HUMAN CAPITAL DEVELOPMENT

IN THE PEOPLE'S REPUBLIC OF CHINA AND INDIA:

ACHIEVEMENTS, PROSPECTS, AND POLICY CHALLENGES

ASIAN DEVELOPMENT BANK

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CONTENTS

Tables, Boxes, and Figures

Boxes

Figures

Tables

Foreword

Low level of education and skills is one of the major constraints to the overall economic development in South Asia and many other regions. The midterm review of the Strategy 2020 of ADB recognizes the need for investments in education and vocational training toward enhancing the productivity, employability, and innovativeness of the workforce in the developing member countries (DMCs).

The study on *Human Capital Development in the People's Republic of China and India: Achievements, Prospects, and Policy Challenges* is very timely in drawing lessons from two of the largest countries in the world that are undergoing major economic and social transformations, attributed to the expansion and effective utilization of human resources as well as market reform and outward-oriented policies. These lessons have huge policy implications in other DMCs. The People's Republic of China (PRC) after having experienced large-scale expansion and productive utilization of its young population has to now witness the gradual aging of its population, while India will continue to experience a growth in its young population in the next 2–3 decades before its population starts to age.

Both India and the PRC are faced with disparities in educational achievements and opportunities, and in the quality of educational outcomes despite the high rate of economic growth. These two countries are promoting the employability of their young population amid growing domestic and global competition, rapid technological changes, and unprecedented labor mobility.

This study highlights new estimates of human capital contribution to growth in the gross domestic product in the PRC and India for the period 1960-2010. It also analyzes how aggregate growth in labor productivity is linked to the differential growth of labor productivity in individual sectors and the reallocation of labor between sectors. The PRC apart from seeing improved labor productivity in individual sectors witnessed a shift to manufacturing and services sectors contributing to labor productivity. On the contrary, the services sector in India played a more dominant role than the manufacturing sector in contributing to the overall economic growth, in terms of both sectoral productivity and structural change effects. Both these countries are investing in education and training to enhance their stock of human capital toward becoming more productive and competitive and to transition to a knowledge economy.

As a way forward, this report proposes several policy actions for these two countries to promote a more productive and inclusive human development outcome. The analysis presented in this report and the policy actions suggested can be useful to other DMCs, particularly those in the South Asia region, where the human development index is still

relatively low compared to those in most of the other regions. The study provides an important framework to analyze the prospects of investing in the development of human capital in low-income countries, lower-middle-income countries, and upper-middle-income countries supported by ADB. The report proposes to broaden the access to education by targeting the poor households with a particular focus on improving the quality of education, the coverage of higher-quality technical and vocational education and training, and higher education to facilitate the transition to both medium and higher skills to move up the value chain. This will require, the report argues, expanding training capacities, strengthening school–industry cooperation, improving the mobility and flexibility in labor markets, and reducing mismatches in supply and demand of labor.

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Dr. Lee presented the draft report at a workshop organized in ADB which was chaired by Ayumi Konishi, Director General, EARD, who also provided comments on the draft report. In addition, several ADB staff attending the workshop also provided comments on the presentation. This report reflects the comments received and also identifies areas for further research. A follow-on study covering more countries from South Asia, Southeast Asia, and East Asia is in progress.

Abbreviations

ADB	Asian Development Bank
ASER	Annual Status of Education Report
CHIPS	Chinese Household Income Project Series
DMC	developing member country
FDI	foreign direct investment
GDP	gross domestic product
GER	gross enrollment rate
HRDF	Human Resource Development Fund
MGI	McKinsey Global Institute
NSS	National Sample Survey
OECD	Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
PRC	People's Republic of China
R&D	research and development
SOE	state-owned enterprise
TFP	total factor productivity
TVET	technical and vocational education and training

Executive Summary

This report analyzes human capital development and its future prospects in the People's Republic of China (PRC) and India. It highlights the related differences and achievements in the two countries and investigates the role of human capital development in their economic growth.

The world has witnessed the remarkable economic growth of the PRC and India, two demographic giants, in the past decades. The strong and sustained output growth of the PRC in the past 35 years has driven the unprecedented transformation of a rural, command economy into a global economic superpower. Having made the transition from an upper-middle-income economy to one of high-income status, the PRC is now striving to develop more technologically sophisticated industries. Economic growth in India began to accelerate dramatically once economic reforms and open-trade policies were initiated in the early 1990s. The economic miracle witnessed in the PRC as well as India is attributed to the expansion and effective utilization of their abundant human resources, in addition to market reform and outward-oriented policies.

The PRC and India have successfully improved their stock of human capital in terms of educational attainment and skills development, achieving critical improvements in literacy—the basic determinant of the quality of life and that of the labor force. In 2010, about 50% of the population in India aged between 15 and 64 years, and over 70% in the PRC, had attended secondary education. Significant improvements in the quality of their labor force have raised their productivity and also allowed for the expansion of the manufacturing and services sectors, resulting in fast-paced economic growth.

Despite strong human capital growth, there remain disparities in educational achievements and opportunities and, more importantly, in the quality of educational outcomes. Promoting the employability of graduates is still a task to be accomplished, pointing to the need for skills development, especially among the youth. Other key challenges are decline in employment elasticity, informalization of jobs, and restrictions in labor mobility to promote greater inclusion in both economies.

This study presents new estimates of the contribution of human capital to growth in gross domestic product for 5 decades (1960–2010) in the PRC and India using the growth accounting methodology on aggregate data. The growth accounting estimates confirm human capital as an important factor of economic growth contributing directly to annual gross domestic product per worker growth in both countries as follows: 1961–1980: about 21% in India and 16% in the PRC; 1981–2010: about 22% in India and 2.4% in the PRC.

Cross-country regression results confirm that human capital has also contributed to economic growth by facilitating technology adaptation and innovation.

This study also analyzes, using "shift-share analysis," how aggregate growth of labor productivity is linked to the differential growth of labor productivity in individual sectors and the reallocation of labor between sectors. Results for the PRC show that between 1987 and 2008, strong growth in labor productivity in individual sectors has been a salient feature in the growth of the economy, and structural changes due to labor movements toward the manufacturing and services sectors also made a significant contribution to the overall growth of labor productivity. In contrast, in India, the services sector played a more dominant role than the manufacturing sector in contributing to the overall economic growth, in terms of both sectoral productivity growth and structural change effects.

Both countries are expected to undergo significantly different demographic changes in the coming decades. In the PRC, the prime working-age population aged between 15 and 59 years is already facing a decline due to aging and low fertility rates, and is expected to shrink further by over 200 million people by 2040, whereas the prime working-age population in India will continue to expand during the same period.

It is projected that significant educational progress will be made by 2040, especially at the secondary and tertiary levels. In the next 30 years, the proportion of the Indian population that would have attained secondary education as their highest level is expected to increase from 44% to 64% of the working-age population. In the PRC, the proportion of the population with a tertiary education is projected to increase rapidly from 5% in 2010 to 36% by 2040. Improving labor force participation and employment opportunities among the working-age population should continue in both countries. Reducing gender disparities in labor force participation in both countries, especially in India, is a critical challenge.

Significant structural changes have occurred in the labor markets of the PRC and India. This study also examines, using microdata, the changes in labor supply and demand, and wage inequality. Over the past 2 decades, there have been significant increases in wage inequality and skill premium in the urban labor markets of the PRC and India. The gender wage gap has also been rising in the urban PRC. In contrast, the relative gender wage improved at the primary and tertiary levels of education but deteriorated at the secondary level in both the urban and the rural labor markets of India. Analysis of labor demand and supply based on movements in relative supply and relative wages of various demographic groups suggests that there was a strong demand factor favoring more educated workers and for increasing relative wages in the PRC as well as in India.

Since the impact of human capital development policies hinges on other economic and development reforms, a country-specific integrated approach to addressing important challenges in education and skills development is recommended. PRC and India must expand access to educational opportunities for all, and develop high-quality human capital that can adequately support advances in technology and higher-value industries to achieve sustained growth. As they move up the value chain, both countries should have a higher level of human capital stock given the need of transition to a knowledge-based economy that requires more sophisticated applications of skills.

This paper proposes several policy actions and research areas toward a more productive and inclusive human development:

(i) broadening access to basic education across regions and social groups, while upgrading its quality, in both the PRC and India;

(ii) strengthening financing of education to increase the affordability of quality education (particularly, improving the quality of teachers and school facilities) for children of poor households, especially from the rural areas of both the PRC and India, and the ones from migrant families in the PRC;

(iii) improving higher education, as well as strengthening technical and vocational education and training (TVET) programs, to support the transition to more skill-oriented industries in the PRC, while aiming at the creation of more medium-skilled workers and job opportunities in India;

(iv) reforming the focus of TVET programs toward supporting the changing market demands for diverse skills and competencies, and strengthening the integration and effectiveness of the institutional arrangements in financing, coordination, incentive provision and quality assurance that support it;

(v) expanding training capacities to strengthen "skills training" for the growing young workforce, especially in India; and to meet the challenge of shortage of skilled workers, mostly medium-skilled workers in India and highly skilled workers in the PRC;

(vi) strengthening school–industry cooperation to improve matching between skills and jobs;

(vii) improving the mobility and flexibility in labor markets to reduce geographical mismatches in labor supply and demand across regions, industries, and demographic groups; and

(viii) harnessing quality employment opportunities to narrow the present and the future labor supply–demand gap in different skills, as well as further develop labor-intensive manufacturing and off-farm rural employment, especially in India, and knowledge-intensive manufacturing and services sectors, especially in the PRC.

Within the framework of these broad policy recommendations, human development policies at the national, regional, and provincial levels need to be designed, implemented, and evaluated in a more deliberate and systematic manner considering their consistency with development policies and relevance to the changing demand.

In designing comprehensive as well as targeted interventions to encourage greater education and skill investments, more systematic studies based on household- and firm-level data should be considered as they would promote a better understanding of the factors that determine individual decisions in each country. Approaches based on randomized evaluations are also useful in the design and implementation of more effective policies specific to the targeted group in each country.

CHAPTER 1

Overview

The two demographic giants of the world—the People's Republic of China (PRC) and India—have demonstrated positive but different rates of economic and human development over the past 2 decades. Significant improvements in both the quantity and quality of their labor forces have raised productivity and facilitated expansion, especially of their industry and services sectors, thereby contributing to their economic growth. In both these countries, the rapid expansions, as well as structural changes in labor supply and demand, have contributed to the accelerated economic growth over the past decades. Significant changes in rates of returns to education, skill premium, and wage inequality have also occurred. In spite of both the countries experiencing rising inequality among the workforce, they have successfully reduced poverty while raising per capita income.

A. Objective and Scope

This report compares the achievements of these countries in human capital development in the past 5 decades (1960-2010) and identifies the factors behind the similarities and differences between them. It highlights the high-level policy lessons and insights that are crucial in addressing the remaining gaps between the PRC and India, and in shaping their future human and economic developments. The human capital development lessons that can be learned through this assessment of the past experience of these two countries are not only critical for improving their productivity and innovation for continued development but are also valuable for other developing economies as well.

While human capital is a multidimensional concept covering a set of health- and education-related characteristics that contribute to worker productivity, this report focuses largely on the quantity and quality of education, training, and skills of the labor force in the PRC and India at the national level, and to some extent at the regional level. Health and other important aspects of human capital are beyond the scope of this report.

Representing around 40% of the working-age population of the world and 37% of the total population of the world, the issues related to human capital development within the PRC and India are numerous and diverse. Many of these issues are best tackled in country-specific contexts. This comparative report only tackles major human capital development achievements and broad-based challenges that are common to both countries, and presents policy options for addressing these challenges. Specific policy issues and challenges that are best addressed through a case study; impact evaluation; more detailed analysis at the regional, household, sectoral, or firm level; or a combination of these are recommended for future in-depth analysis and research.

B. Organization of the Report

This section reviews the past and the present economic, institutional, and human development conditions in the PRC and India, and describes the remaining development challenges that may either constrain or enable continued human and economic development in both countries.

The rest of the report is organized into the following thematic sections. Chapter 2 highlights the differences in achievements between the PRC and India in terms of human capital development. It looks at the changes in school enrollments and educational attainment, as well as the gaps in access to education, and the quality of educational output and its determinants. The section also reviews the policies pursued by these countries that contributed to these changes. The section reviews the issues associated with the employability of graduates and the need for further skill development, and compares the skill profiles in these countries. It also tackles the remaining employment and employment-related challenges to inclusive growth. Country and gender differences in rates of return to schooling and skill premiums, which have important implications on wage distribution, are examined.

Chapter 3 reviews the contribution of human capital development toward economic growth in the PRC and India, as presented in the theoretical and empirical literature. It also presents new estimates of the contribution of human capital to the growth of the gross domestic product (GDP) during 1960–2010, using the growth accounting methodology on aggregate data. It then discusses empirical results that show the role of human capital on technological progress, and thereby overall economic growth. It also examines the impact of labor reallocation on aggregate productivity growth using the "shift-share analysis" technique over industry data.

Chapter 4 examines and compares the changes in labor supply and labor participation between the PRC and India. It reviews the differences in labor participation rates by gender and by age, and the factors that may have influenced them. It also presents projections of future progress in labor supply and educational attainment, and assesses whether the supply of skilled workers can meet demand changes in the future, with implications for economic development.

Based on an analysis of microdata from labor force surveys, Chapter 5 examines the changes in labor supply and demand, and highlights the implications of technology development for labor demand changes and wage inequality in the PRC and India. Despite strong growth, inequality has risen in both economies. An investigation of the change in wage inequality over the period of fast growth will give some insight on the source of inequality.

Chapter 6 concludes by laying out policy challenges related to education, skill development, and labor and employment related to the issues presented in Chapters 2 to 5 and other existing literature. It draws some policy options to address these challenges on education and skill development. It also reviews some of the important strategies that the PRC and India have pursued to build human skills, both in formal schooling and in the workplace, toward meeting the emerging challenges of changing global demands and skill requirements.

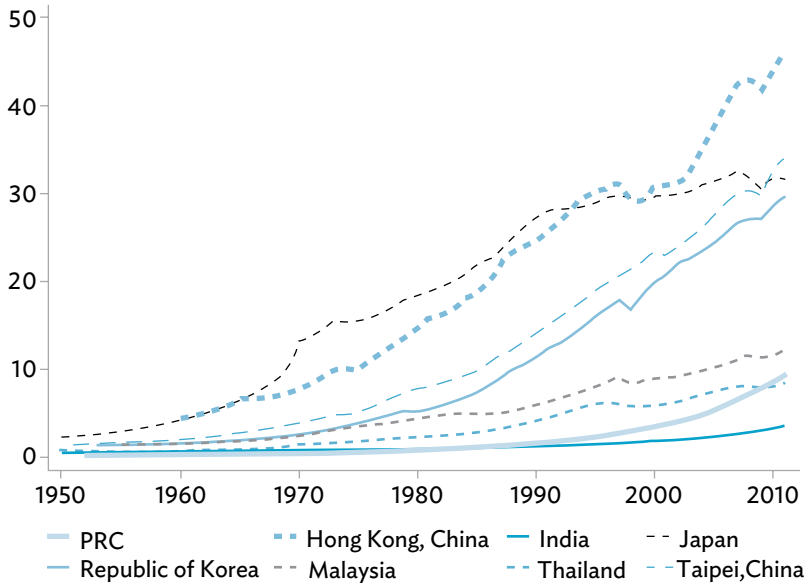
C. Background and Motivation

In the 1960s, the PRC had a lower per capita income than India. Growth in per capita income was relatively slow in both the economies until the 1980s when growth began to accelerate dramatically in the PRC, and modestly in India. Since then, the PRC has rapidly overtaken India, and now has a substantially higher income per capita.

Comparing the trends in per capita income highlights the remaining large income gaps not only between the PRC and India but also between them and other advanced and developing economies. For instance, the income gap between the PRC and the Republic of Korea, which started to widen steadily in the 1970s; similarly, the income gap between India and the Republic of Korea remains as wide until today (Figure 1). This implies that while India can learn from the economic success of the PRC in recent years, both the PRC and India can also learn from other successful economies.

The unprecedented economic success of the PRC is attributed to many factors, including market reforms, an outward-oriented strategy, a prudent macroeconomic policy, and high saving and investment rates. Significant human capital development and improvement is also one of the key contributing factors to the outstanding economic takeoff of the PRC (Yao 2013).

Figure 1: Trends in Per Capita Gross Domestic Product in Selected Economies
(in $ PPP 2005 constant prices)



PPP = purchasing power parity, PRC = People's Republic of China.

Source: Penn World Table 8.0 (Feenstra, Inklaar, and Timmer 2013).

1. Labor-Intensive Growth

Establishing a sound, labor-intensive industrial base was another key factor behind the human capital and economic development successes of the PRC (Yao 2013). As the PRC and India were agricultural economies in the early 1950s, majority of their labor force were employed in agriculture. The PRC, however, managed to successfully expand its manufacturing industry, adopt favorable labor market reforms (Meng 2012), and increase its labor productivity. From being an agricultural economy, the PRC underwent structural transformation toward having a more developed industry sector.

By the 1980s, the manufacturing sector accounted for 40.2% of the GDP of the PRC, but only 16.2% of the GDP of India (World Bank 2014). The labor productivity of the manufacturing sector in the PRC (2.3 times its average productivity) was higher than that of the manufacturing sector in India (1.3 times). In terms of its share in total employment, the gap between the manufacturing sectors of India (13%) and the PRC (17.3%) was smaller (Yao 2013).

According to the McKinsey Global Institute, nonfarm employment in the PRC has expanded by 121 million jobs in the past decade (MGI 2012b). One in every three new nonfarm jobs was associated with exporting industries, while two in every three nonfarm jobs were filled by workers shifting from low-productivity agriculture (MGI 2012b).

In India, the share of nonfarm employment in total employment also expanded as 67 million new nonfarm jobs were added (MGI 2012b). However, the growth in nonfarm jobs was just enough to keep pace with the growth in labor force and not sufficient for more workers to shift into more productive jobs. Hence, while the share of farm jobs in total employment declined in 2000–2010, the number of farm workers remained steady at about 240 million (MGI 2012b).

Furthermore, while job creation in the PRC in the 2000s was mostly associated with higher value-added manufacturing and export-oriented sectors, over 40% of the job creation in India was in low-skill construction (only 16% in the PRC) (MGI 2012b). Only 12% of the growth in nonfarm jobs was in manufacturing, very low relative to that of the PRC (29%).

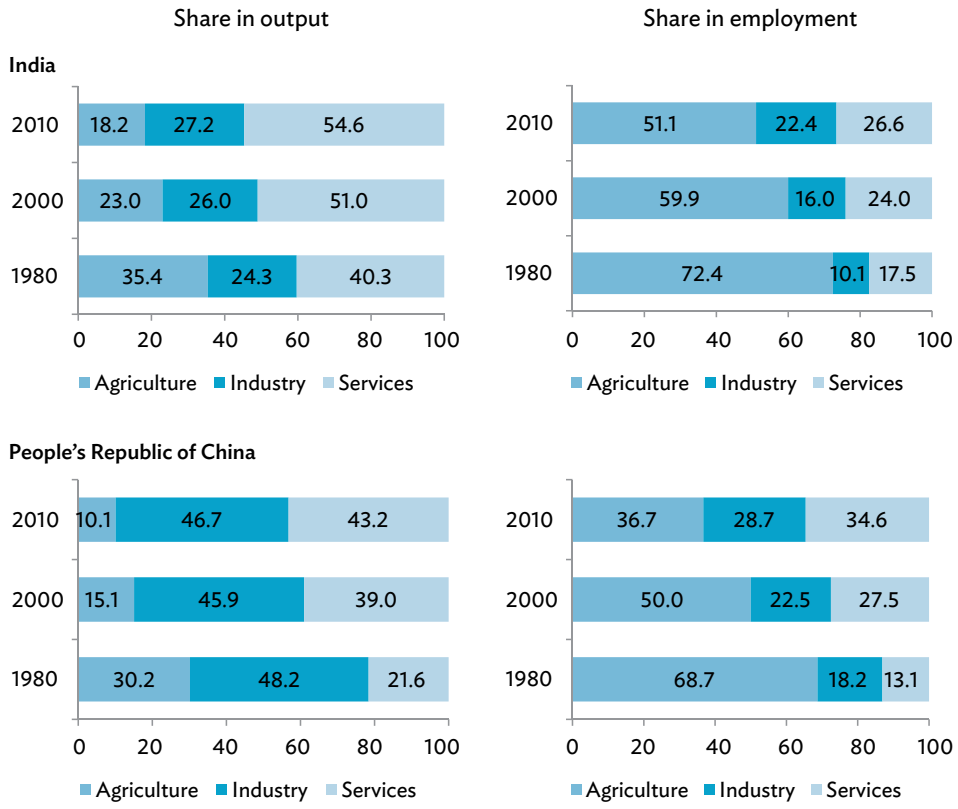
Today, only around one-third of the labor force in the PRC is employed in the agriculture sector, declining from over two-thirds in 1980 (Figure 2). In contrast, the agriculture sector still accounts for half of the total employment in India. While all sectors in India saw an absolute increase in employment in the past decade, it did not experience the rapid structural change in employment, which is usually associated with high growth as experienced in the PRC (Government of India 2012a). The current economic structure in India is somewhat similar to that of the PRC in 2000 when the agriculture sector accounted for around half of the total employment and yet accounted for only less than one-fifth of the total output.

In India, according to the 66th round of the employment–unemployment surveys of the National Sample Survey (NSS),[1] the share of the manufacturing sector in employment

[1] Each round is conducted from July to June of the following year.

remained at 11% in 2000–2010. In the same period, the share of the manufacturing sector in total output declined from 16.2% to 14.5% (World Bank 2014).

Figure 2: Economic Structure—Gross Domestic Product and Employment Shares *(%)*



Source: Author's estimates based on World Bank (2014) and Groningen Growth and Development Centre 10-Sector Database http://www.rug.nl/research/ggdc/data/10-sector-database (accessed 30 May 2014).

The weaknesses manufacturing sector of India are well-known. Although the services sector in India has grown rapidly, underdevelopment of labor-intensive manufacturing has been a significant barrier to job creation and sustained economic growth. India would need to promote labor-intensive manufacturing industries while improving the agriculture and services sectors.

2. Economic Reforms and Challenges

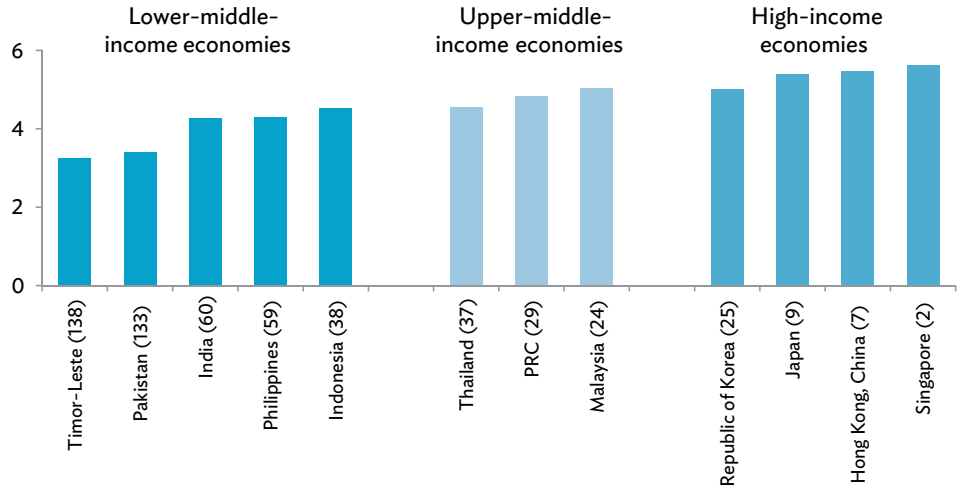
The fast-paced growth attained by India in the past 2 decades has successfully reduced poverty and increased per capita income. Economic reforms, especially during its international liberalization in the 1990s, spurred the economic performance of India. However, to nurture and promote more equitable and sustained growth, more economic and governance reforms as well as further human development in education and skills are required. This also applies to the PRC, although it requires a slightly more advanced institutional reform.

A recent report on the global competitiveness of 148 economies worldwide (Schwab and Sala-i-Martín 2013) ranks the PRC at 29th place and India at 60th place (Figure 3). The report highlights the importance of a set of factors (termed as "pillars" in the report) that are mutually enforcing in determining the productivity of a country across different stages of development. These development pillars that serve as the bases for assessing the global competitiveness and ranking of countries include (i) basic requirements for development and competitiveness, including institutions, infrastructure, macroeconomic environment, and health and primary education; (ii) efficiency enhancers, such as higher education and training, goods and labor market efficiency, and technology readiness; and (iii) innovation and sophistication factors.

Since these development pillars are mutually enforcing, weakness in one pillar has negative consequences in others. For instance, a strong innovation capacity requires sufficient financing for research and development, including a workforce that is healthy, well-educated, well-trained, and adept at absorbing new technologies, among others (Schwab and Sala-i-Martín 2013). Meanwhile, efficiency in the goods and labor markets especially requires well-functioning institutions, a stable macroenvironment, and extensive and efficient infrastructure.

Countries with a higher level of development perform well in most of these development pillars; therefore, these countries tend to score better overall as shown in Figure 3. To avoid stagnating at middle-income levels while transitioning to high-income level (i.e., middle-income trap), rapidly growing middle-income countries, such as the PRC and India, can use their performance in each of these pillars as a guide toward transitioning from middle-income to high-income status. Box 1 presents a more detailed discussion of the performance of the PRC and India in the different pillars of global competitiveness and highlights the factors that need to be improved for achieving higher productivity.

Figure 3: Global Competitiveness Index



PRC = People's Republic of China.

Note: Scores are normalized into a 1-to-7 scale. Figures in parentheses correspond to economy ranking (out of 148 economies).

Source: K. Schwab and X. Sala-i-Martín. 2013. *The Global Competitiveness Report 2013–2014: Full Data Edition.* Geneva: World Economic Forum.

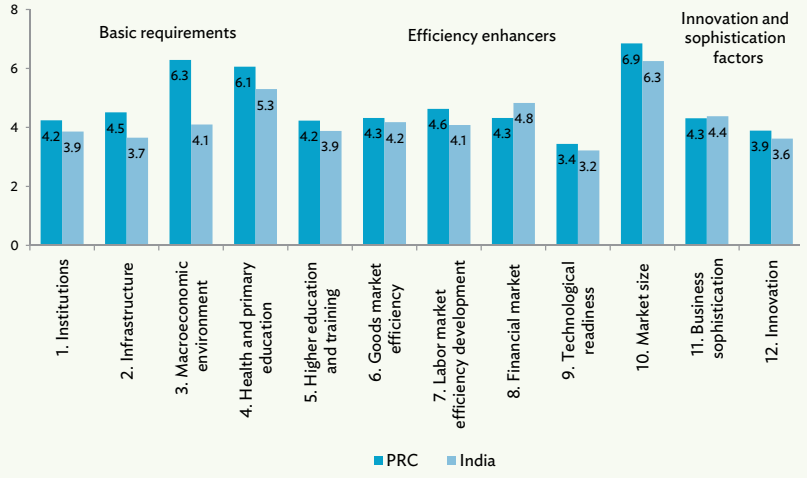
Box 1: Global Competitiveness Performance

Belonging to the upper-middle-income status, the People's Republic of China (PRC) has improved production processes and product quality and is striving to develop more technologically advanced sectors as it transitions to a development stage that is efficiency-driven. Its macroeconomic performance, which ranked 10th out of 148 countries (see Figure B1), is well ahead of many economies, including the more advanced ones. The institutional framework of the PRC, ranked 47th, is slightly above other efficiency-driven economies, but there are still some weak institutional factors that it can improve on (e.g., corruption, security issues, and accountability). While better institutions played a positive and important role in enabling the rapid development of the PRC in the past, remaining institutional weaknesses may constrain the future development prospects of the PRC.

The basic education (4th) and infrastructure (48th) of the PRC are better than in many economies. More investments on higher education and training are, however, required to further improve its secondary (90th) and tertiary (83rd) enrollment rates, average quality of teaching (54th), and responsiveness of educational content to business needs (83rd). This is especially crucial for the PRC to improve its technology adoption (79th) and further expand its capacity for innovation (32nd).

Still considered a factor-driven economy, India competes based on its factor endowments—mainly abundant human and natural resources (Schwab and Sala-i-Martín 2013). However, India is not performing well in most of the basic drivers of global competitiveness (i.e., institutions, infrastructure, macroenvironment, and basic services; see pillars 1–4 in Figure B1), which are crucial especially in its current level of development. Despite steady improvements, public health and education levels (102nd) remain poor and are considered a prime cause for the low productivity in India (Schwab and Sala-i-Martín 2013). In addition, the supply of transport, information and communication technology, and energy infrastructure in India does not meet the needs of the economy (85th). The macroeconomic performance of India is also lagging behind most economies (110th).

Figure B1: Global Competitiveness Scores by Pillar



PRC = People's Republic of China.

Note: Scores are normalized into a 1-to-7 scale. Pillars 1–4 comprise basic requirements; 5–10, efficiency enhancers; 11–12, innovation and sophistication factors.

continued on next page

Box 1: continued

The relatively poor infrastructure in India, as well as institutional and macroeconomic environment, has important efficiency implications on its goods (85th) and labor markets (99th). Better governance, incentives and institutional capacity, stable macroeconomic environment, as well as extensive infrastructure, are all required to encourage a favorable business and investment climate that will attract investment and fuel the development of efficient goods and the expansion of a flexible labor market.

Source: Based on Schwab and Sala-i-Martín (2013).

3. Human Development

Drèze and Sen (2013), in their book *An Uncertain Glory: India and its Contradictions,* point out that the rapid expansion of human capability is an integral element in achieving rapid economic growth in the East Asian economies. They assert that India needs a better-educated and healthier labor force, combined with an increased use of technology and better quality control, to catch up with the PRC.

Bhagwati and Paragariya (2013), in *Why Growth Matters,* argue that reforms, particularly switching from the counterproductive, inward-oriented policy to a more open-trade policy framework, led to economic growth in India. While perceiving that the growth of India in human resources and demographic dividend can place it on the same growth trajectory in the next few decades as the PRC had in earlier years, they point out poor quality of basic, as well as higher, education to be a hindrance to long-term growth.

Comparison of the human development experiences of the PRC and India shows some similarities and differences. As shown in Table 1, before the economy of the PRC began to take off, despite being poorer, the PRC had a more favorable initial overall human development condition than India (UNDP 1990; Yao 2013). Its human development index (0.716) was higher than that of India (0.439) (UNDP 1990). The PRC has a longer life expectancy; better literacy rate; higher school enrollment rates, both at the primary and secondary levels; and higher educational attainment.

As shown in Figure 4, while the overall progress in educational attainment is positive for both the PRC and India, the gap between them, as well as between the PRC and the Republic of Korea, continues to widen.

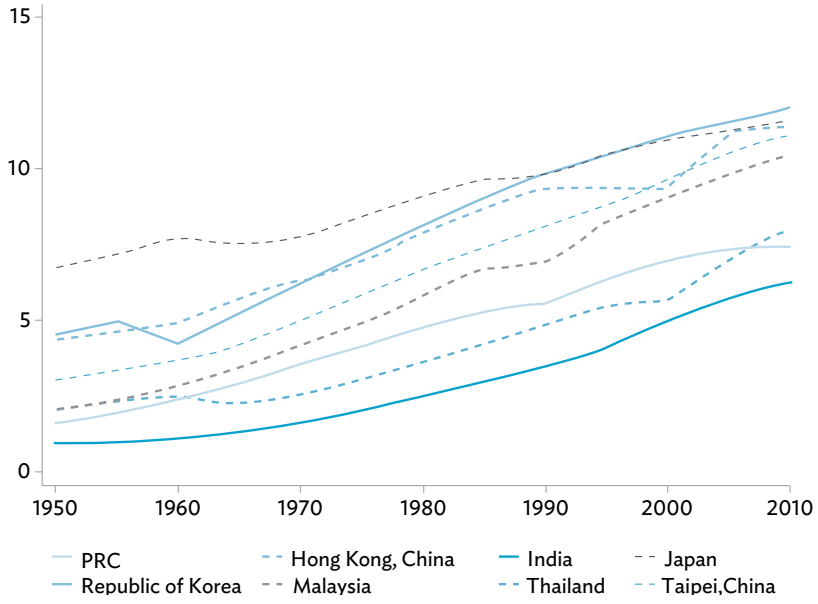
Table 1: Human Development Indicators

Indicator	Economy	Earliest	Year	Latest	Year
Life expectancy at birth (years)	India	41.38	1960	65.9	2011
	PRC	43.4	1960	75.14	2011
Human development index	India	0.439	1990	0.554 (136th)	2012
	PRC	0.716	1990	0.669 (101st)	2012
Adult literacy rate (percent of population 15 years and above), total (female)	India	40.8 (25.7)	1981	62.8 (50.8)	2006
	PRC	65.5 (51.1)	1982	95.1 (92.7)	2010
School enrollment (percent gross)					
Primary, total (female)	India	78.2 (61.0)	1971	112.6 (113.9)	2011
	PRC	119.3 (100.8)	1974	127.9 (127.7)	2011
Secondary, total (female)	India	23.9 (14.0)	1971	68.5 (66.3)	2011
	PRC	56.1 (45.7)	1976	86.6 (87.3)	2011
Tertiary, total (female)	India	5.0 (2.2)	1971	23.3 (20.3)	2011
	PRC	0.3 (0.2)	1974	24.3 (25.7)	2011
Years of schooling (average among aged 15 years and above), total (female)	India	1.6 (0.8)	1970	5.2 (4.1)	2010
	PRC	3.4 (2.8)	1970	8.1 (7.6)	2010

PRC = People's Republic of China.

Sources: World Bank. 2014. World Development Indicators Online. http://databank.worldbank.org; UNDP. 1990. *Human Development Report 1990. Concept and Measurement of Human Development*. New York: United Nations Development Programme. http://hdr.undp.org/en/reports/global/hdr1990; UNDP. 2013. *Human Development Report 2013. The Rise of the South: Human Progress in a Diverse World*. New York: United Nations Development Programme. http://hdr.undp.org/en/2013-report; and R. J. Barro and J.-W. Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics*. 104. pp. 184–198.

Figure 4: Trends in Educational Attainment
(average years of schooling, 1960–2010)



PRC = People's Republic of China.

Source: R.J. Barro and J.-W. Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics*. 104. pp. 184–198.

CHAPTER 2

Human Capital Development, Achievements, and Gaps

As the two most populous countries in the world, the People's Republic of China (PRC) and India have been successful in improving their stock of human capital, in terms of both educational attainment and skills development in the last 5 decades (1960–2010).This was mainly due to substantial improvements in education and skill development investments, supported with better policies and institutions. However, disparities in educational opportunities as well as in achievements remain. Employability of graduates also poses a significant challenge.

A. Literacy, School Enrollments, and Educational Attainment

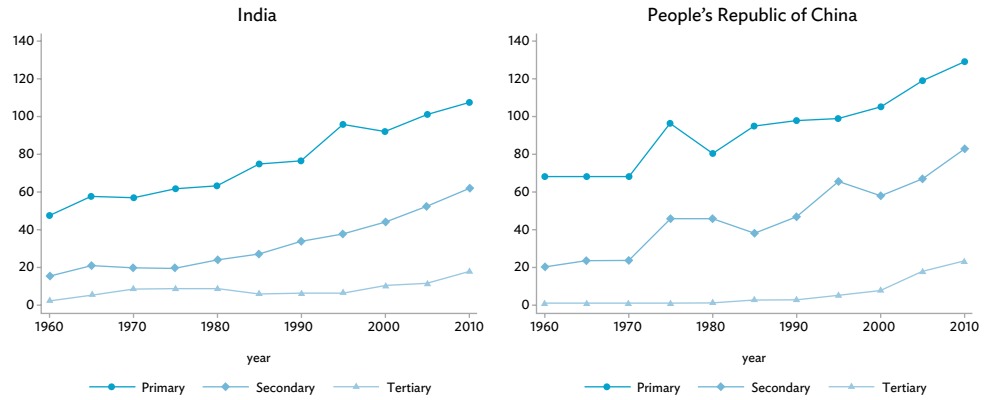
The PRC and India have achieved critical improvements in literacy—the basic determinant of the quality of life and the quality of the labor force—as well as in enrollment in primary education. In recent years, the literacy rate among the population aged 15 years and above has increased to 95% in the PRC and over 60% in India.

The gender disparity in the literacy rate has declined over time, but significant disparity still remains. Data as of 2006 show that in India, 75% of males aged 15 years and above can read and write short, simple statements on their everyday life with understanding, whereas only 51% of females in the same cohort can do the same (World Bank 2014). In the PRC, the gender disparity in literacy rates is significantly lower—98% of males and 93% of females aged 15 years and above were literate as of 2010 (World Bank 2014).

India has recorded substantial improvements in gross enrollment rate (GER) at all levels. Its primary GER has increased to over 100% in recent years, from only 78% for the total population and 61% for females in the 1970s (World Bank 2014). Its secondary and tertiary GERs have considerably increased as well, but they are still low (secondary level, 68.5%; tertiary level, 23%).

As shown in Figure 5, outstanding improvements in enrollment rates were also achieved by the PRC, especially at the primary and secondary levels. Its secondary GER jumped from about 20% in 1970 to 87% in 2010. The share of students enrolled in higher education, including higher vocational education, increased to more than 24% by 2010 from only about 3% in the early 1980s. Interestingly, the PRC has a higher level of secondary enrollment rates than India, though there is no gap in tertiary enrollment rates between the two countries.

Figure 5: Gross Enrollment Ratios by Level
(%, 1960–2010)



Source: Author's estimates based on United Nations Educational, Scientific and Cultural Organization (UNESCO), various years. Statistical Yearbook. Paris.

Alongside increases in school enrollments across all levels, substantial improvements in the educational attainment of the labor force were also seen in both countries. In 2010, 66.5% of the population aged 15–64 years in the PRC have either reached or completed secondary level, while 4.5% have advanced to the tertiary level (Table 2). This means that the PRC currently has a strong stock of workers with secondary education, and to a lesser extent, with tertiary-level education. The share of students enrolled in higher education, including higher vocational education, increased to more than 24% by 2009 from only about 3% in the early 1980s (World Bank 2012).

In India, in the population aged 15–64 years,41.5% have secondary education and 8.5% have tertiary education. Interestingly, while the share of the labor force in India with secondary education is only about 60% that of the PRC, India has a greater stock of workers with tertiary education (7.1 million) than the PRC (4.9 million). However, one-third of the working-age population in India has no schooling. This is very high compared to only 5.4% in the PRC.

From 1960 to 1980, the average years of schooling among the population aged 15–64 years increased by 1.2 years in India, and by 2.5 years in the PRC (Table 2). From 1980 to 2010, it increased by almost 4 years in India, and by around 2.6 years in the PRC. Overall, the average years of schooling increased by over 5 years in both India and the PRC in the past 5 decades.

Higher enrollment rates had resulted in a dramatic decline in the proportion of the population aged 15–24 years with no schooling in both countries between 1970 and 2010 (Table 3). It went down from 16.3% to only 0.1% in the PRC, and from 52.3% to 7.1% in India. Enrollment gains are high both at the secondary and tertiary levels in the PRC, but mostly at the secondary level in India.

Table 2: Educational Attainments in the People's Republic of China and India

Country and Year	Population Aged 15–64 Years (million)	No Schooling	Highest Level Attained						Average Years of Schooling
			Primary		Secondary		Tertiary		
			Total	Completed	Total	Completed	Total	Completed	
			(percent of population aged 15–64 years)						
People's Republic of China									
1960	402	56.9	29.6	9.8	12.8	3.0	0.7	0.4	2.36
1980	644	24.8	40.7	21.3	33.7	9.4	0.9	0.5	4.86
2000	958	11.0	30.4	18.3	54.1	27.5	4.6	2.8	6.93
2010	1091	5.4	23.7	14.8	66.5	22.9	4.5	2.7	7.51
India									
1960	266	72.1	24.8	8.6	2.5	0.2	0.6	0.3	1.13
1980	423	66.3	12.7	7.4	18.7	0.5	2.3	1.2	2.34
2000	673	44.0	16.2	13.5	32.8	19.8	7.1	4.0	5.03
2010	829	33.2	16.8	15.2	41.5	25.0	8.5	4.9	6.24

Source: R.J. Barro and J.-W. Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics.* 104. pp. 184–198.

Table 3: Educational Attainments of Population Aged 15–24 Years in the People's Republic of China and India

Country and Year	Percent of 15–24 Population in Group of 15 Years and Above	No Schooling	Highest Level Attained						Average Years of Schooling
			Primary		Secondary		Tertiary		
			Total	Completed	Total	Completed	Total	Completed	
			(percent of population aged 15–24 years)						
People's Republic of China									
1970	31.6	16.3	44.8	30.5	38.4	7.4	0.5	0.1	5.5
2010	20.0	0.1	3.5	2.3	75.9	72.8	20.5	6.1	10.9
India									
1970	30.4	52.3	37	24.3	9.6	0.2	1.1	0.4	2.5
2010	27.1	7.1	25.6	25.6	61.8	0.9	5.5	1.8	7.1

Source: J.-W. Lee and R. Francisco. 2012. Human Capital Accumulation in Emerging Asia, 1970–2030. *Japan and the World Economy.* 24 (2). 76–86.

Various factors have contributed to making the conditions in both the PRC and India favorable for human capital development. Nonetheless, achieving significant improvements in enrollment rates and educational attainment have been largely due to the education policies implemented in both countries. Because of its Compulsory Education Law[2] in the mid-1980s, the PRC has made great progress toward expanding access to post-basic

[2] The Compulsory Education Law of the PRC was revised in 2006, promising everyone 9 years of compulsory education free of all charges. It clarifies the financial support system for education payments and provides more assistance to rural students to ensure that they receive basic education.

education in recent years and its goal of making primary and junior secondary schooling universal in the country (World Bank 2012).

In India, the constitutional right of universal free and compulsory education[3] was deferred until 2009, when the Parliament of India enacted The Right of Children to Free and Compulsory Education Act, or Right to Education Act, one of the most significant education reforms in India in recent decades (Government of India 2011a, Jones and Ramchand 2013).

The Right to Education Act provides for the right to free elementary education for 6- to 14-year-olds in neighborhood schools, including textbooks, uniforms, and other indirect costs (Government of India 2013,Jones and Ramchand 2013). It also provides for the compliance with improvement in school infrastructure, a fixed student–teacher ratio, and a 25% reservation for the economically disadvantaged communities in admission to private schools, among others.

Another factor that contributed to the significant educational achievements is the strong household demand for education. Empirical literature has identified the role of both income and nonincome factors for educational investments.[4] For instance, Fredriksen and Tan (2008) suggest that aside from having strong public institutions, rapid economic growth and a more equal income distribution facilitated the educational investments in the Republic of Korea and Singapore, among other things. Higher income for more families implies that more families can afford to invest in the education of their children.

A cross-country analysis by Lee and Francisco (2012) covering a sample of 80 countries worldwide, including the PRC and India, confirmed this. They found that secondary and tertiary enrollment rates were positively related to per capita income, parental education, and public education expenditure between 1970 and 2010 and negatively related to income inequality and total fertility rate.

All these factors have favorably improved in both the countries during this period, and have arguably contributed to the improvements in their enrollment rates. For instance, the average gross domestic product per capita has increased to almost 22 times its initial level in the PRC between 1970 and 2010 (from $131 in constant 2005 $ purchasing power parity to $2,870), while it almost quadrupled in India (from only $273 in constant 2005 $ purchasing power parity to $1,032).

There was also a substantial decline in the total fertility rates or the average number of births per woman in both countries from 5.5 in 1970 to 2.6 in India in 2010, and to only

[3] Prior to its amendment in 2002, Article 45 of the Indian Constitution states that "the State shall endeavor to provide within a period of ten years from the commencement of this constitution, for free and compulsory education for all children until they complete the age of 14 years" (Government of India 2012b). Several states have also enacted legislation in the 1960s to provide free and better quality primary education (e.g., Kerala Education Act 1959, Punjab Primary Education Act 1960, Gujarat Compulsory Primary Education Act 1961) but the provision of free and compulsory education for children was not achieved.

[4] See Lee and Francisco (2012) for a review of empirical literature on the determinants of growth in enrollment rates and educational capital.

1.7 in the PRC because of its one-child policy in 1979.[5] Becker and Lewis (1973) suggest that families face a trade-off between having more children or having less but more educated children who are more likely to succeed (i.e., a quantity–quality trade-off). Investment in human capital rises with the stock of human capital, as its rate of return continues to increase (Becker, Murphy, and Tamura 1990). But as the education of children becomes more expensive, there is a fall in the demand for having children. This implies that societies with an abundant stock of human capital choose smaller families and invest more in each member, while those with limited human capital do the opposite.

In addition to the substantial improvements in enrollment and completion rates, the relatively younger population structure in both countries is another important enabling factor behind the improvements in average years of schooling among their labor force (Lee and Francisco 2012). As shown in Table 3, in 1970, the population aged 15–24 years represented 31.6% of the total population aged 15 years and above in the PRC and 30.4% in India.

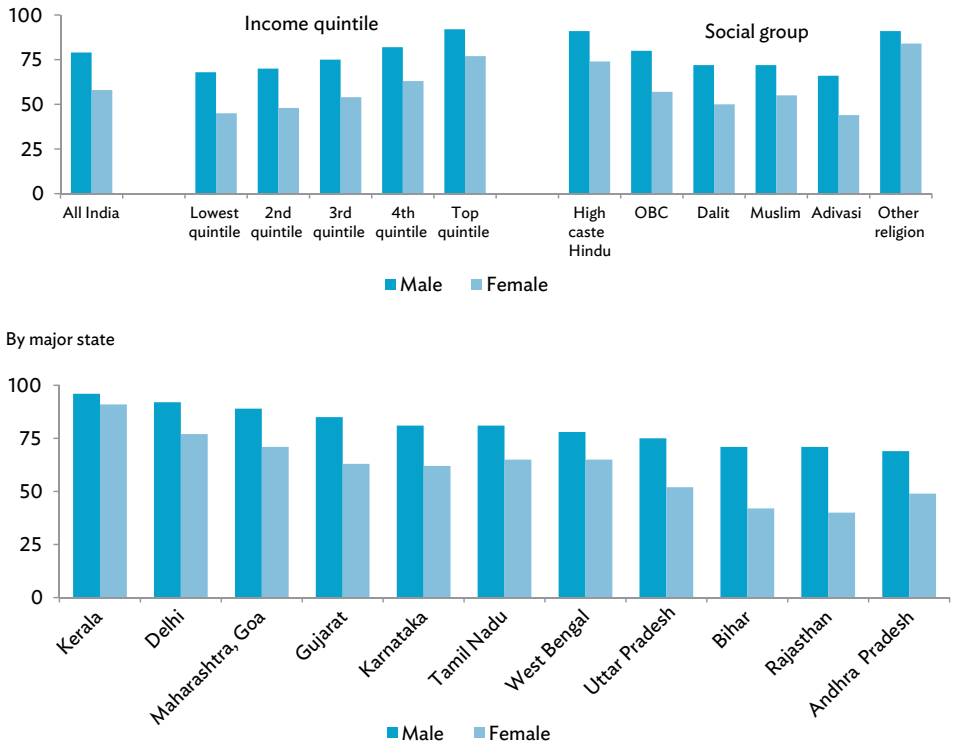
This implies that a 1 percentage point increase in the proportion of 15- to 24-year-olds achieving a particular educational level translates to around 0.32 percentage point increase in the proportion of the population aged 15 and above reaching that level in the PRC and 0.30 in India. As Lee and Francisco (2012) point out, this is much higher than say in advanced countries where the same increase among the 15- to 24-year-olds translates to only a 0.24 percentage increase among the population aged 15 years and above. Although this population dividend for educational growth had declined substantially in both countries by 2010 as the share of the population aged 15–24 decreased to only 20% for the PRC and 27.1% for India, it remains higher than the share in advanced countries, which had further declined to 17.1% in 2010.

B. Disparities in Educational Achievements and Opportunities

Despite strong growth in educational achievement over the past decades, there are pervasive educational inequalities between genders, and across different social groups and economic strata in India and, to a lesser extent, in the PRC. While the gaps have narrowed over the past decades, progress and achievements are not spread evenly across regions. Educational inequalities in India remain highly evident in literacy rates , school enrollment, type of schooling, educational expenditures, and school performance (Desai et al. 2010). For instance, males tend to have a higher literacy rate than females (see Figure 6), are more likely to enroll in school, and are less likely to drop out.

[5] The one-child policy was introduced in the PRC to alleviate social, economic, and environmental problems in the country (Information Office of the State Council, PRC 1995).

Figure 6: Literacy Rates for Population Aged 7 and Above in India
(%, 2004–2005)



OBC = other backward classes.

Source: Desai et al. (2010) based on India Human Development Survey, 2004–2005.

Although a greater proportion of Muslims in India are urban residents, Muslim students are equally deprived, as the Dalit and Adivasi students (Desai et al. 2010). Dalit, Adivasi, and Muslim students are far less likely to enroll in school, are slightly more likely to drop out than others, and are less likely to be literate. While social background is also associated with economic background and parental education, which exert an independent effect on education, data show that not all of the effects of social background can be reduced to poverty or low parental education. These children face unique disadvantages in school admissions, from primary to tertiary school.

There is a significant disparity in literacy rates between rural and urban areas in the PRC. Table 4 shows literacy rates in rural and urban areas declined over time, but the urban–rural literacy gap in 2005 still remained at almost 9 percentage points (93.7% in the urban PRC versus 84.8% in the rural PRC). The gap is much higher among females. The overall disparity in literacy rates across provinces is quite high. Fan, Kanbur and Zhang (2011) show there was a literacy gap of over 40 percentage points between Beijing (highest: 96.1%) and Tibet (lowest: 55.2%).

Table 4: Literacy Rate in the People's Republic of China by Gender and Region
(% of population)

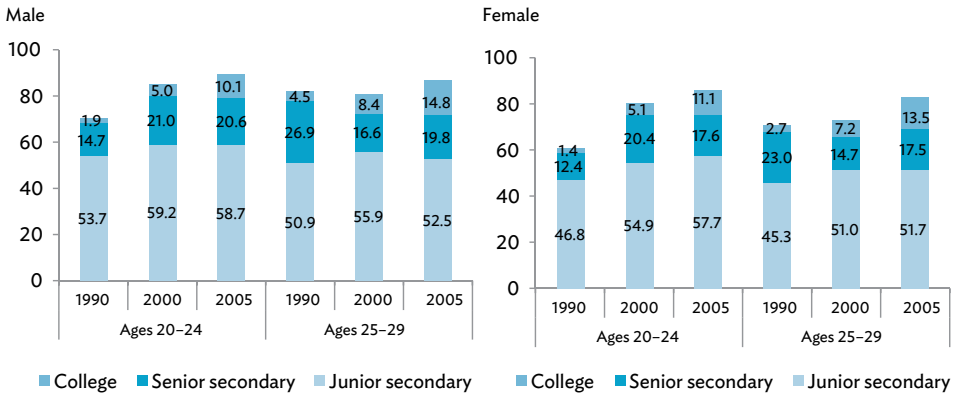
Year	National	Rural			Urban			Rural (Total)/Urban (Total)
		Total	Female	Male	Total	Female	Male	
1981	68.1	65.2	50.9	78.9	83.6	75.4	91.1	0.68
1990	77.8	73.8	62.9	84.3	88	81.6	93.9	0.77
2000	84.8	81.3	73.5	88.8	91.3	86.9	95.9	0.85
2005	89	84.8	78.2	91.5	93.7	90.3	97.2	0.87

Source: S. Fan, R. Kanbur, and X. Zhang. 2011. China's Regional Disparities: Experience and Policy. *Review of Development Finance.* 1 (1). pp. 47–56.

Figure 7 illustrates how educational attainment and gender disparity in education improved in the PRC over the years. The share of the population aged 20–24 who have completed at least junior secondary education increased by almost 26 percentage points among females from 61% in 1990 to 86% in 2005, or about 7 percentage points higher than the improvement among males (19 percentage points).

However, despite the substantial expansion in educational opportunities, the proportion of females who have completed at least junior secondary education (86%) remains lower than males (89%) in the same cohort as of 2005. The same is also true for the older cohort (population aged 25–29), with 83% of females and 87% of males with at least junior secondary education in 2005.

Figure 7: Educational Attainment in the People's Republic of China by Cohort
(% of population)



Source: Author's estimates based on Wu and Zhang (2010).

Although the proportion of the female population aged 20–24 who were able to get a college degree was slightly lower than males in 1990, it increased by 1 percentage point more than males in 2005. Results of the analysis by Wu and Zhang (2010) suggest that by 2005, the disadvantage faced by women entering college in the PRC had disappeared, and women have since become more likely to enter college.

More pronounced than the gender disparity in attainment is the urban–rural gap in attainment. Over 98% of the population aged 20–29 had at least completed compulsory education in rural areas as of 2005, compared with only 84.3% among the population aged 20–24, and 78.1% among the population aged 25–29. The urban-rural disparity is also reflected in terms of average years of schooling for the same cohort—9.6 in urban areas and only around 8.5 in rural areas in 2005.

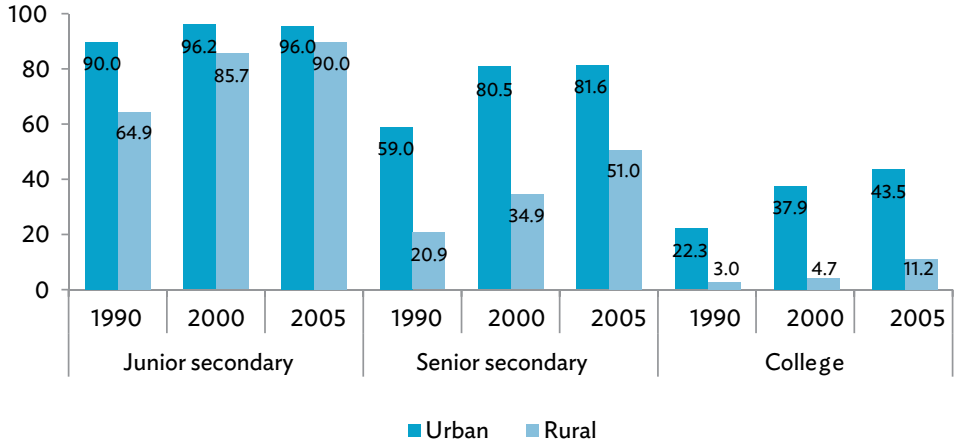
The urban–rural disparity in tertiary enrollment rates has widened due to the slow improvement in rural areas (Figure 8). Between 1990 and 2005, the tertiary enrollment rate in urban areas almost doubled from only 22.3% to 43.5%. In rural areas, tertiary enrollment in the same period almost quadrupled from 3% to 11.2%, but is still very low.

Inequities in access to education in the PRC are manifested in educational outcomes. As of 2009, 9% of students were not able to complete the full compulsory education (World Bank 2012). However, the low completion at the full junior secondary level remains a challenge not only for poorer students but also for children of migrant workers (World Bank 2012).

While the PRC has made significant progress on early childhood education and nutrition, disparities in human capital development still begin in early childhood. According to the World Bank (2012), early childhood education and nutrition are two major obstacles that put some very young children behind before they even start. In 2010, for instance, the prevalence of stunting—an indicator of malnutrition—among children aged below 5 in poor rural areas (over 20%) was almost six times the average rate in urban areas. Poor early childhood nutrition has immediate and serious consequences on the health and cognitive ability of children, which, in turn, have a negative impact on the educational performance, as well as productivity later in life.

Figure 8: Enrollment Rates in the People's Republic of China by Cohort and *Hukou* Status

(%)



Note: *Hukou* means household registration. Enrollment rate is the proportion of the population enrolled in junior secondary level, aged 13–15; senior secondary, aged 16–18; and college, aged 19–22.

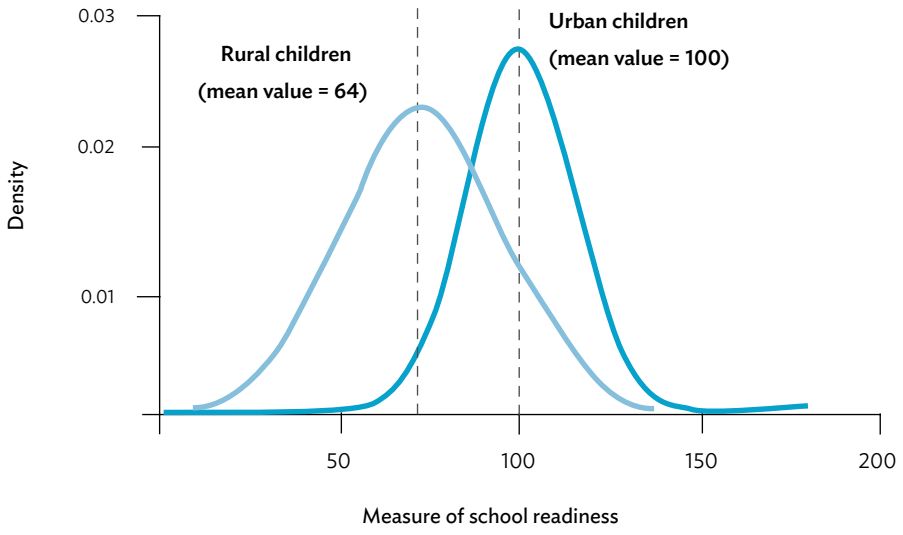
Source: Author's estimates based on Wu and Zhang (2010) and China Population Census (various years).

The disparity between urban and rural areas is also striking in terms of preprimary enrollment rate. In 2009, early childhood education covered 80% of children in the urban areas, but only 30% of children in rural areas (World Bank 2012). This is lower than the national average for India (40% in 2007), and is very low compared with the average in developed countries (e.g., about 100% in the Republic of Korea). In addition, there are major urban–rural disparities in educational inputs. A major constraint in making access and quality of preprimary education more equitable according to the World Bank (2012) is the low level of financing, which is mostly private.

Figure 9 illustrates the urban–rural disparity in school readiness among preschoolers aged 4–5 years in the PRC. Using the same measure of educational readiness, only 3% of the young children in the urban PRC scored below the 70% passing score and were considered "unready" for primary school (Rozelle 2011, World Bank 2012). Meanwhile, the average score among preschoolers in rural PRC is only 64%, well below the basic school preparedness standard (Ou and Liu 2007, World Bank 2012). The lack of readiness for school among children has long-term implications on their lifelong educational performance and productivity (Wu, Young, and Cai 2012).

Clearly, another source of inequity in education access in the PRC is the local household registration or the *hukou* system, which results in the exclusion of migrant workers in urban areas from having equal access to urban public services, such as compulsory education for children, entitlement to minimum living standard guarantee programs, and others. Despite the amendment of the compulsory education law in 2006, its enforcement remains questionable; in addition to fees, non-fee barriers (e.g., permits and other paperwork) limit access of migrant children to public schools (Ming 2014). A significant proportion of children of migrant households are not able to attend public schools for the lack of *hukou* and turn to privately operated migrant schools (Chen and Feng 2013).

Figure 9: Distribution of Educational Readiness Test Scores of 4- to 5-Year-Olds in Selected Regions in the People's Republic of China



Source: Author's estimates based on World Bank (2012). Urban data are based on Ou (2007) and rural data are based on Rozelle (2011) for Gansu, Henan, and Shaanxi provinces; both studies use the same measure of school readiness.

This is evident in the disparity in enrollment rates in different types of urban schools between children from resident and migrant households. A greater proportion of children from migrant households attend regular private schools, which are often of poorer quality than public schools in the PRC (e.g., province, district, and city schools) (World Bank 2012). Meanwhile, the majority of children from resident households are enrolled in public schools. For instance, in 2005, data from five cities in the PRC show that while only 37% of school children from resident households are enrolled in regular private schools, 55% of children from migrant households attend this school—a rate that is even higher than the 45% enrollment rate among those belonging to the poorest quintile resident households (Wang and Wu 2008). In Shanghai, PRC, one of the best cities in terms of providing support to migrant students, 30% of migrant children were enrolled in (private) migrant schools in 2011 because they could not attend public schools (Chen and Feng 2013).

There are also disparities in enrollment rates among migrant children in public schools across provinces and cities (Ming 2014). While almost all migrant students in northern Guangdong province and about two-thirds in Beijing were reportedly attending public schools in 2007, only about one-third of migrant children in Guangzhou and half in Dongguan, Shanghai, and Shenzhen did attend public schools (Ming 2014).

While the removal of fees at the primary and junior secondary levels have improved access to education in the PRC, rising opportunity costs and unaffordable non-fee costs (e.g., travel and learning materials) remain a burden, especially among poor households in the rural PRC (World Bank 2012). At the secondary level, high tuition fees and other expenses limit access to education, especially in rural PRC (Liu et al. 2009). Liu et al. (2009) estimate secondary GER in rural areas at only around 25%. This is despite the financial aid that the government offers to poor students, which covers only 20% of the tuition fee—an average of $160 tuition per year (Liu et al 2009; World Bank 2012). In the Shaanxi province, for instance, the public financial aid to poor students covers only around 6% of total direct costs of secondary school (Liu et al. 2009; Rozelle 2011).

Another explanation for the disparity in secondary enrollment rates in rural PRC according to Liu et al. (2009) is the *zhongkao*—a competitive, standardized, entrance exam administered among students in their final year of junior high school—which determines the qualification of a student for senior high school. Students with low *zhongkao* scores automatically drop out of school after junior high school, but there are students with high scores who discontinue their education due to financial, as well as nonfinancial, reasons.

C. Quality of Education

The quality of education is a very important determinant for the productivity of an individual as a worker. Beyond achieving higher educational attainment, both the PRC and India have made some improvement in educational quality in recent decades. However, disparities in access to good-quality education across regions and provinces remain a serious concern, especially in poorer rural areas in India. In the PRC, there have been increasing concerns over the quality of secondary and higher education.

The high dropout rate across various levels of education in India is indicative of the poor quality of education, especially at the lower levels. About 35% of students who start school do not reach grade 10 (Sabharwal 2013). Of the 26 million who take the grade 10 exit examinations, 10 million do not pass. Eight million of the 16 million who take the grade 12 examinations fail to clear them. Only 5 million of the 8 million who successfully go past grade 12 examinations go on to attend college.

As the experience of economies that have transitioned to high-income economies (e.g., Japan and the Republic of Korea) shows, beyond the level of human capital investments, both quality and equity matter (World Bank 2012). Empirical evidence suggests that more than educational attainment, the quality of educational output is a stronger determinant of economic growth (Hanushek and Woessmann 2007).

However, overall, the quality of education in India remains poor (Panagariya 2008). Furthermore, substantial disparities in quality of basic education across different areas and social groups are a persistent challenge.

Conceptually, quality of educational output can be measured by the achievement of students and graduates. One indicator for this is the mean scores of students on internationally comparable tests such as the Programme for International Student Assessment (PISA). PISA is a triennial international survey among 15-year-old students in randomly selected schools to measure the competencies of students and evaluate education systems in participating economies worldwide. PISA is administered by the International Association for the Evaluation of Educational Achievement, which also administers similar tests such as the Trends in International Mathematics and Science Study and the Progress in International Reading Literacy Study.

Table 5 compares the performance of students in selected economies based on their mean PISA 2012 score and ranking in math, reading, and science. Since only three regions of the PRC participated in the 2012 round—Shanghai; Hong Kong, China; and Macau, China—the mean scores and rankings do not reflect national performance. Similarly, only two Indian states—Tamil Nadu and Himachal Pradesh—participated in the PISA in 2010 (PISA 2009 Plus) and none in the 2012 round. Thus, the mean scores and rankings for the two participating Indian states are based on PISA 2009 Plus results.

Students in three participating regions in the PRC—Shanghai; Hong Kong, China; and Macau, China—performed strongly in all subjects. Students in Shanghai outperformed all participating students in the 2012 assessment survey (65 economies), including those in 34 economies of the Organisation for Economic Co-operation and Development (OECD) and partner economies. In 2012, students in Hong Kong, China ranked second in reading and science, and third in mathematics (OECD 2013). Those in Macau, China ranked 6th in mathematics, 16th in reading, and 17th in science.

The inclusion of the PRC in PISA and the solid performance by Shanghai in all three subjects—reading, mathematics, and science—in both 2009 and 2012 raised the bar for global education policy (Sellar and Lingard 2013). Different cultural and historical factors are being associated with this outstanding performance (Cheng 2011), including the successful education reforms, which serve as a basis for learning in the PRC (Tan 2012, 2013).

Table 5: Programme for International Student Assessment Results
(mean score and rank)

	Math		Reading		Science	
Location	2009 Plus	2012	2009 Plus	2012	2009 Plus	2012
Shanghai, People's Republic of China	600 (1)	613 (1)	556 (1)	570 (1)	575 (1)	580 (1)
Singapore	562 (2)	573 (2)	526 (5)	542 (3)	542 (4)	551 (3)
Hong Kong, China	555 (3)	561 (3)	533 (4)	545 (2)	549 (3)	555 (2)
Korea, Republic of	546 (4)	554 (5)	539 (2)	536 (5)	538 (6)	538 (7)
Taipei,China	543 (5)	560 (4)	495 (23)	523 (8)	520 (12)	523 (13)
Japan	529 (9)	536 (7)	520 (8)	538 (4)	539 (5)	547 (4)
Macau, China	525 (12)	538 (6)	487 (28)	509 (16)	511 (18)	521 (17)
Germany	513 (16)	514 (16)	497 (19)	508 (20)	520 (13)	524 (12)
United Kingdom	492 (28)	494 (26)	494 (25)	499 (23)	514 (16)	514 (20)
United States	487 (31)	481 (36)	500 (15)	498 (24)	502 (23)	497 (28)
Russian Federation	468 (38)	482 (34)	459 (52)	475 (41)	478 (41)	486 (37)
Tamil Nadu, India	351 (72)	–	337 (72)	–	348(72)	–
Himachal Pradesh, India	338 (73)	–	317 (73)	–	325 (74)	–

– = no data, PISA = Programme for International Student Assessment.

Note: Figures in parentheses are rankings. Seventy-four economies participated in PISA 2009 Plus and 65 economies participated in PISA 2012.

Sources: Organisation for Economic Co-operation and Development. 2012a. PISA 2012 Results in Focus: What 15-Year-Olds Know and What They Can Do with What They Know: Key Results from PISA 2012. Paris. http://www.oecd.org/pisa/keyfindings/pisa-2012-results.htm; M. Walker. 2011. PISA 2009 Plus Results: Performance of 15-Year-Olds in Reading, Mathematics and Science for 10 Additional Participants. Melbourne: ACER Press.

According to Tan (2013), the one-child policy in the PRC and the competitive culture of Shanghai reinforced the pressures to succeed across families. Sellar and Lingard (2013) suggest that socioeconomic background accounts for 12.3% of the variation in the reading performance among students, suggesting that the region was successful in terms of both achieving outstanding performance and promoting equity among its students by enabling students to overcome their disadvantaged socioeconomic backgrounds.

Students from Tamil Nadu and Himachal Pradesh in India fared poorly in all subjects. Of the students in 74 OECD and developing economies that participated in PISA 2009 Plus, students from Tamil Nadu ranked 72nd in all subjects, while students from Himachal Pradesh ranked 73rd in both math and reading, and 74th in science.

The striking contrast between the stellar PISA performance of the students in Shanghai in the PRC and Tamil Nadu and Himachal Pradesh in India, shown in Table 5, is especially intriguing. If feasible, a comparative analysis of the factors explaining the differences in the performance of students can yield useful information for designing quality improvement interventions or demonstration studies. However, several factors prevent such an analysis. One, as indicated in the PISA 2009 Plus report, the survey returns for both Tamil Nadu and Himachal Pradesh did not meet the standards of PISA on student sampling due to

the lack of a comprehensive list of students in both states (Walker 2011)[6] Two, while the educational system and the students in Shanghai—a metropolitan city—are arguably the best in the PRC, the same cannot be said about the towns and cities of Tamil Nadu and Himachal Pradesh. Since a comparative analysis of their differences is not feasible, Box 2 tries to explain the factors that contributed to the PISA performance of students in Shanghai by estimating its educational production function.

Box 2: What Explains Better PISA Test Scores?

Measuring the quality of educational performance and understanding the factors contributing to these outcomes are important in designing policies that will promote better outcomes. To understand the factors influencing the math test scores of the students in Shanghai, People's Republic of China, various school and nonschool factors are examined, and the role of these factors in improving the academic performance of students is analyzed using the standard approach. Specifically, the following education production function is estimated from the PISA 2009 dataset representing the students in Shanghai (n = 4,591):[1]

$$Q_{ijk} = \alpha + \beta_1 * l_{ijk} + \beta_2 * F_{ijk} + \beta_3 * R_{ijk} + \varepsilon_{ijk} \quad \text{(B1)}$$

where Q_{ijk} represents international achievement test score of student i in school j of country k. l represents a set of factors related to the individual characteristics of students, such as student age, gender, preprimary education, and average grade. F includes factors related to family background, such as parental education and occupation, and number of books at home. R includes school characteristics, such as funding sources and autonomy, and inputs, such as class size, availability of teachers and instructional materials, and standardized tests. Finally, ε_{ijk} represents a set of unmeasured or unobserved factors influencing test scores.

In 2009, the average PISA test scores in mathematics of students in Shanghai are around 200 points higher than those in Tamil Nadu and Himachal Pradesh. Interestingly, while 87% of the sample students from Shanghai had more than a year of preschool education, only 32% of the sample from two Indian states attended preschool.

Overall, students in Shanghai have better family background characteristics than those in India. For instance, a larger share of the students in Shanghai has a father with tertiary education (34%) and parents employed in white-collar, high-skilled jobs (55%) compared to India (27%, 30%). In terms of school inputs, Shanghai has a much smaller student–teacher ratio (14:1) than India (33:1). Schools in India also have greater autonomy than those in Shanghai.

Table B1 presents regression results only for those students in Shanghai,[2] which suggest that, on average, students in Shanghai with more than a year of preschool education performed significantly better. Children of parents who are high school or college educated, who are employed full time, and who have white-collar jobs have significantly higher math scores than the others. Since greater cognitive ability is associated with higher educational attainment, and having a high-skilled job means greater income-earning capacity, children of better-educated and high-skilled parents tend to be better nourished and have well-developed cognitive ability.

continued on next page

[6] Because of this sampling issue, caution should be exercised when using the data from Himachal Pradesh or Tamil Nadu and when interpreting the reported analyses.

Box 2: continued

Table B1: Regression Results: Determinants of PISA Math Test Score of Students in Shanghai
(dependent variable: PISA math score)

Variables	Coefficient[a]	Robust Standard Error[b]
Student Characteristics		
Age (years)	-11.46***	3.15
Female	-7.83***	1.82
Preprimary education (>1 year)	24.06***	2.64
School starting age	-9.42***	1.29
Grade level (base group = Grades 7–8)		
Grade 9	59.08***	5.57
Grade 10	88.79***	6.57
Grade 11	106.36***	17.47
Grade 12	47.10	42.64
Language spoken at home (base group = language in test)		
Other than the test language	-19.61**	9.00
Family Background		
Educational level of mother (base group: no schooling and primary)		
Secondary	11.65***	3.76
Tertiary	17.59***	4.45
Educational level of father (base group: no schooling and primary)		
Secondary	6.63*	3.75
Tertiary	22.29***	3.89
Living with (base group: not living with any parent)		
Single mother or father	2.93	5.74
Both parents	7.65*	4.29
Parents' working status (base group: none of the parents working full time)		
Both full time	18.87***	3.03
One full time, one halftime	5.13	5.15
At least one full time	16.99***	3.60
Highest parents' job (base group: blue collar, low skilled)		
Blue collar, high skilled	-4.26	3.68
White collar, low skilled	7.85***	2.98
White collar, high skilled	14.82***	3.43
Books at home (base group: <26 books)		
26–200 books	27.51***	2.23
More than 201 books	49.13***	3.14

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Table B1: continued

Variables	Coefficient[a]	Robust Standard Error[b]
School Inputs		
Shortage of math teachers (base group: not at all or very little)		
Strongly + to some extent	-10.74**	4.87
Shortage of instructional materials (base group: not at all or very little)		
Strongly + to some extent	12.62*	6.62
Teacher education (share at school)		
Fully certified teachers	2.03***	0.36
Student–teacher ratio	-2.78***	0.31
Teacher absenteeism (base group: not at all or very little)		
Strongly + to some extent	-19.89***	4.89
Match class duration (hours per week)	3.38***	0.94
Standardized tests	21.58**	10.74
Ability grouping between classes	-1.77	3.89
Institutions		
Funding source		
Student fees or school charges paid by parents (% of total)	0.33	0.63
Government (% of total)	-0.05	0.62
Autonomy (by principal, teachers, and school governing board)		
Autonomy in formulating budget	55.53***	7.33
Autonomy in establishing starting salaries	-2.75	4.29
Autonomy in determining course content	-7.58*	4.14
Students	4,591	
Schools	147	
R-squared	0.288	

* indicates significance at 10%,** indicates significance at 5%, and *** indicates significance at 1%.

[a] Coefficients are least-squares regression estimates using students' sampling probability as weights.

[b] Robust standard errors are adjusted for clustering at the school level.

Source: Author's calculations.

Box 2: continued

Overall, school inputs also appear to be strongly related with higher test scores. Specifically, both inadequacy of math teachers and pervasive absenteeism among teachers have a strong negative relationship with the math scores of students. Meanwhile, the proportion of fully certified teachers and the lower student–teacher ratio are both significantly and positively associated with better student performance. A 1 percentage point increase in the proportion of fully certified teachers is associated with a 2-point test score improvement, while a 1-unit reduction in student–teacher ratio is associated with a 2.8-point test score improvement. This confirms the claim that more educated teachers and a smaller class size are beneficial to classroom learning and student performance.[3] Autonomy over budget has a strongly significant and positive effect on math test scores in the PRC, but autonomy over course content has a negative (slightly significant) effect.[4]

Notes:

[1] Relative to this, the sample for Tamil Nadu and Himachal Pradesh is very small (n = 485).

[2] The regression results for the limited sample of the two Indian states also confirm the significant impacts of parental factors as well as school factors such as teacher absenteeism, student–teacher ratio, and funding from parents on test scores. However, the small size and nonrepresentative sample make the results less reliable.

[3] It should be noted that this does not necessarily indicate a causal relationship. The positive effects of teacher quality and class size on test scores are often supported by other studies using other methodologies. An experiment conducted by Lai, Sadoulet, and De Janvry (2011), for example, using administrative data from the lottery-based open enrollment system in middle schools in Beijing, revealed that school fixed effects are a strong determinant of student performance. These fixed effects were highly correlated with teacher qualifications.

[4] Hanushek and Woessmann (2011) argue that the interaction of autonomy with the accountability mechanism often makes the difference. The school systems in the PRC and India may have differed in terms of school autonomy and the accountability mechanism used. This issue can be further investigated if data of better quality are available.

Source: M. Walker. 2011. *PISA 2009 Plus Results: Performance of 15-year-olds in Reading, Mathematics and Science for 10 Additional Participants.* Melbourne: ACER Press.

Despite the data sampling issues associated with the two Indian states, it should be noted that the PISA 2009 Plus results are consistent with the results of an earlier survey conducted among students in Orissa and Rajasthan using a similar questionnaire, the Trends in International Mathematics and Science Study (Das and Zajonc 2008; World Bank 2006). Likewise, the results of the Annual Status of Education Report (ASER) 2009 (Pratham 2013), India's largest privately funded literacy survey in rural areas (representing 69% of the total population in India), are consistent with the findings of PISA 2009 Plus. Specifically, in the same year that PISA 2009 was administered among 15-year-old students of Himachal Pradesh and Tamil Nadu (i.e., 2010), ASER test results confirm the poor performance of 14- to 16-year-old students in rural areas. ASER suggests that in 2010 (and across the years) learning levels in rural Indian schools were far below the grade-appropriate level.

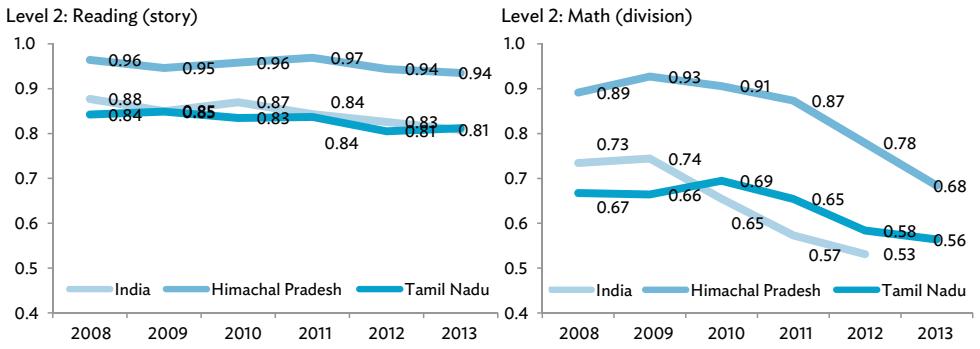
As shown in Figure 10, in 2010, only 96% could read a story—considered a Level 2 text—among the 14- to 16-year-old students tested in Himachal Pradesh, and only 83% in Tamil Nadu. In terms of arithmetic, only 91% of students tested in Himachal Pradesh and 69% in Tamil Nadu could solve a 3-digit by 1-digit division problem in the same year. These figures suggest that there are quite a number of students who have passed Level 2 and did not acquire reading or arithmetic mastery at the grade-appropriate level, and they do not acquire it even as they progress to higher grade levels.

Furthermore, the performance of students in the same age cohort in the following years did not improve and deteriorated steadily up to 2013. For instance, in 2008, 84% of students in the 14–16 year age group in Tamil Nadu could at least read a longer paragraph (Level 2 text), whereas this figure went down to 81% in 2012 and remained the same in 2013.

According to Jones and Ramchand (2013), low learning levels among rural students in India can be partly explained by poor pupil and teacher attendance rates and poor teacher competency. In 2013, attendance among rural primary school teachers was only about 86%, while student attendance was only 71.8%, lower than in the previous years, for example, 73.4% in 2010 (Pratham 2013).

According to an earlier study by Muralidharan and Kremer (2008), private school teachers in rural India are less likely to be absent than public school teachers. They are also more likely to hold a college degree but less likely to be formally certified.

Figure 10: Reading and Math Performance among Rural Students in India
(proportion of 14- to 16-year-olds)



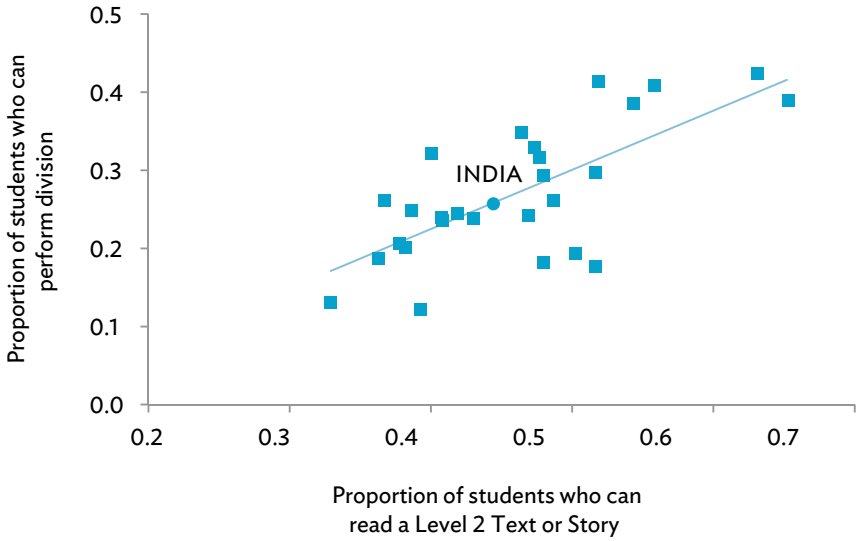
Note: The Annual Status of Education Report (ASER) administers a "floor level" test of reading and basic arithmetic. Each child is marked at the highest level that he or she can read or perform comfortably.

Source: Author's estimates based on Pratham (2013) using ASER database (http://www.asercentre.org/education/data/india/statistics/level/p/66.html, accessed 1 May 2014).

A wide divergence in reading, writing, and arithmetic skills among students across social and religious backgrounds can still be seen in India. For example, among students aged 8–11 years, only about 54% can read a simple paragraph; children from Dalit, Adivasi, and Muslim families even fall substantially behind most communities (Desai et al. 2010).

Figure 11 illustrates the disparity in the quality of education in rural areas across different states. It also suggests that learning levels in reading and math among students are positively correlated.

Figure 11: Reading and Math Performance among Rural Students in India across States
(% of 5- to 16-year-olds)



Note: The Annual Status of Education Report (ASER) administers a "floor level" test of reading and basic arithmetic. Each child is marked at the highest level that he or she can read or perform comfortably.

Source: Author's estimates based on Pratham (2013) using ASER database (http://www.asercentre.org/education/data/india/statistics/level/p/66.html, accessed 1 May 2014).

Educational disparities in the PRC are not limited to levels of outcome but also extend to quality of outcomes (World Bank 2012). Available data from the longitudinal survey on Rural Urban Migration in China shows that there are significant gaps in scores of cognitive and math tests for primary school students between rural and urban households and between migrant and nonmigrant urban households (Zhang 2014).

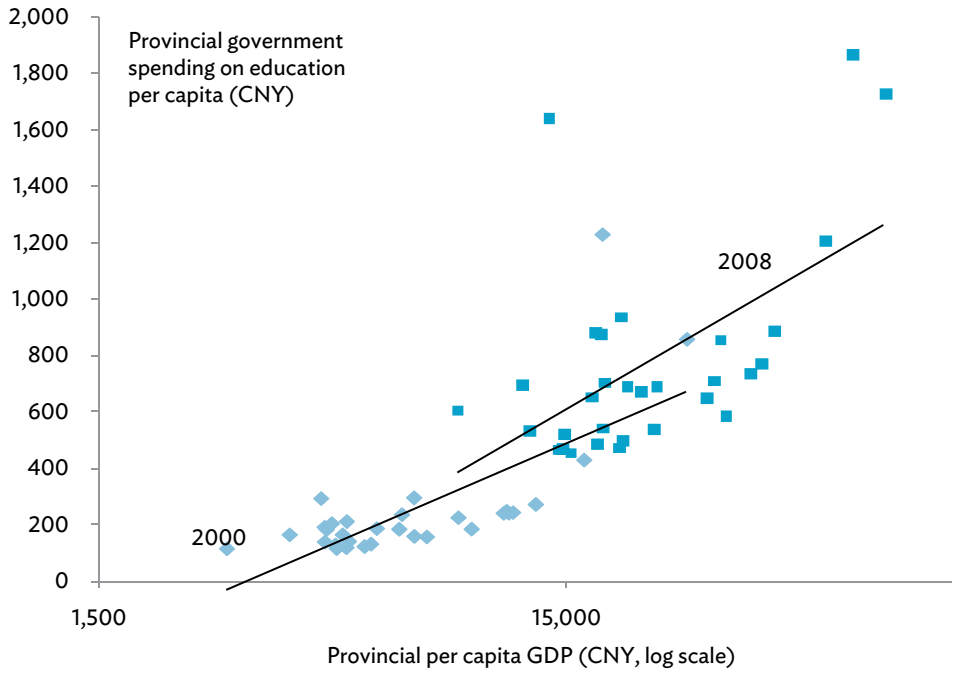
Lai et al. (2014) also found significant gaps in academic achievement between migrant students and students in poor rural areas. Specifically, migrant students in Beijing outperform poor rural students in Shaanxi. Two important but opposing factors explain this: (i) self-selection widens the achievement gap in favor of migrant students and (ii) school effect diminishes this gap. Children with stronger academic and family backgrounds are more likely to follow their migrant parents to Beijing and enroll in migrant schools (self-selection). Meanwhile, school resources and teacher qualifications in migrant schools are inferior to those in rural public schools.

Differences in the quality of basic education across provinces are partly related to the disparity in the spending for education across provinces. Although total public spending on education, as well as subsidies to rural education, increased in the past decade (World Bank

2012), disparities in per capita spending across provinces worsened between 2000 and 2008 (Figure 12). Despite national policies, poorer provinces in the PRC tend to spend less on education, while wealthier provinces tend to invest more.

As discussed in Section B of this chapter, the quality of education received by the children of migrants in the PRC is often compromised. Although urban schools are, on average, better than rural schools, the quality of migrant school education in cities could be inferior to that of rural education. A study by Rozelle et al. (2009) revealed that on average, 4th grade students of rural public schools in the Shaanxi province performed better in standardized math and Chinese tests (by 7.2 and 10 percentage points) than their counterparts in migrant schools in Beijing.

Figure 12: Provincial Per Capita Education Spending and Income in the People's Republic of China
(CNY)



GDP = gross domestic product, CNY = Chinese yuan.

Source: H. Brixi et al. 2011. Equity and Public Governance in Health System Reform: Challenges and Opportunities for China. *Policy Research Working Paper.* No. 5530. Washington, DC: World Bank.

D. Employability and Skills Development

It is often pointed out that the supply of skilled labor in both the PRC and India is not sufficient to meet the challenges of growing demand and changing skill requirements. This comes mainly from a lack of quality education at the higher levels, including technical and

vocational education and training (TVET), as well as from a mismatch between the level of skills that the employers require and the supply of employable skills in the labor market today (Chen, Mourshed, and Grant 2013; World Bank 2012).

An important issue in both the countries is the transition of graduates from school to work (Sabharwal and Sharma 2012; World Bank 2012). Concerns about the quality of graduates are widespread, with employer surveys revealing that university or vocational school graduates usually lack technical and English language training, as well as soft skills that the employers require. For instance, a 2005 survey found that only one in 10 university graduates in the PRC is ready to work in multinational companies (Farrell and Grant 2005). Another study revealed that employers prefer international graduates because they are more creative and innovative, have better command of the English language, and liaise and communicate more effectively with overseas clients than the locally educated graduates (Australian Education International 2006).

The American Chamber (AmCham) China reports that aside from rising labor costs, high turnover rate, and the impact of regulations, the severe shortage of appropriately skilled employees is among the human resource challenges that remain a major concern for AmCham China members. Out of 266 members surveyed in 2012, about 70% reported they encountered difficulties in attracting and retaining skilled as well as technical staff.

According to AmCham China (2011), quality and mobility of the skilled labor pool in the PRC are seen by domestic and foreign firms as long-term challenges despite significant efforts by the government to improve the quality of skilled workers. Despite the rapid increase in skilled workers to a total of 45 million over the last 30 years (as shown in Table 2), the shortage of skilled employees across all job types persists. In 2013, more than a third of the PRC firms surveyed said they struggled to recruit skilled workers, with 61% of these companies attributing this to a shortage of general employable skills (Chen, Mourshed, and Grant 2013).

Two main reasons cited by many employers for this shortage are skills mismatch and inappropriately skilled university graduates in the face of growing demand for skilled labor (AmCham China 2011). In addition, the rapid growth of state-owned and private enterprises in the PRC represents an additional challenge in the supply side. These issues constrain the flow of investment and expansion of businesses in the PRC.

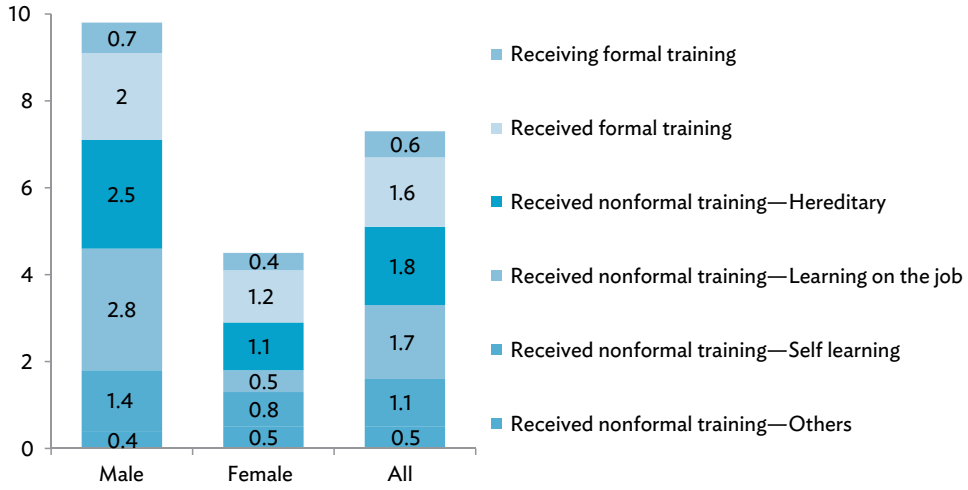
Results of an employer survey by Blom and Saeki (2011) covering a sample of 157 large and small industrial companies across India mirror this. Survey results revealed that 64% of employers hiring fresh engineering graduates in India are either somewhat satisfied or dissatisfied with the quality of the new hires in terms of their skills. Based on their factor analysis, they found that employers perceive soft skills—core employability skills (e.g., integrity, reliability, flexibility) and communication skills (e.g., written communication, computer skills, English communication)—to be very important. Skills gaps are most severe in the higher-order thinking skills and least in English communication—one of the most demanded skills by the employers.

In India, employability of students is low and widely varied across cities and states. Results of a recently administered nationwide multidimensional skill assessment test—the

Wheebox Employability Skill Test—showed that only slightly over a third of the students who took the exam were found employable (CII, PeopleStrong, and Wheebox 2013). Performance differed widely across cities, states, skill domains, age groups, and gender. Younger students (39% passing rate) performed better than older ones (28% passing rate), while female students (42% passing rate) fared better than males (30% passing rate).

Unlike in most developed countries, over 90% of the labor force in India lack any form of skills training (Government of India 2011a). Overall, only around 43 million, or less than 10% of the labor force, in India had vocational training in 2009–2010 (Government of India 2012a). Most of them have only nonformal vocational training, and only less than 2% of the total labor force in India has formal training. As shown in Figure 13, the proportion of males (aged 15–59 years) who are either receiving or have received any vocational training is twice as much as females. Some 33% of workers with vocational training are in the services sector, 31% are in manufacturing, 27% are in agriculture, and the rest are in nonmanufacturing and allied activities (Government of India 2012a).

Figure 13: Labor Force with Vocational Training in India
(% of population aged 15–59)



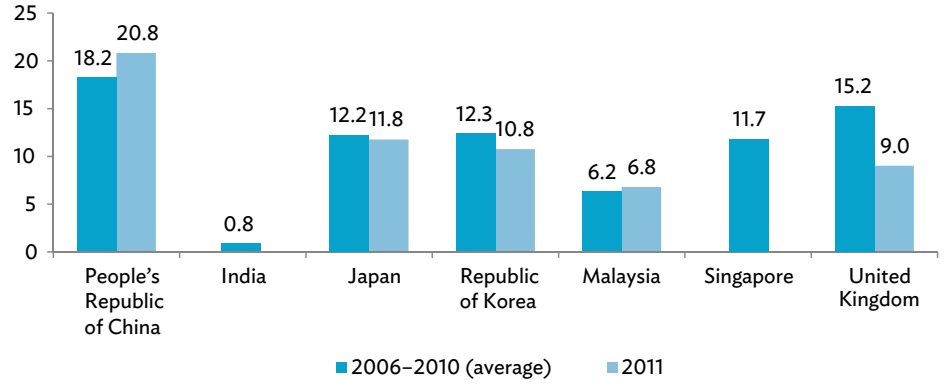
Sources: Author's estimates based on Sanghi and Sensarma (2014); National Sample Survey 66th Round (2009–2010): Report on Status of Education and Vocational Training in India.

Although 90% of employment opportunities in India require vocational skills (Okada 2012), skill formation among young people who constitute the largest and a rapidly growing segment of the demographic structure is low. As shown in Figure 14, student participation in formal technical and/or vocational courses at the secondary level in India is very low compared with that in the PRC, other developed countries in Asia, and the United Kingdom.

Every year, 12.8 million young people enter the labor market (Government of India 2012c). However, with only 2.5 million vocational training seats available in the country (Government of India 2012c), most of these young people remain unskilled and, often, they find work in the informal sector (Okada 2012).

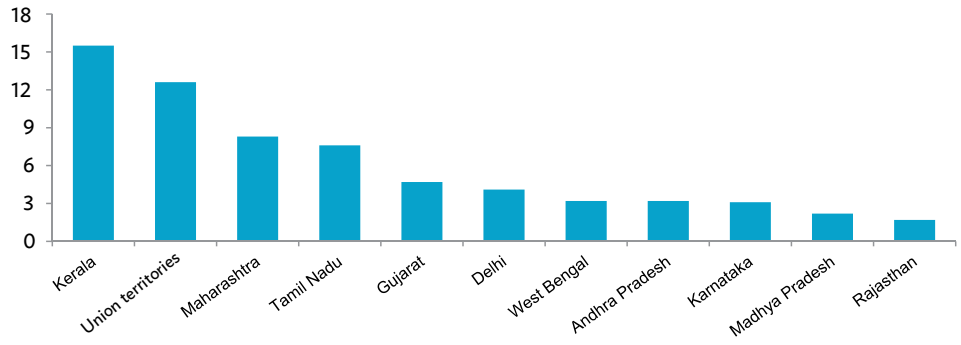
As Figure 15 illustrates, aside from being low, the level of skill formation varies across states in India. In Kerala, 15.5% of youth aged 15–24 received formal skills training; in contrast, only less than 1% of those in Bihar were formally trained.

Figure 14: Proportion of Secondary Students Enrolled in Technical and/or Vocational Education Programs



Source: World Bank. 2014. World Development Indicators Online. http://databank.worldbank.org.

Figure 15: Youth with Formal Skills Training in India
(% of population aged 15–24)



Source: Author's illustration based on TeamLease and IIJT (2009).

The shortage of skilled workers creates serious constraints to the production and innovation capabilities of Indian industries and their competitiveness in the global economy (Okada 2012). It reflects the capacity constraints in India in terms of skills development. While India has well-institutionalized public vocational education and training systems, they are not large enough to accommodate large numbers of school graduates and are inadequately prepared to equip the young workforce with skills that industries need to meet the changing skill requirements of today, which are a result of rapid globalization and technological innovation (Okada 2012).

TVET programs in India are identified as too fragmented and ineffective (Government of India 2012a, 2012c, Panth 2013). Industrial training institutes in India have largely been supply driven rather than demand driven (Okada 2012). They lack the flexibility to respond to specific local skill demands because they follow a highly standardized curriculum. They are also outdated in terms of facilities and equipment.

As in many other countries, the governance of the vocational training system in India has been complex. Until recently, the Ministry of Human Resource Development, which is responsible for formal education, was only slightly involved in TVET activities. In addition to the Directorate General of Employment and Training, more than 17 government ministries or departments, along with their related agencies, provide or sponsor TVET programs.

Sponsored by various agencies, different formal and nonformal TVET programs differ in many ways, including duration, target groups, entry qualifications, testing and certification, and curriculum (Okada 2012). As a result, the programs overlap and have little unified recognition of qualifications and equivalence (Okada 2012).

The Government of India has recently pursued drastic measures to reform its training policy, intensifying its efforts to increase the number of skilled workers. These include forging partnerships with leading firms in the industry (e.g., Toyota, Tata Motors, Suzuki) to offer training courses to suit specific skills requirements of the firms. It will be interesting to assess the effectiveness of this reform in improving access to, and responding to the demand for, vocational training.

Over the past decade, vocational education has expanded rapidly in the PRC. In 2011, almost half of the high school students were in secondary vocational schools (Poon 2012). In the same year, a total of 7.4 million students at the tertiary level were enrolled in the 1,280 TVET institutions nationwide (Poon 2012). In addition, as many as 100 million of the working-age population receive in-service training from either nondegree TVET providers or private enterprises and companies each year (Poon 2012).

Despite government spending in the TVET system (over CNY14 billion in 2007–2011), disparities between the most advanced TVET institutes and the least advanced are enormous. Developing and implementing a set of centralized policies remains an important challenge.

The TVET system of the PRC—one of the largest in the world with over 30 million students—also faces several governance and financing challenges. As it is being managed by at least two large ministries, the Ministry of Education and the Ministry of Human Resources and Social Security, and their local offices, the system is fragmented and poorly coordinated, while trying to achieve multiple priorities (Poon 2012; World Bank 2012).

A uniform and consistent skills and competencies standard among TVET graduates in the PRC is another challenge since the current system of qualifications and competency certification is fragmented (World Bank 2012). The lack of a framework for licensing and accreditation of nonpublic training providers limits the growth of the private sector and results in a lack of quality assurance and consumer protection for those undertaking private training. A mechanism for systematically involving employers in curriculum

development is also lacking (World Bank 2012). If present, such a mechanism can promote the development of a practical, employment-oriented curriculum that could help clear skills mismatches. Furthermore, to maximize public investments in the construction of vocational schools, practical training facilities, and "skilled" skill trainers (with in-service training) are crucial (Shi 2012).

In the PRC, the increasing demand for skilled workers makes the skills gap more apparent. The case of Yunan province illustrates the supply–demand gap in skills and mismatches in the PRC. According to Liang and Chen (2014), as of 2010, over half of the current workforce of Yunnan only had a basic education (47%) or less (11%). Skilled workers with at least high school education are limited (only about 14% of the labor force). Since most of the job openings require tertiary education, in 2010–2011, only 35%–45% of the job openings were filled and half of the applicants were rejected due to lack of required skills and mismatch of wage expectations (Liang and Chen 2014).

Growth in global and local demand for skills outpaced the improvements in the educational attainment of the labor force in Yunnan. While demand from the services sector has been mostly driving the growth in employment in Yunnan in recent years, the share of workers with a high school degree or above had increased from 6.5% in 2000 to 9.3% in 2010, and those with tertiary education had increased from 1.4% to 3.2% over the same period (Liang and Chen 2014).

E. Challenges to Quality Employment and Inclusive Growth

In developing countries, periods of economic growth are usually accompanied by structural transformation toward more intensive industrial production and services and, therefore, more employment. However, despite rapid economic growth in the past decades, there are a number of challenges to the creation of quality employment and accomplishment of inclusive growth in both the PRC and India. Three issues are discussed here—decline in employment elasticity, informalization of jobs, and restrictions in labor mobility.

1. Jobless Growth in India

The shares of industry and services sectors in the total output of India have been increasing sharply in the past 20 years. However, despite this, employment expansion in these sectors remains limited, relative to the PRC and other East Asian economies, and has slowed in recent years (Government of India 2012a; Mehrotra, Gandhi, and Sahoo 2012a, 2012b). In the manufacturing sector, for instance, total employment increased by 10 million jobs during the first half of the past decade (from 44 million in 1999/2000), but declined by 5 million in the second half.

The manufacturing subsectors that experienced a net increase in both output and employment in the past decade include textiles; wearing apparel and leather products; paper and paper products, and publishing and reprinting of recorded media; basic metals; motor vehicles and other transport equipment; furniture; and medical and optical instruments,

watches, and clocks (Mehrotra, Gandhi, and Sahoo 2012b). However, several manufacturing subsectors experienced a decline in employment,[7] including food products and beverages, tobacco products, nonmetallic mineral products, and fabricated metal products.

Employment in the nonmanufacturing (industry) sector expanded by 27 million in the past decade, mostly in the construction industry both in urban and rural areas (Mehrotra, Gandhi, and Sahoo 2012b). In the services sector, total employment expanded by 22.1 million from 1999–2000 (55th NSS Round) to 2009–2010 (66th NSS Round). Of this, the trade and repair subsector accounted for more than one-third of the employment expansion. Other important contributors were retail trade, education, and the health sector.

Table 6 summarizes the elasticity of employment with respect to output in 5-year periods over the past decade. Overall, employment elasticity declined from 0.44 during the period covering fiscal year[8] FY2000–FY2005, to only 0.01 during FY2005–FY2010. The same trend was observed across sectors, except for construction and other nonmanufacturing subsectors. In the manufacturing sector, for instance, from a 0.76 employment elasticity in the first half of the decade, employment elasticity declined to –0.31 in the second half of the decade. This is associated with the increase in the cost of labor and the substitution of labor-intensive technology with one that is capital intensive in the manufacturing sector due to lack of skilled workers in India (Government of India 2012a).

As shown in Table 6, except for the nonmanufacturing sector and some subsectors (e.g., construction, banking), the employment elasticity of output is below 1 for most sectors and subsectors in India. Having an employment elasticity of less than 1 means that for every 1 unit of increase in output in these sectors and subsectors, employment expands disproportionately, or even contracts for some subsectors (those with negative employment elasticity), suggesting jobless growth.

Table 6: Employment Elasticity in India

Sector/Subsector	FY2000–FY2005	FY2005–FY2010
Agriculture	0.84	-0.37
Nonagriculture	0.58	0.18
Manufacturing	0.76	-0.21
Mining and quarrying	0.83	0.55
Electricity, gas, and water supply	0.56	-0.11
Construction	0.78	1.19
Nonmanufacturing	0.92	1.26
Services	0.45	0.06
Total	0.44	0.01

FY = fiscal year.

Notes: Employment elasticity is the midpoint elasticity for the period. In India, FY starts on 1 April and ends 31 March.

Source: Mehrotra, Gandhi, and Sahoo (2012b) estimates based on the National Sample Survey employment data and Central Statistical Organization gross value-added data.

[7] See Mehrotra, Gandhi, and Sahoo (2012a) for more details.
[8] Fiscal year 2000 in India covers 1 April 1999 to 31 March 2000.

2. Job Creation and Structural Unemployment in the People's Republic of China

With the demographic expansion of the PRC coming to an end, and with its rapidly expanding economy and rising demand for labor, job creation is a less serious concern for the PRC than for India. Data for 2008–2012 show that the number of employed urban workers has steadily increased, although rural employment has declined.

Unlike in India, rapid economic expansion in the PRC has generated a comparable increase in job opportunities in industries such as manufacturing and services, especially in urban areas. Expansion of urban employment allowed for the gradual absorption of both the former workers of state-owned enterprises (SOEs) and the rural labor surplus (Cai and Wang 2010). The past decade has also seen sustained growth in employment in private and foreign-owned enterprises and corporations.

The retirement of older members of the workforce, and the decline in the number of new entrants to the workforce due to slower population growth and higher school participation among youth, ease any pressure associated with the expected slowdown of job creation as the economy of the PRC moves to more capital-intensive industries.

Nevertheless, the issue of structural unemployment—the fundamental mismatch between the supply and demand of workers—remains. Difficulties in searching for jobs are faced by two main groups of workers in the PRC: young college graduates who lack training and experience and the unskilled elderly, especially in urban areas. This demand–supply mismatch issue will be discussed in more detail in Chapter 4.

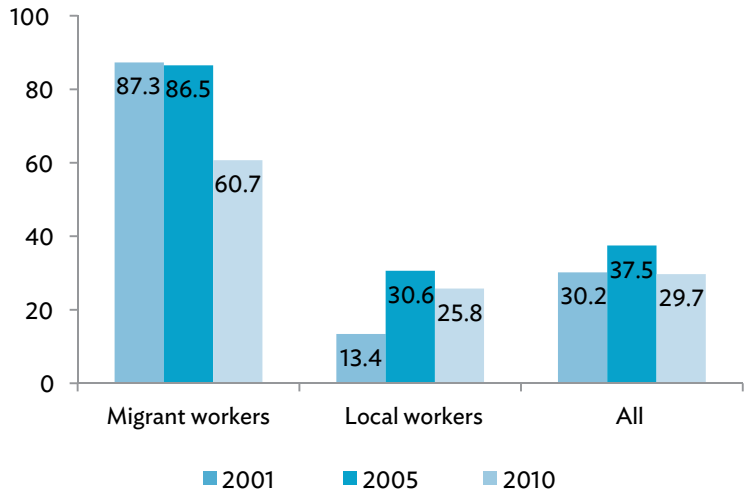
3. Informalization of Jobs

The informal sector in the urban PRC has undergone a major transition over the past 2 decades. Following the liberalization of the labor market in the PRC, which allowed labor mobility from rural to urban areas and across regions, employment in the PRC expanded, both in the formal and informal sectors. Rural migrant workers ballooned from only 2 million in early 1980s to 30 million in the late 1980s (Du and Xue 2012), and over 200 million in more recent years (ILO 2014).

The accelerated growth in rural migration, alongside the restructuring of SOEs, has led to informalization of the urban labor market in the PRC. From the early 1980s through the 1990s, most migrant workers and unemployed urban residents from SOEs entered the informal sectors (Cai, Yang and Wang 2010; Du and Xue 2012).

Based on the three waves of the China Urban Labor Survey data, Figure 16 shows that from about 30.2% in 2001, the overall share of informal employment in the urban PRC increased to 38% in 2005, but went down again to about 30% in 2010 (World Bank 2012). The proportion of urban residents with informal employment almost doubled from only 13.4% in 2001 to 25.8% in 2010. Meanwhile, it declined among migrant workers from 87.3% to 60.7% during the same period. Nonetheless, the prevalence of informal employment among migrant workers was still more than twice of those who had official residence status in 2010.

Figure 16: Size and Composition of Informal Employment in the Urban Labor Market in the People's Republic of China
(% of total employment)



Note: Informal worker is defined as either self-employed or with no contract.

Source: World Bank (2012) based on Cai, Du, and Wang (2011).

There are several definitions of informal employment. Table 7 presents the estimates by Park, Wu, and Du (2012) of the informal employment rates in six large cities in the PRC in 2010 using household survey data (China Urban Labor Survey 3—according to several accepted definitions of the International Labour Organization).

As shown in Table 7, the estimated rates vary across cities and across different definitions. Overall, informal urban employment in the PRC is estimated at around 20%–37%. This figure is consistently higher among migrants (45%–66%)—those with no official resident permit or are working outside their city of residence—than urban residents across definitions. Of the six cities considered, Shenyang has the highest estimated proportion of informally employed workers (26%–58%) and Shanghai has the lowest (9%–23%).

It is interesting to note that while there are less urban resident workers with no social insurance (16.2%; definition 1) than workers with no formal contract (26.3%; definition 2), the opposite is true for migrant workers (60.6% versus 49%).

In India, aside from having jobless growth in the manufacturing sector, the past decade is also characterized by increasing informalization (Mehrotra, Gandhi, and Sahoo 2012b). From 1999/2000 to 2009/2010, the share of the informal sector in the total output of India expanded further by 1.6 percentage points to 92.8%.

Majority (90%) of informal employment in 2009/2010 was in the unorganized sector (Figure 17, panel A). While the organized sector[9] accounted for a smaller share of total

[9] Here, organized sector is comprised of all public sector enterprises, public or private limited companies, cooperatives, trusts, and other enterprises that satisfy the following conditions. First, the enterprise is either proprietary (male and female); partnership with members from the same household or members from different households; or employer households (i.e., private households employing maids or servants, watchmen, cooks, etc.). Second, the enterprise employs 10 workers or more, otherwise, the enterprise is considered unorganized (microenterprises or those that employ six workers or less).

informal employment in India, it was still considerable at around 10% (Figure 17B). Employment in the informal sector, which included microenterprise workers, unpaid family members, casual laborers, home-based workers, migrant laborers, and domestic workers, accounted for most of the expansion in employment in the past decade. From 1999/2000 to 2009/2010, informal employment expanded in the organized sector by 43.8 million and in the unorganized sector by 21.6 million.

Table 7: Informal Employment Rates by City in the People's Republic of China Using Different Definitions
(%)

	City						
Definition/Sample	Shanghai	Wuhan	Shenyang	Fuzhou	Xi-an	Guangzhou	Total
Definition 1							
Full sample	16.6	25.8	29.4	32.7	30.0	31.0	25.5
Local residents	4.0	19.1	24.6	24.0	26.2	18.2	16.2
Migrants	69.9	86.8	72.9	64.5	76.3	46.3	60.6
Definition 2							
Full sample	14.7	37.0	53.9	35.2	35.8	34.6	31.0
Local residents	8.9	31.5	51.9	29.0	33.2	27.7	26.3
Migrants	39.3	87.3	71.4	57.9	66.2	42.9	49.0
Definition 3							
Full sample	22.7	39.1	58.3	44.6	41.0	41.2	37.2
Local residents	10.7	33.3	56.1	37.2	37.7	31.5	29.6
Migrants	73.2	91.4	78.9	71.4	80.0	52.8	65.9
Definition 4							
Full sample	9.3	23.2	26.0	24.3	25.3	25.7	19.9
Local residents	2.5	16.7	21.4	16.8	22.1	15.0	13.2
Migrants	38.0	82.2	66.9	51.6	63.3	38.6	45.4

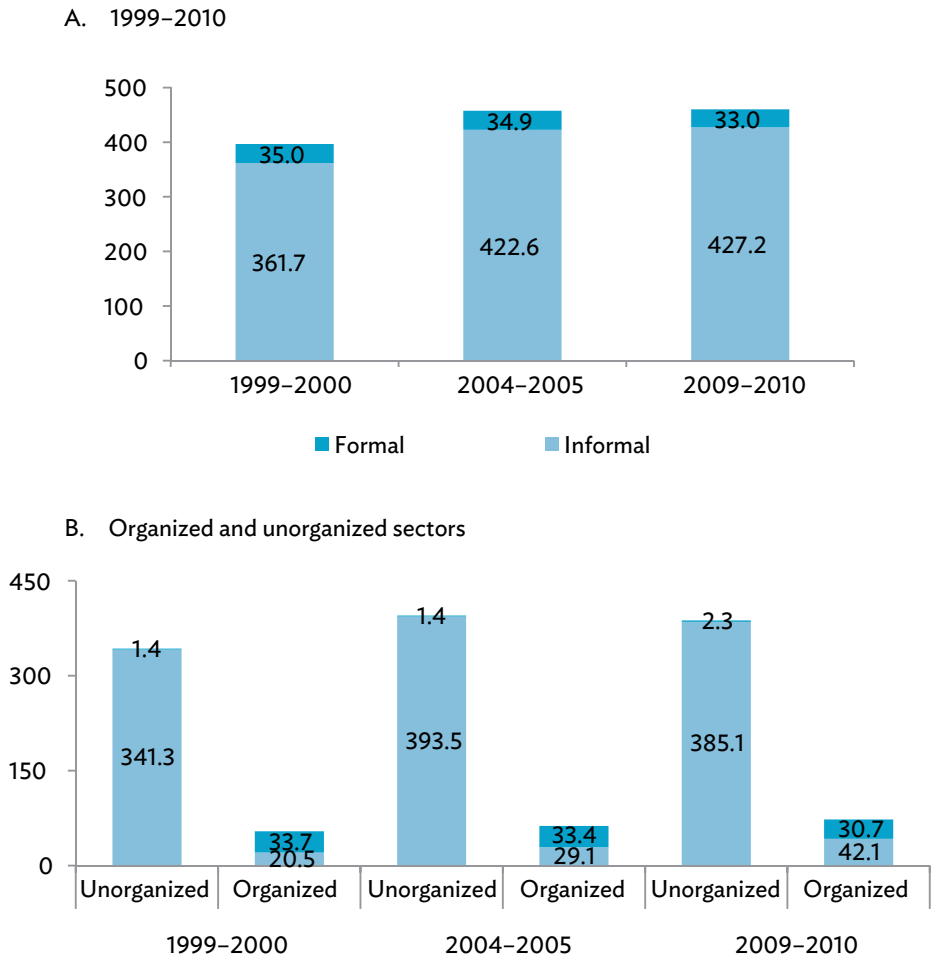
Note: Definition 1: an employee is informally employed if the employer provides no social insurance; definition 2: an employee is informally employed if there is no formal contract or high-quality job; definition 3: either definition 1 or definition 2 is satisfied; definition 4: both definitions 1 and 2 are satisfied. Local resident workers are those with official residence permit (*hukou*). Otherwise, workers are classified as migrants.

Source: A. Park, Y. Wu, and Y. Du. 2012. Informal Employment in Urban China: Measurement and implications. *Working Paper*. No. 77737. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/2012/07/17718498/informal-employment-urban-china-measurement-implications

In contrast, formal employment contracted from 35 million in 1999–2010 to only 33 million in 2009–2010. This decline represents the decline in formal employment in the organized sector by 3 million, which was partly offset by the slight increase in formal employment in the unorganized sector.

The considerable share of the organized sector in informal employment, and its further expansion, suggests that the organized enterprises are increasingly hiring casual workers due to labor laws and other concerns (Government of India 2012a; Sanghi and Sensarma 2014).

Figure 17: Formal and Informal Employment in India
(millions)



Sources: Government of India (2012a) based on the National Sample Survey 66th Round for 2009–2010; National Commission for Enterprises in the Unorganized Sector (NCEUS) (2007) for 1999–2000.

4. Labor Mobility and Geographical Mismatches

The present labor supply–demand gaps in the PRC and India are partly a mismatch in geographic distribution of labor supply and demand. Big cities in the PRC tend to have more high-skilled labor than they can use, while other mid-size and smaller ones have less than what they need (Chen, Mourshed, and Grant 2013). This geographic mismatch is partly due to the influx of migrant workers from rural areas (Fang 2014), and the perception that better opportunities are offered in big cities (Chen, Mourshed, and Grant 2013), but barriers to labor mobility also play a role (World Bank 2012). Lowering barriers to labor mobility, such as ensuring portability of pension and social security rights, and phasing reforms of the *hukou* system to equalize access to a common set of social entitlements can partly address the mismatch (World Bank 2012).

According to a 2009 report by Team Lease and IIJT, states in India with higher economic growth rates (e.g., Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu), and therefore new job opportunities, have fewer workers available and slower population growth. In contrast, those with slower economic growth rates (e.g., Bihar, Madhya Pradesh, Uttar Pradesh) and fewer new job openings are the ones with more workers and faster population growth rates.

To cope with this challenge, migrant workers will play a role in offsetting the domestic mismatch. However, labor movements seem to be very limited in India. For instance, the 66th Round of National Sample Survey (NSS) (2009–2010) reports that only about 1% of the workers reported a change in their occupation in the past 2 years preceding the survey.

F. Rates of Return to Schooling and Wage Structure

1. Rates of Return to Schooling

Contrary to the usual trend (i.e., diminishing returns to education) found in studies in developing countries (Psacharopoulos 1994; Psacharopoulos and Patrinos 2004), estimates by Agrawal (2012) using a nationally representative survey, the 2005 India Human Development Survey, show that private returns increase with the level of education in India. Specifically, wage increases by 5.5% for every additional year of schooling at the primary level, 6.2% at the middle level, 11.4% at the secondary level, 12.2% at the higher secondary level, and 15.9% at the graduate level.

According to Agrawal (2012), this can be attributed to two related factors: technological advancement and industrial structure change, and the quality of schooling in India. The former suggests an increasing demand for skilled workers, while the latter implies the unavailability of these workers. In India, graduates from the good colleges and universities can be hired by global firms and foreign enterprises as well as call centers that provide significantly higher salaries than small, domestic firms. This must have contributed to the increasing rates of returns to schooling. The increasing returns to education suggest that if given the opportunity, individuals have an incentive to achieve higher levels of schooling.

Rural–urban disparities in returns, which are also considerable in India, can also be attributed to rural–urban disparities in the quality of education (Agrawal 2012). Returns are lower in rural areas at all levels, except at the graduate level, than in urban areas. Income disparities in returns also exist in India, with returns being higher at the top quintiles and lower at the bottom quintiles (Agrawal 2012). This suggests that education has a positive impact on wage inequality.

Increases in returns to education, especially among households that rely on income from education-intensive services and/or education-intensive occupations, led to increased levels of inequality in the Indian urban sector during 1993–2004 (Cain et al. 2010).

Estimates by Fulford (2014) using the 1983–2005 NSS data show that overall, per capita household consumption increases with the education of household members in India. For

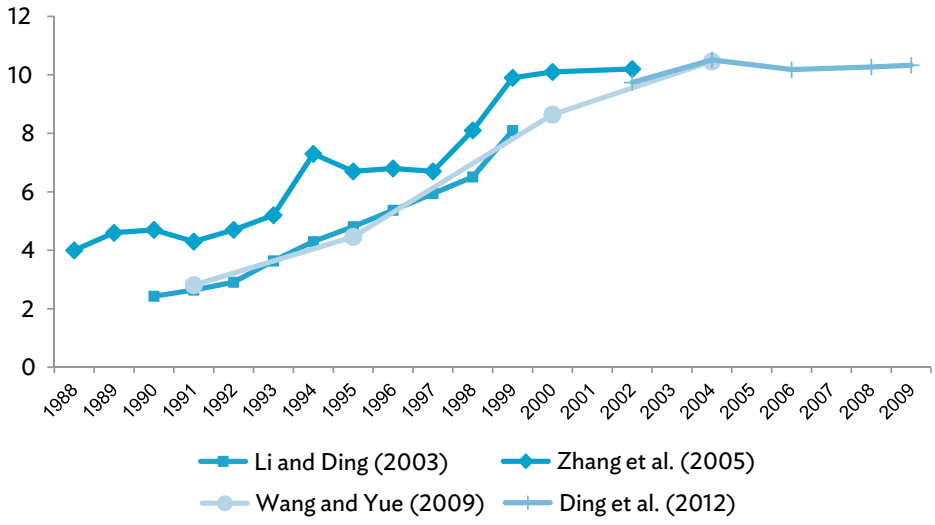
every additional year of schooling, consumption increases by only 3%–4% for male cohorts, while the aggregate returns for female cohorts are close to zero. According to Fulford, the low consumption returns to education can be partly explained by the low returns to education associated with gains at the lower levels of education (i.e., between attaining literacy and finishing secondary school). The slow expansion in formal employment, which can generate higher returns, is another important explanation for the low returns, especially for women.

An analysis by Fang et al. (2012) covering the period following the compulsory education law of 1986 in the PRC reveals that wages in the PRC during 1997–2006 increased by around 20% for each additional year of schooling. This is comparable to returns found in most industrialized economies. They also found that, as in India and other developing countries, returns are marginally higher in urban (15%) than in rural areas (14%) based on data from the China Health and Nutrition Survey.

Using data from the China Urban Household Survey, Ding, Yu, and Yu (2012) estimated the rate of return for each additional year of education in urban areas at 9.7%–10.3% during 2002–2009. Their estimates show a steady upward trend in returns over time. Similar studies covering earlier years also show the same trend in urban areas (Figure 18).[10] For example, using the Chinese Household Income Project data, Li and Ding (2003) estimated the rate of return to education at 2.4%–4.3% during 1990–1994 and 4.8%–8.1% during 1995–1999. Another study by Zhang et al. (2005) based on data from the China Urban Household Survey suggests education returns of about 4%–4.7% during 1988–1992, 5.2%–6.7% during 1993–1995, and 6.8%–10.2% during 1996–2002.

Figure 18: Rates of Return to Education in Urban Areas in the People's Republic of China

(%)



Source: Author's estimates based on Li and Ding (2003), Zhang et al. (2005), Wang and Yue (2009), and Ding, Yu, and Yu (2012).

[10] For a summary of estimates of earlier studies on rates of return to education in urban areas in the PRC, see Ding,Yang, and Ha (2013).

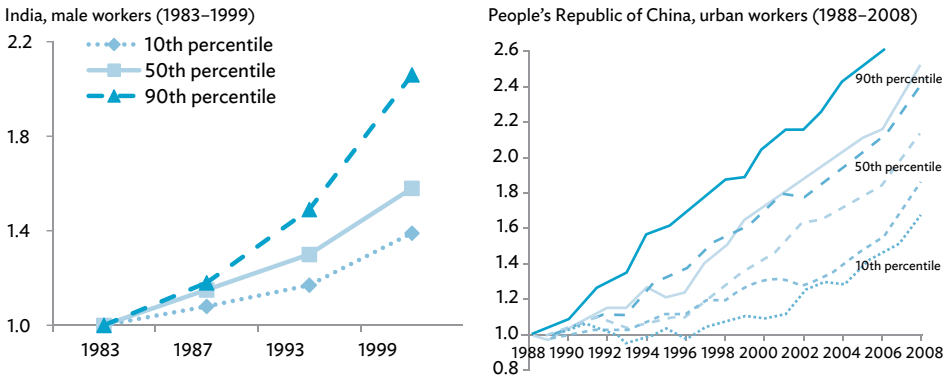
Rising education returns over time is partly attributed to the liberalization of labor markets and wage setting in the PRC beginning in the mid-1980s, particularly in urban areas. Since then, the skills of workers and higher productivity have been rewarded through higher wages (Zhang et al. 2005). According to Ding, Yang, and Ha (2013), another way to explain this trend is through the relative supply and demand for skilled labor. Specifically, the market-oriented reforms in the PRC caused an upward shift in the demand for skilled workers and higher labor productivity, while their supply remained stable, thereby causing an upward shift to their wage premium.

Other studies focusing on the urban PRC, however, suggest otherwise (e.g., Mishra and Smyth 2014; Qiu and Hudson 2010; Zhang et al. 2005). As in India, estimates of returns to education in the PRC also increase with educational level (Zhang et al. 2005). Fang et al. (2012) also found a striking gender disparity in returns to education, with the returns for each additional year of schooling for males being higher than for females in 1997–2006.

2. Wage Inequality and Skill Premium

The increasing differences in indexed real wages at the 90th (most skilled), 50th, and 10th percentiles in both India and the PRC (Figure 19) indicate increasing wage inequality.

Figure 19: Indexed Real Weekly Urban Wage



Note: Dark lines indicate high-exposure regions, while light lines indicate low-exposure regions.

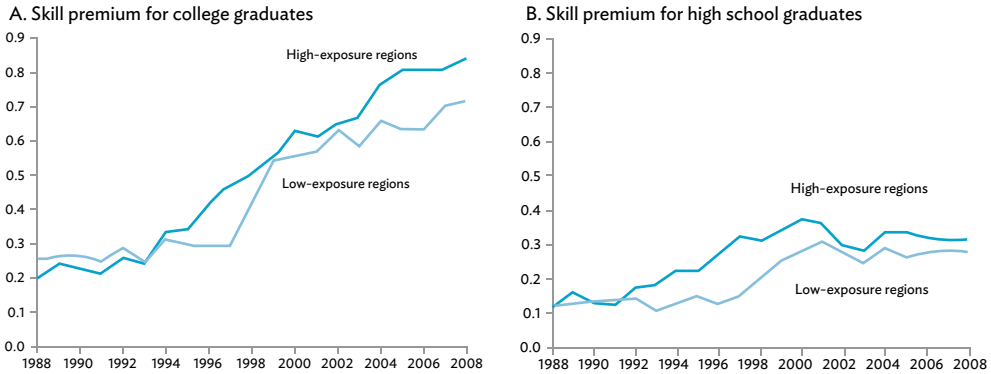
Sources: Kijima (2006) for India; Han, Liu, and Zhang (2012) for the People's Republic of China.

Skill premium, which depends largely on supply and demand of workers by skill level, has increased steadily in India since the early 1980s (Figure 20). Meanwhile, it was suppressed in the PRC until the early 1990s but increased sharply thereafter. Previous literature suggests that the increasing demand for more skilled labor explains the increased skill premium in India (Meng 2012).

Cai and Du (2011) found in their analysis that wages of unskilled and skilled workers in the PRC have converged. Since 2003, wages in nonagriculture sectors, wages of migrant workers, and wages of hired workers in the agriculture sector have increased dramatically. Both the increasing wage trends and wage convergence are interpreted as evidence

supporting the hypothesis that the industry sector in the PRC has passed the Lewis turning point (Lewis 1972), or the period during which labor demand expansion exceeds labor supply, and, as a result, the wage rate of ordinary workers starts to rise.

Figure 20: Skill Premium for College and High School Graduates in the People's Republic of China



Source: J. Han, R. Liu, and J. Zhang. 2012. Globalization and Wage Inequality: Evidence from Urban China. *Journal of International Economics.* 87. pp. 288–297.

According to Cai and Du (2011), consumption levels improve with labor mobility and, more significantly, with the attainment of urban citizenship. Specifically, consumption of rural households increases by 80.1% as they become migrant households, while the consumption of migrant households increases by 117.8% as they get urban *hukou*.

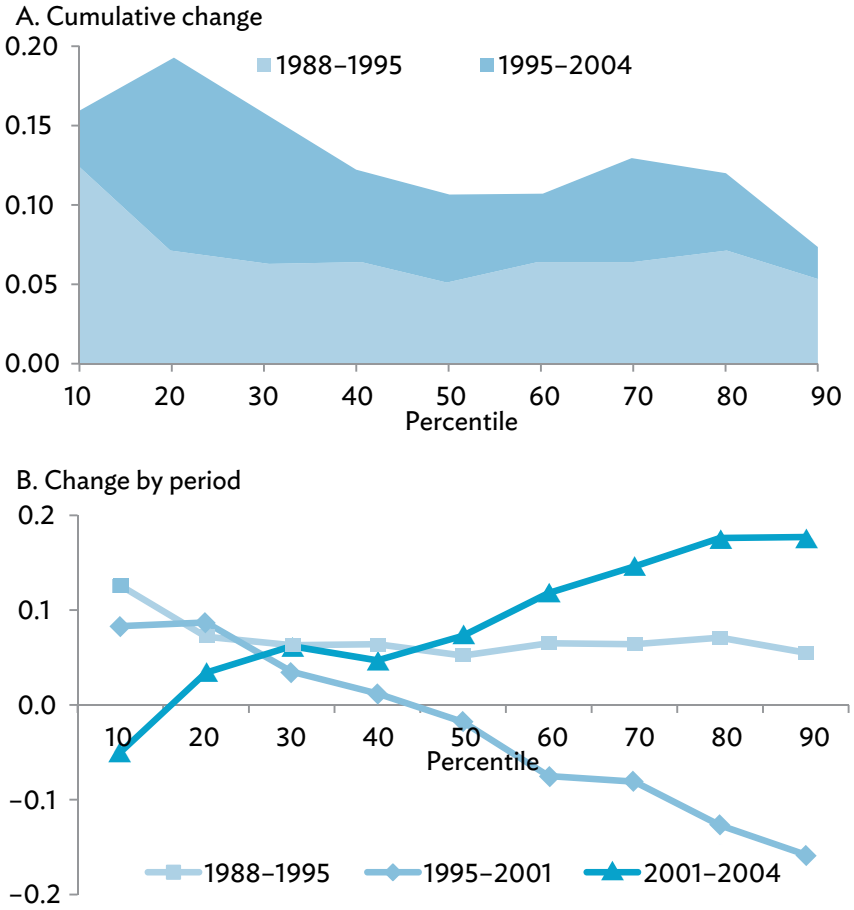
Gustafsson and Li (2000) investigated the gender wage gap in the urban PRC. Their results indicate that the gender wage gap in the PRC is relatively small but on the rise between 1988 and 1995. These are mostly attributed to the decrease in wages paid to female workers with limited experience and skill. As shown in Figure 21A, the change in gender wage gap is positive across the earnings distribution and greatest at the lower end of the earnings distribution.

The same trend continued across the earnings distribution, at least until 2001, but the gap widened greatly at the upper end of the distribution in recent years (2001–2004)(Figure 21B). The average female–male earnings ratio declined from 86.3% to 76.2% during 1988–2004. According to Zhang et al. (2008), the widening of the urban gender wage gap during this period mirrors the rapid increase in returns to both observed and unobserved skills in the PRC, which worked more favorably for the higher skill levels in men. In the same period, the employment rates declined, but more sharply for females than for males as more low-skilled women than low-skilled men exited from employment over time.

Gender differences in wage are quite pervasive in India. Women wage workers work fewer days per year, and are paid considerably less than men across educational levels, except those who are in urban areas and have completed the secondary level. For every 1 rupee (Rs) earned by men, women in urban areas earn only Rs0.68 and those in rural areas earn Rs0.54 (Desai et al. 2010). Gender differences in public sector salaries are lower but not negligible; on average, women receive 73% of the salary received by men.

As a result of having better jobs (especially salaried work), working more days, and receiving a higher wage rate, average annual earnings are much higher for men. These advantages accumulate across educational levels, age, social groups, genders, and, especially, urban locations. Rural men earn Rs16,216 per year or 3.6 times as much as their women counterparts (Rs4,491 per year); meanwhile, urban men earn Rs48,848 per year or 2.3 times as much as their women counterparts (Rs21,263 per year) (Desai et al. 2010).

Figure 21: Changes in the Gender Earnings Gap in Urban Areas in the People's Republic of China
(by earnings decile, %)



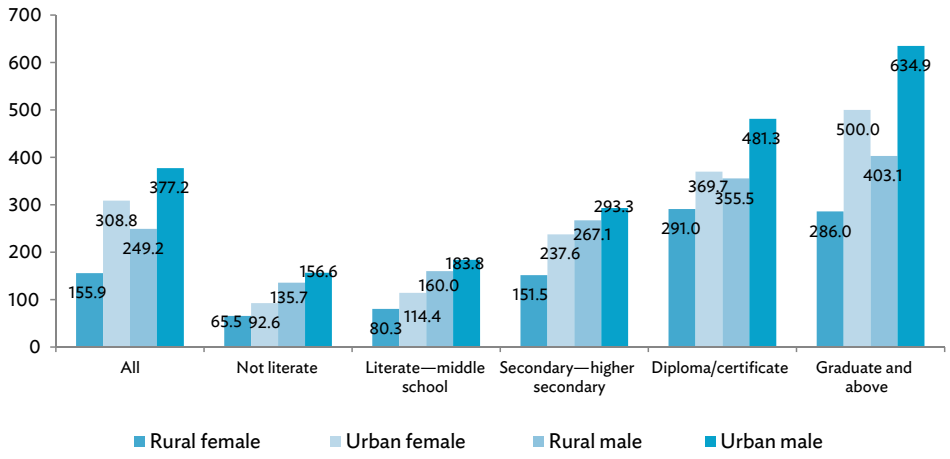
Note: Gender earnings gap is the male log earnings at a given decile minus the female log earnings at the same decile. Changes are differences between the gaps in the two indicated years.

Source: Author's illustration based on Zhang et al. (2008).

Gender wage differences are one of the factors associated with gender differences in labor participation rates (see Chapter 4 for a more detailed discussion). Overall, the average daily wage among wage or salaried employees is higher for males than for females in both rural and urban areas, as shown in Figure 22. Gender wage differences among employees are also distinct across different educational levels, especially among college graduates.

Bhalla and Kaur (2011) suggest that gender wage differences in India are partly due to gender differences in education and work experience. On average, female workers are less educated than males and have less work experience (in years), which is partly due to childbearing. For instance, each additional year of schooling increases wages of female workers by 14%–15%, and every additional year of work experience increases wages by 4%–6%.

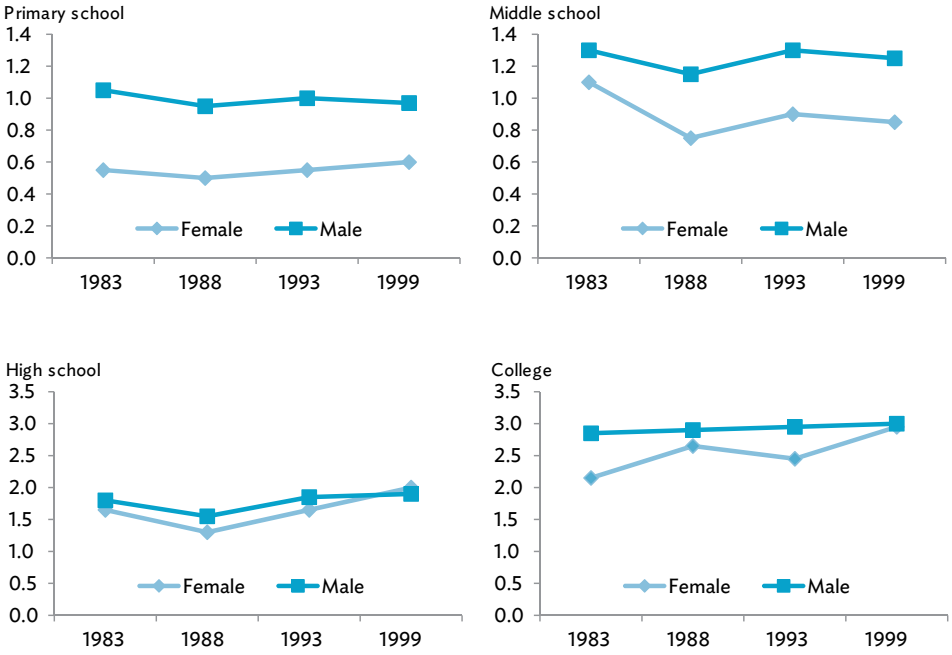
Figure 22: Average Daily Wage among Regular Wage or Salaried Employees by Education in India, 2009–2010
(rupees)



Source: Author's estimates based on the National Sample Survey 66th Round.

Chamarbagwala (2006) argues that while during the 1980s and 1990s there was a considerable widening of the skill–wage gap, accompanied by large increases in the supply of and demand for high school and college graduates, the gender wage differential narrowed significantly among high school and college graduates (Figure 23). It is argued that an increased demand for skilled workers,especially for skilled women, contributed significantly to the decline in gender disparity. Menon and Rodgers (2008) analyzed household data from India during 1983–2004 and found out that the trade liberalization in India increased the relative wages of women.

Figure 23: Relative Wages by Educational Attainment and Gender in India



Source: R. Chamarbagwala. 2006. Economic Liberalization and Wage Inequality in India. *World Development*. 34 (12). pp. 1997–2015.

CHAPTER 3

Human Development and Economic Growth

The past decades have seen outstanding improvements in educational attainment levels as discussed in the previous section. In 2010, the average years of schooling among the population aged 15–64 had increased to 7.5 years in the People's Republic of China (PRC) and 6.2 years in India (Barro and Lee 2013). The proportion of population aged 15–64 years with secondary education has increased to over two-fifths in India and two-thirds in the PRC.

In emerging and developing economies such as the PRC and India, an abundance of well-educated and better-skilled workers has boosted productivity, increased returns on investment, and facilitated technological adaptation and innovation. This section reviews the literature on the contribution of human capital development to growth and focuses on its empirical investigation in the PRC and India. It focuses on the role of quality improvements in the labor force, rather than quantity, on economic growth.

This section presents a new set of growth accounting estimates for the PRC and India for the past 5 decades (1960–2010). It compares the contribution of labor force and human capital improvements to output growth in the PRC and India between two periods: 1960–1980 and 1981–2010. The growth accounting methodology measures only the direct contribution of human capital accumulation, as a productive input, to output growth. Human capital can also contribute to economic growth through another channel, that of facilitating technological adaptation and innovation. This section discusses empirical results that support the positive role of human capital on technological progress and thereby overall economic growth.

In the PRC, the massive redistribution of the labor force across industries also contributed to higher productivity and growth in the economy. The reallocation of labor force from agricultural production in the rural areas toward production of manufactured goods in the urban areas allowed the expansion in labor-intensive manufacturing industries. In India, in contrast, there has been a very slow movement of workers out of agriculture into industry. Over half of the total labor force in India still remains in the agriculture sector. The section also examines the impact of labor reallocation on aggregate productivity growth based on an industry-level "shift-share" analysis.

A. Impacts of Human Development on Economic Growth: Theory and Evidence

Growth theories explain the improvement in education attainment and human capabilities that promote economic growth over the long run (Lucas 1988, 1993; Mankiw, Romer, and

Weil 1992). While human capital development is not the only determinant of economic growth, empirical evidence points to improvements in educational attainment and human capabilities as critical factors in long-term growth (Barro 1991; Barro and Lee 1994; Barro and Sala-i-Martin 2004; Mankiw, Romer, and Weil 1992).

Basic education increases the efficiency of each individual worker, whereas a lack of it can become a constraint in moving up the value chain and producing more sophisticated, high-value products (Schwab and Sala-i-Martín 2013). Furthermore, a pool of well-educated and well-trained workers who can perform complex tasks and adapt rapidly to the evolving needs of the production system is especially important for economies transitioning from simple production to more advanced production (Schwab and Sala-i-Martín 2013). Exports diversification and product quality upgrading are positively associated with endowment of skilled labor (ADB 2012a).

The traditional neoclassical growth theory regards technology as a public good—nonexcludable and nonrival—which has a limited role in explaining cross-country differences in economic growth. In contrast, other strands of literature consider it as a crucial factor in explaining these growth differences. Endogenous growth theory (Romer 1986, 1990), for instance, highlights the role of technological progress in long-term economic growth.

The development of new technologies hinges on the strong innovative capacity of the human capital stock present in the economy. In particular, high skilled human resources are often required for innovative activities. For developing countries, technology adaptation is considered to be more important than technology innovation to catch up with advanced countries, with technological progress requiring a healthy, well-educated, and trained workforce that is adept at absorbing new technologies among other things (e.g., research and development [R&D] investments, efficient goods market) (Barro and Sala-i-Martin 2004; Nelson and Phelps 1966). Empirical evidence also shows that the stock of human capital plays a key role in determining the extent and speed of technology diffusion in developing countries (Borensztein, De Gregorio, and Lee 1998).

Existing literature shows that human capital plays an important role in driving economic growth in the PRC and India. Empirical results based on growth accounting exercises, however, show that the contribution of human capital, measured by the improvement of educational attainment for labor force, to gross domestic product (GDP) growth is smaller when compared to growth in either physical capital per worker or total factor productivity (TFP). For instance, estimates by Bosworth and Collins (2008) show that during 1978–2004, education had a positive, but small, contribution of about 0.3–0.4 percentage point in the annual growth in output per worker of both countries. This represents around 12% of annual growth in output per worker in India, but only about 4% in the PRC, which had a higher output per worker growth during this period. Growth accounting for the PRC by Young (2003) shows that rising labor participation rates, improvements in educational attainment, and the transfer of labor out of agriculture accounted for the major part of GDP per capita growth during 1978–1998. However, the contribution of educational attainment to growth is not substantial.

Recent literature shows that there is a positive impact of human capital on technology development. Analysis of firm-level panel data from the PRC by Fleisher et al. (2011) highlights the important role of education on worker productivity and the TFP of the firms. The marginal product of workers is estimated to increase by around 30% for every additional year of schooling. Likewise, the TFP of foreign-invested firms also increases with an increase in the level of education of the chief executive. Their estimates also suggest that the effect of schooling on productivity vary substantially across ownership classes, with foreign-invested firms having the highest impact.

A comparative study by Li, Mengistae, and Xu (2011) suggests that, aside from having better infrastructure and more flexibility in hiring workers, having more skilled workers promotes higher TFP in the PRC than in India. The average proportion of workers who regularly use computers at work is significantly higher (by a median difference of 3 percentage points) among the firms in the PRC (22.2%) than in India (16.7%).

Improvements in human capital played a key role in the structural transformation of the economies of the PRC and India, and in achieving high growth rates in the past decades. Microdata analysis by Lee and Malin (2013) reveal that education plays an important role in improving the allocation of labor between the agriculture and the nonagriculture sectors of the PRC. They estimated that during 1978–2004, about 11% of aggregate growth in output per worker was due to increased education. Of this, 9 percentage points was gained through the labor reallocation channel, and the remaining 2 percentage points was due to higher within-sector human capital.

According to Fleisher, Li, and Zhao (2010), the regional growth patterns in the PRC are related to regional differences in physical and human capital, among other things. They found that human capital positively affects output and productivity growth across provinces through direct (e.g., domestic innovation activities) and indirect (e.g., spillover effect on TFP growth) processes. They also found that while investment in infrastructure generates higher returns in developed regions, human capital investment generates slightly higher or comparable returns in less developed areas.

Using firm-level data, Hsieh and Klenow (2009) found that, on the one hand, inefficiencies due to misallocation of factors of production may have lessened the TFP growth in Indian manufacturing by 2% from 1987 to 1994. On the other hand, because of allocative efficiency improvements, the PRC may have boosted its TFP by 2% per year during 1998–2005.

B. Growth Accounting

Growth accounting is a methodology used for decomposing the growth rate of the total output of an economy into components associated with changes in factor inputs (usually labor and capital) and TFP (also known as the Solow residual), which reflects technological progress and other elements (Solow 1957). Like many other analytical tools, this methodology has its limitations[11]—it only provides a mechanical decomposition of output growth into a variety of inputs and TFP (Topel 1999).

[11] For example, the growth accounting methodology assumes perfect competition, and therefore factors of production are paid the value of their marginal product. It is a simplistic mechanical decomposition and not a theory of growth.

It only accounts for the direct contribution of each of the factors of production and disregards interaction effects between inputs, such as the contribution of human capital to the growth of other inputs and technological progress. Because of this, the contribution of human capital to growth can be underestimated. Nonetheless, it is useful in generating benchmark estimates.

This accounting framework decomposes the growth of output into the contribution of four productive components: (i) growth in physical capital stock; (ii) growth in labor force; (iii) growth in human capital per worker, which reflects the changes in the quality of labor such as an increase in the average years of schooling for the labor force; and (iv) TFP growth.[12] By assuming a specific type of production function, output growth can be also expressed in per worker terms. It can then be decomposed into three growth components: (i) growth in physical capital per worker, (ii) growth in human capital per worker, and (iii) growth in TFP.

This approach is applied to decompose total and per worker output growth rates in the PRC and India during 1961–1980 and 1981–2010.[13] Average human capital (that is, aggregate labor quality) is measured as the weighted sum of the shares of workers multiplied by the relative marginal products (or relative wage rates) across all education categories. Labor is assumed to be only disaggregated by educational attainment, and the relative wage rate of a worker with schooling is determined by the rate of constant marginal return to an additional year of schooling of 10.1%.

Over the periods 1961–2010, the average annual GDP growth rates of the PRC and India were 7.6% and 5.1% per year, respectively. Both economies have shown improvements in economic growth since the 1980s. In the PRC, the average annual GDP growth rate increased from 4.6% during 1961–1980 to 9.6% during 1981–2010 (Table 8). The average annual GDP growth rate of India increased by a smaller degree compared with that of the PRC, from 3.6% during 1961–1980 to 6.1% during 1981–2010.[14]

Table 8 summarizes the growth accounting estimates. In India, the average labor force grew at about 1.3%–1.4% in 1961–2010, contributing to about 39% of the annual GDP growth in 1961–1980 and 22% in 1981–2010. In the PRC, the average labor force growth rate declined from 1.6% in 1961–1980 (35% of annual GDP growth) to 0.8% in 1981–2010 (8% of annual GDP growth).

As shown in Table 8, the accumulation of physical capital explains the largest portion of output growth in both economies. In the PRC, the physical capital contributed to about 56% of the average GDP growth rate during 1961-1980 and 49% during 1981-2010, while

[12] For more details, see Barro and Sala-i-Martin (2004).

[13] An alternative approach uses regression. Empirical studies based on provincial data (Chen and Li 2000; Fleisher, Li, and Zhao 2010; Li and Huang 2009) support the positive role of human capital for economic growth.

[14] There is quite a large volume of literature assessing the role of labor resources in the economic growth of the PRC and India. According to estimates by Cai and Wang (2005), for example, the sizable decline in total dependency ratio in the PRC (20.1 percentage points) between 1982 and 2000 contributed about 2.3 percentage points or a quarter of the average growth rate (8.6%) during the period. A more recent paper by Liu and Hu (2013) estimates the contribution of the decline in fertility and the rise in the share of working age population to the acceleration in the average annual per capita GDP growth in the PRC at about 1.19 percentage points in 1983 and 0.73 percentage point in 2008. Meanwhile, ADB (2011a) estimates suggest that between 1981 and 2010, the contribution of favorable population age structure to annual per capita output growth was about 1.16 percentage points in the PRC and about 0.56 percentage point in India.

in India it contributed to about 32% of the average GDP growth rate during 1961-1980 and 41% during 1981-2010.

During 1961–1980, the annual growth rate of the TFP in the PRC was only 0.1%, while it was 0.7% in India. In the following 3 decades (i.e., 1981–2010), TFP growth accelerated significantly to 3.9% in the PRC and to 1.4% in India. The significant improvement in TFP growth was critical in the acceleration of GDP growth in recent decades, contributing about 23% of GDP growth in India and 41% in the PRC.

While the contribution of human capital accumulation accounts for a significant portion of annual GDP growth in India (10% during 1961–1980 and 14% during 1981–2010), its impact is much smaller in the PRC. In the PRC, the contribution of human capital to annual GDP growth was about 6% during 1961–1980 and about 2% during 1981–2010. In the second period, human capital contributed about 2% of the average GDP growth in the PRC, compared with about 14% in India.

Table 8: Growth Accounting for the People's Republic of China and India

Country and Period	Labor Income (share in GDP)	Annual GDP Growth Rate (%)	Contribution of			
			Physical Capital	Human Capital	Labor Force	TFP Growth
India						
1961–1980	0.71	3.6	0.0114	0.0034	0.0141	0.0071
			(31.6%)	(9.6%)	(39.1%)	(19.7%)
1981–2010	0.60	6.1	0.0248	0.0086	0.0133	0.0142
			(40.7%)	(14.2%)	(21.8%)	(23.3%)
PRC						
1961–1980	0.55	4.6	0.0261	0.0026	0.0164	0.0013
			(56.2%)	(5.6%)	(35.4%)	(2.8%)
1981–2010	0.48	9.6	0.0472	0.0019	0.0079	0.0388
			(49.3%)	(2.0%)	(8.2%)	(40.5%)

GDP = gross domestic product, PRC = People's Republic of China, TFP = total factor productivity.

Note: Figures in parentheses are the contributions of each of the factors of production to annual GDP growth rate.

Source: Author's estimates based on GDP, physical capital stock, and labor share data from Penn World Tables 8.0 (Feenstra, Inklaar, and Timmer 2013) and Barro and Lee (2013).

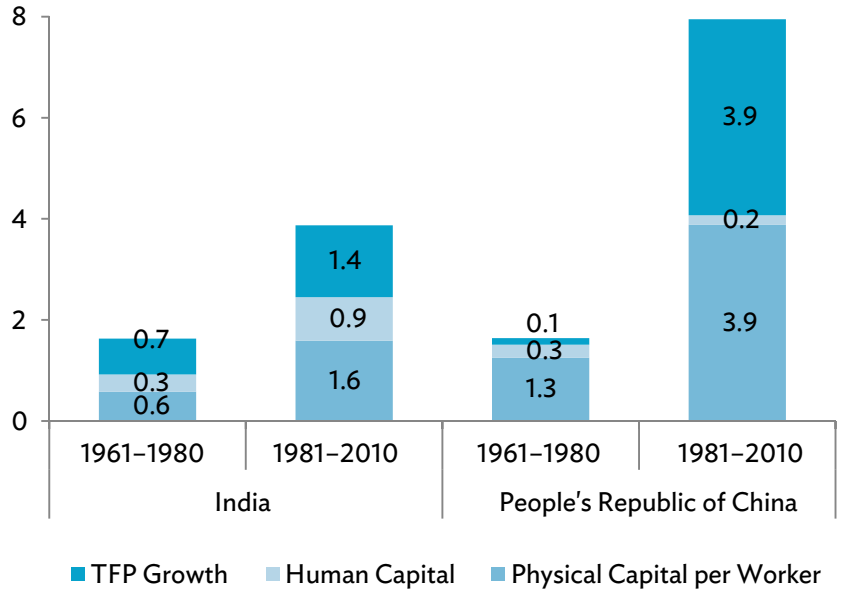
The average annual GDP per worker growth rates remained low both in the PRC and India (1.6% per year) during 1961–1980, before it accelerated to 8.0% in the PRC and to 3.9% in India during 1981–2010 (Figure 24). TFP and human capital explain much larger fractions of annual GDP per worker growth than of the overall GDP growth.

In the PRC, the share of TFP in annual GDP per worker growth was about 8% during 1961–1980, before it jumped to about 49% during 1980–2010. In India, it was about 44% during 1961–1980 and 37% during 1980–2010. Meanwhile, in the PRC, human capital contributed to 16% of the annual GDP per worker growth during 1961–1980 and 2.4% during 1980–

2010, whereas it contributed to about 21%–22% of the annual GDP per worker growth in India in 1961–2010.

The growth accounting estimates confirm that human capital is an important factor of economic growth in the PRC and India, but relatively lower than raw labor and physical capital, as well as TFP. Nonetheless, because of the limitations mentioned earlier, it does not necessarily indicate that human capital is less important than the other factors.

Figure 24: Sources of Annual Gross Domestic Product per Worker Growth in the People's Republic of China and India
(percentage points)



TFP = total factor productivity.

Source: Author's estimates.

If human capital influences TFP growth, growth accounting would underestimate the contribution of human capital to economic growth. For instance, the TFP growth may be an outcome of the efforts and capability for technological improvement in the economy.

C. Role of Human Capital in Technological Progress

Technological advancement in an economy is driven by either the development of new technologies or the adaptation of existing technologies, or both. The latter played a critical role in the rapid economic growth of the PRC and other advanced East Asian economies. Technological adaptation requires a healthy and highly capable workforce. Given access to advanced technology, they are a crucial determinant of the domestic absorptive capacity

or the capability to absorb the spillovers of foreign technologies (Abramovitz 1986), and thereby the extent and speed of technological diffusion in the country.

Empirical evidence supports this. For example, Benhabib and Spiegel (1994) found that a higher level of human capital raises the responsiveness of the growth rate to the initial income gap between developing and advanced economies. The stock of human capital with secondary and tertiary levels of education plays a key role in determining the development of information and communication technology in developing countries (Lee 2001).

Foreign direct investment (FDI) by multinational corporations, which often carry out a substantial part of the investment for R&D all over the world, is considered a highly important channel of technology diffusion (Findlay 1978; Lee and Shin 2012). The stock of human capital interacts with inflows of foreign technology-embodied FDI, thereby contributing to technology growth in developing countries (Borensztein, De Gregorio, and Lee 1998). Empirical studies show that FDI contributes significantly to productivity growth when the host economy satisfies a minimum threshold stock of educated workers (Borensztein, De Gregorio, and Lee 1998; Xu 2000).

Nevertheless, technology adoption alone does not guarantee sustained productivity growth in an economy. The catch-up speed of an economy to the world technology frontier is inversely related to the gap between the domestic and global levels of sophistication. This is also known as the "advantage of backwardness" (Gerschenkron 1962). This implies that as the gap closes, it gets more and more difficult for the lagging economy to catch up with the more advanced ones. To sustain productivity growth, in addition to adapting to the existing technologies, the emerging economy needs to eventually innovate and produce its own technologies. As this occurs, accumulating higher levels of human capital becomes more important.

In a cross-country study, Lee and Shin (2012) confirmed the important role of human capital on technology progress. Overall, they found that technology gap, initial stock of human capital, and FDI have positive impacts on the growth rate of TFP. Specifically, they found that for every additional year of schooling, annual TFP growth is promoted by 0.8 percentage point as shown in column (1) in Table 9. Take for instance, during the period 1970-2000, the PRC had an average of 1.2 years of combined secondary and tertiary schooling, India had 1.1 years, and the Republic of Korea had 3.6 years. The schooling advantage of over 2.4 years of the Republic of Korea is estimated to have raised its TFP growth by an average of about 1.9 percentage points per year, compared with that of the PRC and India.

Similarly, FDI has a positive effect on technology growth.[15] Furthermore, the interaction between FDI and human capital has positive and significant effects on TFP growth as shown in columns (2) and (3) in Table 9. Estimates in column (3) suggest that an additional year of postprimary schooling directly leads to a 0.3 percentage point increase in TFP growth, with an additional 0.36 percentage point increase in TFP growth through the

[15] A 0.023 increase in the FDI–GDP ratio (about 1 standard deviation) leads to an increase in the growth rate of TFP of about 1.2 percentage points per year. The impact of FDI on economic growth, if viewed causally, should be considered to include the impacts from improvements in the business and investment climate that attract more FDI.

interaction with FDI in a country with a world average level of FDI–GDP ratio (0.014). The total effect is greater when both years in schooling and FDI increase.

Table 9: Total Factor Productivity Growth and Foreign Direct Investment
(dependent variable: TFP growth)

Explanatory Variables	(1)	(2)	(3)
TFP gap	−0.6650*** (0.0084)	−0.0749*** (0.0075)	−0.0727*** (0.0084)
Initial average years of secondary and tertiary schooling (aged 15 and above)	0.0082** (0.0038)	0.0014 (0.0038)	0.0032 (0.0044)
Average FDI (FDI as percent of GDP)	0.5419*** (0.1846)		0.2729 (0.2103)
FDI schooling interaction term		0.2901*** (0.1066)	0.2561** (0.1218)
Number of observations	491	491	491
R^2	0.115	0.204	0.106

FDI = foreign direct investment, GDP = gross domestic product, TFP = total factor productivity.

Notes: Columns (1)–(3) are ordinary least squares with country fixed effects. The estimates are based on an unbalanced panel dataset of 88 countries, over six 5-year periods from 1970 to 2000. Period dummies and constant terms are included and not reported. Standard errors are reported in parentheses. Instruments for FDI are the lagged value of FDI, the log value of total GDP, and a measure of the nominal exchange rate volatility.

* indicates significance at 10%,** indicates significance at 5%, and *** indicates significance at 1%.

Source: J.-W. Lee and K. Shin. 2012. Welfare Implications of International Financial Integration. *Japan and the World Economy*. 24 (4). pp. 235–245.

Considering that the average FDI–GDP ratio was 0.04 in the PRC and 0.004 in India in the 1990s, the interaction effect between years of schooling and FDI indicates that an additional year of postprimary schooling is estimated to have increased the TFP growth rate by 1.0 percentage point in the PRC, while increasing only by 0.1% in India.[16] This highlights the fact that to promote technological progress, developing countries should promote not only greater access to advanced technologies but also the accumulation of skilled human resources that are capable of developing or using new technologies.

A recent paper by Park (2012) also investigates the role of human capital, as well as R&D investment on TFP growth, using cross-country panel data covering the period 1970–2007. Table 10 shows that human capital and R&D investment have significant and positive effects on TFP growth. Estimates indicate that a 1 year increase in average years of schooling leads to an increase of about 0.3 percentage point in TFP growth per year.

[16] In the 2000s, FDI flows to India increased significantly as its business environment improved, thereby narrowing the gap with the PRC, and contributing to faster growth. The FDI–GDP ratio in 2005–2010 in India was 0.02.

Table 10: R&D Model of Total Factor Productivity Growth
(dependent variable: average growth rate of TFP)

Explanatory Variables	(1)	(2)	(3)	(4)
Log GDP gap with the United States	−0.012*** (-7.479)	−0.011*** (-6.869)	−0.009*** (−3.962)	−0.008*** (−3.565)
Life expectancy gap with the United States	0.052*** (4.674)	0.045*** (4.033)	0.030* (1.858)	0.029* (1.835)
Human capital	0.022*** (4.594)	0.023*** (4.796)	0.016*** (3.471)	0.019*** (3.952)
Asian economy dummy		0.011*** (2.869)		0.010*** (2.862)
R&D capital stock per worker, growth rate			0.063*** (2.534)	0.057** (2.313)
Number of observations	505	505	146	146
Adjusted R^2	0.167	0.179	0.204	0.243

TFP = total factor productivity, GDP = gross domestic product, R&D = research and development.

Notes: Human capital = exp(0.08 x *h*), where *h* is the 10-year average educational attainment level. *t*-statistics are in parentheses. All models include period dummies but are not reported here.

* indicates significance at 10%, ** indicates significance at 5%, and *** indicates significance at 1%.

Source: J. Park. 2012. Total Factor Productivity Growth for 12 Asian Economies: The Past and the Future. *Japan and the World Economy.* 24 (2). pp. 114–127.

Overall, empirical results confirm that human capital is a key factor in technology adaptation and innovation. Its expansion should be important for sustained economic growth of the PRC and India. To promote technological progress and to move to an innovation-driven economy, the PRC and India must upgrade the quality of secondary and tertiary education while expanding investments for technology imports and innovation.

For instance, the estimates in Table 9 indicate that India can raise the annual growth rates of its TFP (and GDP) by about 0.5% by increasing the average years of secondary and tertiary schooling by 1 year, combined with an inflow of advanced technologies through FDI by raising the FDI–GDP ratio from its current level of 0.02 to that of the PRC, which is 0.04. This implies that human capital can make a significant contribution to reducing the gap in annual TFP growth estimates between the PRC (3.9%) and India (1.4%) in India during 1981–2010 as shown in Chapter 3, Section C. The increase of about 0.5% in annual growth rate would have led to an increase in the level of GDP by about 16% over 30 years.

D. Labor Reallocation, Structural Transformation, and Growth

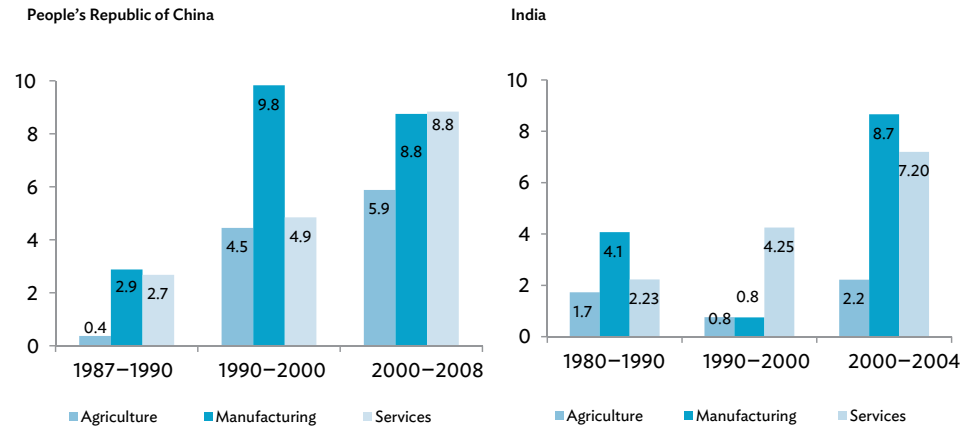
Recent papers emphasize the importance of reallocating human resources across industries for improvement in efficiency and overall economic growth. The study by the McKinsey Global Institute (MGI 2012b) concluded that the shift of labor from farm to nonfarm employment has been a significant contributor to output and productivity growth in the

PRC, but less so for India. The difference can be attributed to the faster labor productivity growth rate in the PRC. In 1990–2010, the labor productivity growth (9.8%) of the PRC was almost double that of India (5%). This was partly due to the faster transition to the manufacturing sector from agriculture in the PRC. The reallocation of labor from agriculture to the manufacturing and services sectors contributed 1.8 percentage points to output and productivity growth in the PRC but only 0.4 percentage point in India.

Lee and Malin (2013) show that about 11% of labor productivity growth in the PRC (1978–2004) is due to improvements in educational attainment of its labor force. Of this, 9 percentage points is attributable to cross-sector labor reallocation, while 2 percentage points is due to increase in within-sector human capital.

Figure 25 presents the average annual labor productivity growth in the PRC and India by sector in 3 decades: 1980s, 1990s, and 2000s. During these periods, the average annual growth in labor productivity in the PRC accelerated steadily in both the agriculture and services sectors. In the manufacturing sector, growth in labor productivity more than tripled its average rate from that during 1987–1990 to an annual average of 9.8% during 1990–2000, but declined slightly by a percentage point during 2000–2008.

Figure 25: Average Annual Growth Rates of Valued Added per Worker by Sector
(%)



Source: Author's estimates based on the Groningen Growth Developing Centre 10-sector database.

In India, however, only the services sector saw a steady rise in labor productivity, rising from 2.2% in the 1980s to 7.2% in the early 2000s. Meanwhile, both the agriculture and manufacturing sectors saw a see-saw pattern of growth in labor productivity. It initially declined in the 1990s from the 1980s, before rising again in the early 2000s.

The shift-share analysis technique empirically examines the impact of labor reallocation on aggregate productivity growth. Recent papers such as Maudos, Pastor, and Serrano(2008); Maroto-Sánchez and Cuadrado-Roura (2009); Timmer and de Vries (2009); McMillan

and Rodrik (2011); and de Vries et al. (2012) have used this technique to examine the impact of structural change on economic growth. It shows how aggregate labor productivity growth is linked to the differential growth of labor productivity in individual sectors and the reallocation of labor between sectors. It uses an accounting technique to decompose aggregate labor productivity growth over a period of time into a "within effect" (labor productivity growth within each industry) and a "shift effect" or "structural change effect" (labor productivity growth due to employment shifts toward more productive industries).

The following equation analyzes the role of labor reallocation for aggregate productivity growth.

$$\Delta Y_t = \sum_{i=1}^{N}(s_{i,t-k} \times \Delta y_{i,t}) + \sum_{i=1}^{N}(y_{i,t} \times \Delta s_{i,t}) \quad (1)$$

Equation 1 shows that the overall growth of labor productivity in an economy is divided into two components. The first is the contribution from productivity growth within individual sectors ($\Delta y_{i,t}$) weighted by the share of employment ($s_{i,t}$) in each sector ("within effect"). The second is the contribution from labor reallocation across different sectors ("structural change effect"). The second term is the change of employment shares multiplied by productivity levels at the end of the time period across sectors.

The structural change term is again divided into two components: the change of employment shares multiplied by the initial productivity levels for the time period ("static structural change") and the interaction between the change in employment shares and the productivity growth in individual sectors ("dynamic structural change").

$$\Delta Y_t = \sum_{i=1}^{N}(s_{i,t-k} \times \Delta y_{i,t}) + \sum_{i=1}^{N}(y_{i,t-k} \times \Delta s_{i,t}) + \sum_{i=1}^{N}(\Delta y_{i,t} \times \Delta s_{i,t}) \quad (2)$$

The contribution of each sector in the "structural change effect" can be either positive or negative, depending on whether a sector is expanding or shrinking. When the contributions from individual sectors are aggregated, the structural change term becomes negative, lowering economy-wide productivity growth, if the labor displaced from high productivity growth sectors moves to low-productivity growth sectors.

To perform this analysis, sectoral data from the PRC and India are used. The Indian data was provided by the Groningen Growth Developing Centre 10-sector database, which provides annual data on value added and employment data from 1970 to 2005 (see Timmer and de Vries 2009). The Groningen Growth Developing Centre data provide disaggregated data consisting of 10 sectors, as defined by the ISIC Revision 2. It includes India in addition to nine Asian economies—Japan; four newly industrialized economies in Asia (Hong Kong, China; the Republic of Korea; Singapore; Taipei,China); and ASEAN-4 (Indonesia, Malaysia, the Philippines, Thailand). The PRC data are from the CIP Database Round 1.0 (2011).[17]

Table 11, part A, presents the results of the shift-share analysis for the PRC during 1987–2008. It shows that the within effects dominate the effects of structural changes across sectors and

[17] http://www.rieti.go.jp/en/database/CIP2011/index.html (accessed 1 May 2014).

time periods. Strong labor productivity growth in individual sectors has been a salient feature of the economic growth achieved by the PRC. Nevertheless, structural change has also made a significant contribution to the overall growth of labor productivity in recent decades.

Table 11: Decomposition of Labor Productivity Growth Using Shift-Share Analysis in the People's Republic of China and India

Period and Sector	Total Labor Productivity Growth	Within Effect[a]	Structural Change Effect (static)[b]	Structural Change Effect (dynamic)[c]
A. People's Republic of China				
All Sectors, 1987–2008	7.21	5.92	0.34	0.94
Agriculture, forestry, and fishing	4.41	0.77	-0.16	-0.25
Mining and quarrying	2.62	0.20	-0.08	-0.06
Manufacturing	8.42	2.33	0.08	0.37
Electricity, gas, and water supply	5.25	0.11	0.04	0.08
Construction	5.57	0.24	0.05	0.12
Services	6.06	2.28	0.41	0.68
By Decade				
All Sectors, 1987–1990	0.69	1.24	-0.43	-0.12
Agriculture, forestry, and fishing	0.37	0.09	0.21	0.00
Mining and quarrying	-3.05	-0.38	-0.08	0.01
Manufacturing	2.88	0.70	-0.67	-0.06
Electricity, gas, and water supply	2.60	0.07	0.08	0.01
Construction	-1.95	-0.10	-0.05	0.00
Services	2.68	0.85	0.08	-0.08
All Sectors, 1990–2000	6.97	6.40	0.63	-0.05
Agriculture, forestry, and fishing	4.45	0.97	-0.30	-0.17
Mining and quarrying	3.78	0.36	-0.23	-0.11
Manufacturing	9.83	2.66	0.00	-0.01
Electricity, gas, and water supply	1.68	0.04	0.09	0.02
Construction	4.87	0.20	0.15	0.09
Services	4.85	2.15	0.92	0.12
All Sectors, 2000–2008	9.95	7.76	1.06	1.13
Agriculture, forestry, and fishing	5.88	0.79	-0.26	-0.16
Mining and quarrying	3.29	0.15	0.01	0.00
Manufacturing	8.75	2.53	0.67	0.68
Electricity, gas, and water supply	10.72	0.29	0.02	0.03
Construction	9.26	0.50	0.03	0.03
Services	8.84	3.50	0.59	0.54

continued on next page

Table 11: continued

Period and Sector	Total Labor Productivity Growth	Within Effect[a]	Structural Change Effect (static)[b]	Structural Change Effect (dynamic)[c]
B. India				
All Sectors, 1980–2004	3.51	2.23	0.85	0.43
Agriculture, forestry, and fishing	1.41	0.44	-0.15	-0.06
Mining and quarrying	2.05	0.04	0.03	0.02
Total manufacturing	3.45	0.49	0.10	0.13
Public utilities	3.75	0.07	0.01	0.02
Construction	-0.77	-0.03	0.27	-0.04
Services	3.90	1.22	0.59	0.37
By Decade				
All Sectors, 1980–1990	3.08	2.04	1.00	0.04
Agriculture, forestry, and fishing	1.73	0.67	-0.27	-0.05
Mining and quarrying	1.17	0.02	0.10	0.01
Total manufacturing	4.07	0.62	0.10	0.05
Public utilities	5.71	0.11	0.00	0.00
Construction	-2.27	-0.10	0.30	-0.06
Services	2.23	0.73	0.77	0.09
All Sectors,1990–2000	2.81	1.61	1.77	-0.56
Agriculture, forestry, and fishing	0.76	0.23	-0.22	-0.02
Mining and quarrying	2.55	0.07	-0.02	-0.01
Total manufacturing	0.75	0.12	0.43	0.03
Public utilities	1.65	0.03	0.06	0.01
Construction	-3.20	-0.13	0.38	-0.11
Services	4.25	1.29	1.12	-0.48
All Sectors, 2000–2004	6.33	6.05	0.41	-0.13
Agriculture, forestry, and fishing	2.22	0.51	0.03	0.00
Mining and quarrying	2.97	0.07	0.07	0.01
Total manufacturing	8.66	1.64	-0.36	-0.15
Public utilities	4.09	0.10	-0.01	0.00
Construction	9.09	0.53	-0.07	-0.03
Services	7.20	3.19	0.76	0.04

Note: The shift-share analysis is used to decompose the overall growth of labor productivity into three components: a = productivity growth within individual sectors weighted by the share of employment in each sector ("within effect"); b = the change of employment shares multiplied by the initial productivity levels for the time period ("static structural change"); and c = the interaction between the change in employment shares and the productivity growth in individual sectors ("dynamic structural change"). All the values are percentage points.

Source: Author's estimates based on the Groningen Growth Developing Centre 10-sector database.

The effect of structural change in both the manufacturing and services sectors was positive during 1987–2008. Higher employment and productivity in the manufacturing and services sectors also contributed positively to the overall labor productivity growth. During 2000–2008, the total structural change effect contributed to the overall average labor productivity growth by 2.2 percentage points, in which manufacturing contributed strongly by 1.1 percentage points, while the agriculture sector contributed negatively by 0.4 percentage point.

Table 11, part B, demonstrates the importance of the services sector in structural change and aggregate productivity growth in India, especially in recent decades. Since 1990, the services sector has dominated the manufacturing sector in terms of contribution to aggregate labor productivity growth due to the strong positive within effect and structural change effect of the services sector. During 1980–2004, the within effect of the services sector (which is average labor productivity growth rate multiplied by the initial employment share) was 1.2 percentage points, far exceeding the 0.04 percentage point by the manufacturing sector.

The services sector contributed positively to the overall structural change effect due to the increase in services sector employment as well as high productivity growth. During 1980–2004, the total structural change effect of the services sector contributed to the overall average labor productivity growth by about 1.0 percentage point while that of the manufacturing sector contributed almost zero.

During 2000–2004, the static structural change effect of the manufacturing sector was negative (–0.36 percentage point) due to the declining employment share of manufacturing employment. In contrast, the services sector showed strong positive static structural change effect due to an increase in services sector employment.

The shift-share analysis shows the relationship between cross-sector labor reallocation and labor productivity growth in the PRC and India. It confirms that in India, the services sector has a more dominant role in contributing to the overall economic growth in terms of sectoral productivity growth and structural change effects. Some services such as software and business consulting have shown astonishing growth in India. Modern services sectors can continue to expand and give positive effects on labor productivity growth and employment in India. However, the weaker performance of labor-intensive manufacturing industries, relative to those in the PRC, has hampered job creation and output growth in India. India needs to develop labor-intensive manufacturing that would help accelerate the pace of job creation and aggregate labor productivity growth.

CHAPTER 4

Labor Supply and Education Prospects and Challenges

The past 5 decades saw remarkable expansion in the supply of labor in the People's Republic of China (PRC) and India. Both countries have experienced very large increases in their labor force—nearly 8 million new entrants a year in the PRC since the mid-1990s, and 7 million per year in India (World Bank 2013). These new entrants are increasingly more educated than the existing labor force.

This chapter examines the changes in labor supply and labor participation in the PRC and India. It reviews the differences in labor participation rates by gender and by age, and the factors that may have influenced them. It also presents projections of future progress in labor supply and educational attainment, and assesses whether the supply of skilled workers can meet demand changes in the future.

A. Labor Supply

Demographic changes and labor supply changes in the demographic structure—a key determinant of labor supply and wage dynamics—have played an important role in the economic performance of both the PRC and India in the previous decades. Both countries have undergone remarkable, but significantly different, demographic changes since the 1950s (Golley and Tyers 2012, 2013).

However, because of its one-child policy along with other factors (e.g., improvements in female education and labor participation rate), the PRC has experienced a rapid decline in fertility rate, resulting in a rapid demographic transition to slower population growth, decline in youth dependency, and rapid aging. Meanwhile, in India, the steady decline in fertility rate and dependency ratio since the 1970s was much slower than in the PRC.

Although the overall dependency ratio in India—ratio of the young and the elderly to those of prime working age (aged 15–59 years)—is currently higher than that in the PRC (Table 12), because the population in the PRC is aging much faster than in India, the ratio will rise rapidly in the PRC in the next 2 decades, while it will be on the decline in India (Wolf et al. 2011).

The size of the prime working-age population (aged 15–59 years) in the PRC peaked in 2010 (Cai 2014), and as shown in Figure 26, has started to decline due to aging and low fertility rate. In India, it is expected to further decrease quite rapidly in the coming decades, as the growth of its workforce starts to decelerate.

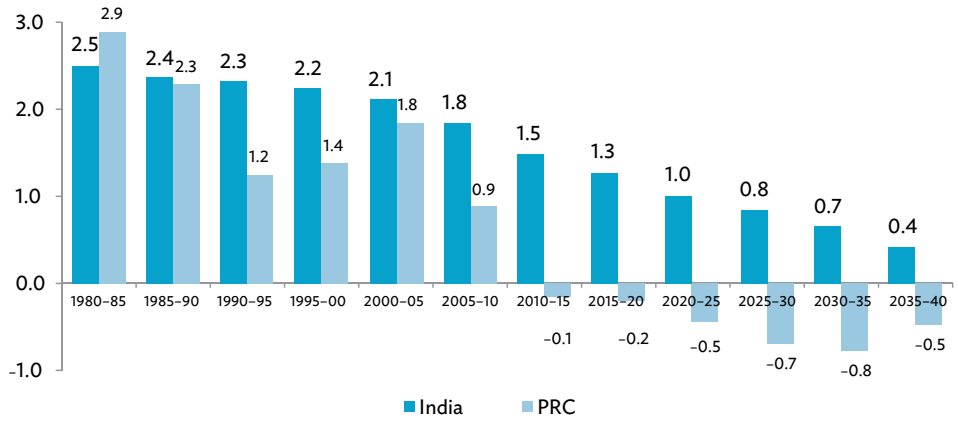
Table 12: Age Dependency Ratios in the People's Republic of China and India
(% of working-age population)

	India		People's Republic of China	
Year	Total	Old	Total	Old
1960	76.5	5.4	77.5	7.0
2012	53.0	7.9	36.4	11.8

Note: Working-age population here refers to 15–59 years old.

Source: World Bank. 2013. *World Development Report 2013: Jobs.* Washington, DC.

Figure 26: Growth of Prime Working-Age Population in the People's Republic of China and India
(average annual rates, %)



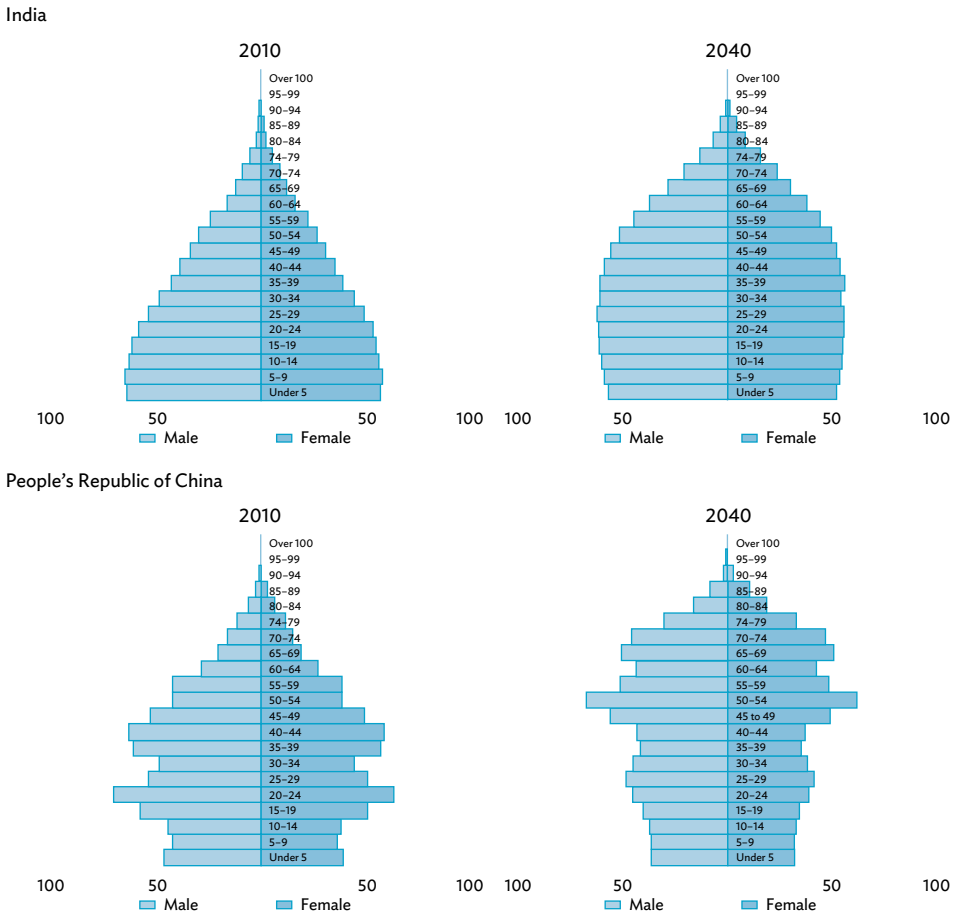
PRC = People's Republic of China.

Source: Author's estimates based on United Nations' (2013) 5-year estimates of population aged 15–59 years from 1980 to 2010, and medium-variant projections for 2015 until 2040.

Based on population projections by the United Nations (2013), the prime working-age population of the PRC is expected to shrink by 15 million people between 2010 and 2020, and another 105.8 million between 2020 and 2040. In contrast, the prime working-age population of India will continue to expand in the same period: by 111.2 million between 2010 and 2020, and another 136.2 million during 2020–2040. The prime working-age population in both countries will reach the same level around 2025.

Figure 27 illustrates the structure of population by age and gender in 2010 and 2040. While the share of the working-age population aged 15–64 is expected to increase in India up to 2050, it is expected to decline in the PRC due to aging of the adult population and low fertility. The diminishing labor supply in the PRC and the expanding labor supply in India present policy challenges for both countries.

Figure 27: Structure of Population by Age and Sex



Source: Author's estimates based on United Nations (2013).

B. Labor Force Participation

More than the size of the working-age population, the size of the productively employed population and the quality of their employment matters. Table 13 presents three issues: (i) the decline in labor force participation in both the PRC and India; (ii) the gap in labor force participation rates between the PRC and India; and (iii) the gender disparities in labor force participation in both countries, especially in India.

As shown in Figure 28, the declining trend in labor participation was seen among males and females in both urban and rural India. The decline was also observed in most states, but the rates varied across states (see Table 14). This can be partly explained by the increasing absence of those aged under 25 from the workforce, which can be associated with an increase in school participation among them (Mehrotra et al. 2013).

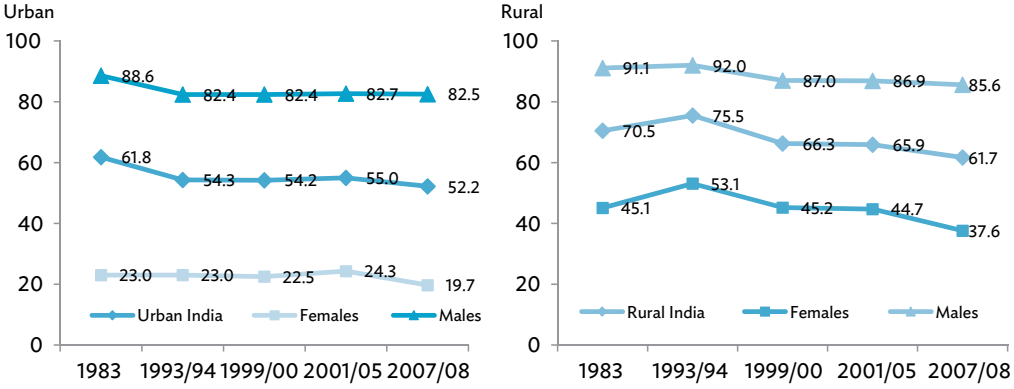
Table 13: Labor Indicators in the People's Republic of China and India

Indicator	Country	1990	2012
Labor force, total (million)	PRC	633.2	787.6
	India	330.7	484.3
Labor force, female (% of total labor force)	PRC	44.7	43.6
	India	27.5	25.3
Labor Force Participation Rate (% of population aged 15–64)			
Total	PRC	84.2	77.0
	India	62.8	57.9
Female	PRC	79.1	70.0
	India	36.5	30.3
Male	PRC	88.9	83.6
	India	87.1	83.5

PRC = People's Republic of China.

Sources: World Bank.2013. *World Development Report 2013: Jobs.* Washington, DC; United Nations Development Programme (UNDP). 1990. *Human Development Report 1990. Concept and Measurement of Human Development.* New York. http://hdr.undp.org/en/reports/global/hdr1990; UNDP. 2013. *Human Development Report 2013. The Rise of the South: Human Progress in a Diverse World.* New York. http://hdr.undp.org/en/2013-report; R. Barro and J.-W. Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics.* 104. pp. 184–198.

Figure 28: Labor Force Participation in India
(% of population aged 15–59)



Note: Labor force refers to the 15–59 age group that reports that they are working, or looking for work, according to the "weekly status" definition of employment.

Source: Bhalla and Kaur (2011) based on the National Sample Survey 1983, 1993/1994, 1999/2000, 2004/2005, and 2007/2008 rounds.

Despite having a higher literacy rate (as discussed in Chapter 2) and educational attainment, labor participation rates are much lower in urban areas, especially among females (Figure 28). In addition, the gender gap in labor participation is much wider in urban than in rural areas.

Disparities in female labor force participation, which also reflect variations in employment opportunities, are dramatic across states, and between rural and urban areas (Desai et al. 2010). Table 14 shows that, for instance, in 2009–2010, the participation rates of the female labor force ranged from 44.7 in the rural area of Andhra Pradesh to 2.8 in rural Delhi. On the other hand, participation rate of female labor force ranged from 29.8 in the urban area of Mizoram to 1.7 in the urban area of Dadra and Nagar Haveli.

Table 14: Female Labor Force Participation Rates in India
(%)

State	Rural			Urban		
	2004–2005 (1)	2009–2010 (2)	Difference (2) – (1)	2004–2005 (3)	2009–2010 (4)	Difference (3) – (4)
India	33.3	26.5	-6.8	17.8	14.6	-3.2
By Major States						
Andhra Pradesh	48.5	44.7	-3.8	23.2	18.6	-4.6
Bihar	13.8	6.6	-7.2	6.8	5.6	-1.2
Delhi	4.7	2.8	-1.9	9.4	6.0	-3.4
Gujarat	42.8	32.2	-10.6	15.5	14.8	-0.7
Karnataka	46.2	37.2	-9.0	19.2	17.7	-1.5
Kerala	32.1	26	-6.1	30.1	23.3	-6.8
Madhya Pradesh	36.6	28.4	-8.2	15.6	13.6	-2.0
Maharashtra	47.5	39.7	-7.8	19.8	16.7	-3.1
Rajasthan	40.7	35.7	-5.0	18.8	12.6	-6.2
Tamil Nadu	46.7	41.1	-5.6	25.3	20.2	-5.1
Uttar Pradesh	24.1	17.5	-6.6	12.0	8.3	-3.7
West Bengal	18.4	15.6	-2.8	16.9	15.1	-1.8

Note: Labor force participation rate refers to proportion of population (aged 15–59) who are either working or looking for work.

Sources: 2004–2005 and 2009–2010 values are from Mehrotra et al. (2013) based on the National Sample Survey 61st and 66th Rounds; differences are author's estimates.

Poorer and less educated women in India are more likely to participate in the workforce (Desai et al. 2010). In rural areas, more than 80% of women participate in agricultural activities, which are mostly daily farm activities (Figure 29).

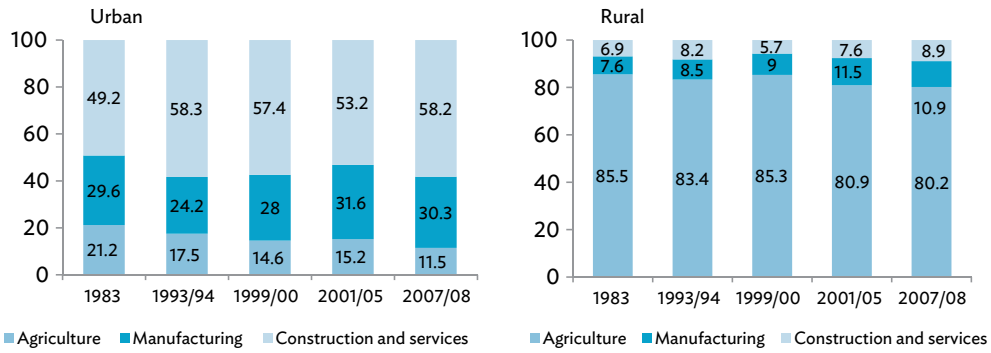
Because female labor force participation rate in India declines progressively with higher levels of education, better education fails to close the gender gap in labor force participation (Desai et al. 2010). Participation in the labor force among women is negatively related to the education of the spouse (Bhalla and Kaur 2011).

In the past 2 decades, while labor force participation has remained steady in rural PRC, it has declined steadily in urban areas (Giles, Park, and Cai 2006; World Bank 2012), among both males and females and across age groups (Liu 2012). According to the World Bank

(2007), the decline in urban labor participation is most prominent starting in the mid-1990s (see also Table 14 and Figure 30).

Figure 29: Distribution of Female Labor Force Participation by Industry in India

(%)

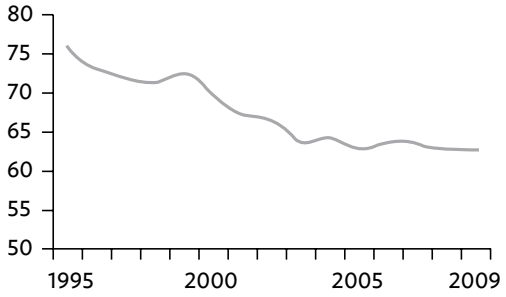


Note: Labor force refers to population aged 15–59 who are reportedly working, or looking for work, according to the "weekly status" definition of employment.

Sources: Bhalla and Kaur (2011) based on the National Sample Survey 1983, 1993/1994, 1999/2000, 2004/2005, and 2007/2008 rounds.

Figure 30: Labor Force Participation in Urban Areas in the People's Republic of China

(%)



Source: World Bank (2012) based on Cai, Du and Wang (2011).

Studies point out that this decline can be attributed to the correction of an inflated labor force participation rate under the full employment policy of the central planning to a postreform market clearing level (see World Bank 2007). Early retirement was extensively used as an instrument to relieve labor market pressures during the peak of restructuring of state-owned enterprises in 1998, when employment opportunities declined, particularly among older and low-skilled workers (Giles, Park, and Cai 2006). Being unable to find a new job, these workers either retired or dropped out from the labor force early. Almost by default, migrants have much higher activity rates than urban residents as they arrive to take up a specific job and often leave when this job is finished (Fox and Zhao 2002).

Another factor contributing to the decline in labor participation is the increased numbers of young Chinese who continue their education and delay their entry into the urban labor market. According to the World Bank (2007), this accounts for as much as half of the decline in the labor force. For instance, as shown in Table 14, the decline in labor participation rates among 20- to 24-year-olds was largely the result of increasing educational participation, particularly in higher education (Liu 2012).

Consistent with an earlier study by Maurer-Fazio, Hughes, and Zhang (2005), logistic regression analysis by Liu indicated that age, education, employment opportunities, communist party membership, and marital status affect labor force participation. Furthermore, Liu found that the relationship between employment and education, as well as party membership, is becoming stronger over time.

Table 15 shows that while there are observable gender differences in urban labor force participation in the PRC, it is less pronounced than in India. According to Giles, Park, and Cai (2006), this gender disparity in participation, which is statistically significant even after controlling for other factors, increases with age.

In the 1980s, rural industrialization contributed to employment growth in the PRC, but since the mid-1990s, there has been an increase in urban labor demand due to the fast growth in the manufacturing and services sectors, particularly in the export-oriented coastal regions. New income opportunities and the liberalization of markets attracted millions of rural workers to urban areas, causing rapid growth in rural–urban migration. The number of rural migrants surged to over 100 million in the late 1990s to 145 million in recent years.

Studies consistently suggest that higher education, young age, being male and single, and having less land and more labor surplus in the household positively influence the probability of migration (Du, Park, and Wang 2005; Knight and Song 2003a; Knight, Song, and Huaibin 1999; Rozelle et al. 1999). Du, Park, and Wang (2005) show evidence of an inverted U-shape income–migration probability relationship in the PRC, with both poor and rich rural residents being less likely to migrate. Poorer rural households are less likely to migrate due to higher barriers they will face, such as having fewer resources to finance migration and lesser access to social networks.

Majority of the labor force tends to migrate alone, and only less than 10% of the migrant workers migrate with their families (World Bank 2009). Female migrants start to return home when they are aged between 25 and 35, while male migrants normally do so in their mid-30s (Meng 2012).

Table 15: Labor Force Participation Rate in Urban Areas in the People's Republic of China

(%)

	1988		1995		2002	
	Male (*n* = 8,550)	Female (*n* = 8,792)	Male (*n* = 6,320)	Female (*n* = 6,674)	Male (*n* = 6,334)	Female (*n* = 6,782)
Average	98.4	91.8	95.8	86.9	90.8	75.1
Educational Level						
Below primary	96.2	56.8	59.1	37.2	50.0	28.1
Primary	98.5	77.4	91.4	59.2	79.8	43.3
Junior	98.6	94.7	96.2	85.7	89.7	62.9
High school	99.6	97.6	96.9	93.4	94.0	83.0
Technical secondary	98.8	97.3	96.0	92.3	89.9	84.4
Junior college	99.2	98.1	96.8	95.3	93.1	87.4
University	88.1	98.1	93.3	88.2	85.8	73.0
Age Group						
20–24	96.9	96.9	85.2	85.6	61.7	58.1
25–29	99.3	99.4	97.1	94.8	94.5	89.2
30–34	99.9	99.5	99.4	98.4	97.4	94.3
35–39	99.9	99.1	99.3	97.4	98.5	91.4
40–44	99.8	97.4	99.4	96.6	97.7	90.7
45–49	98.8	89.5	97.3	81.6	94.8	75.0
50–55	93.8	48.7	88.6	43.0	82.0	33.6
Political Party Membership						
0	98.1	91.5	94.7	86.1	89.4	74.1
1	99.1	94.4	98.5	92.5	93.8	79.8
Minority						
0	98.4	91.8	95.8	87.0	90.8	75.1
1	98.8	92.1	96.6	85.4	90.6	74.2
Civil Status						
Single	–	–	88.0	84.7	75.9	67.5
Married	–	–	97.5	87.5	93.7	76.3
Divorcee or widow	–	–	77.1	84.7	76.9	68.6

n = number of observations, – = no data.

Note: Labor force participation rate is the ratio of labor force participants divided by the working-age population.

Source: Liu (2012) based on Chinese Household Income Project surveys 1988, 1995, and 2002.

C. Projections of Educational Attainment by Gender and Level

Barro and Lee (forthcoming) estimate the projections of educational progress over the next 25 years (2015–2040). The projection methodology has two steps. First, country-specific logistic trends are calculated and projections for school enrollment ratios between 2015 and 2040 are constructed at 5-year intervals. Second, using these enrollment ratio projections and that of the United Nations on population structure, forward extrapolation estimates are made of the educational data by age group for 2015–2040. The method uses updated benchmark data on educational attainment by age in 2010 for forward extrapolations.

Barro and Lee use a logistic growth model to estimate the trend in enrollment rates from 1870 to 2010. The model assumes that the enrollment ratio at education level j ($enroll_{,tj}$ j = primary, secondary, or tertiary level) grows logistically for each country over time (t), until it approaches the maximum ratio, $enroll_{j}^{max}$. That is, it follows the following logistic growth time trend:

$$\text{enroll}_{j,t} = \text{enroll}_{j}^{\max}/(1 + \exp(-\alpha - \beta_j \text{time}) \quad (3)$$

Annual enrollment data by educational level from 146 countries during 1870–2010 are fitted to the growth model using logistic regression with country fixed effects and country-specific slope coefficients. The estimated trends (country-specific slope coefficients)[18] are used to calculate projections of enrollment ratios for 2015 through 2040.

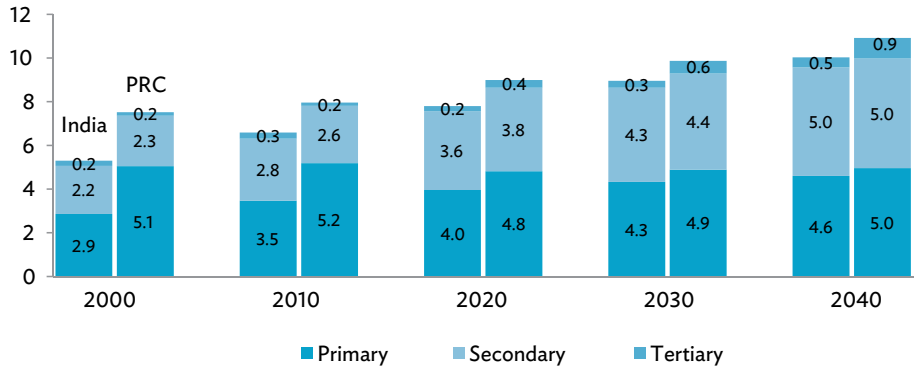
The distribution of educational attainment for the younger population aged 15–24 is estimated at 5-year intervals from 2015 to 2040. Forward extrapolations are made to construct the distribution of educational attainment for the older population groups during the period. Figure 31 and Table 16 show the projection of educational attainment of the working-age population over the next 25 years.

Table 16 shows that the proportion of the population that has attained secondary education as their highest level is expected to increase from 44% to 64% of the working-age population in India for the next 30 years. In contrast, the PRC is expected to have a smaller proportion of the population having attained secondary education as their highest level, but the proportion of the population with a tertiary education is projected to rapidly increase, from 5% in 2010 to 36% by 2040, surpassing India from 2020.

A more rapid educational progress in India in the coming decades would narrow the gap in attainment with the PRC. The average years of schooling in India is projected to increase to 10.03 years by 2040, from only 6.59 years in 2010. In the PRC, it is projected to increase from 7.96 years in 2010 to 10.92 years in 2040. With these improvements, the gap in educational attainment between the PRC and India will decline to only 0.89 year by 2040 from 1.37 years in 2010.

[18] See Barro and Lee (forthcoming) for more details.

Figure 31: Projections of Educational Attainment in the People's Republic of China and India
(population aged 15–64)



PRC = People's Republic of China.

Source: R.J. Barro and J.-W. Lee. Forthcoming. *Education and Modernization Worldwide from the 19th to 21st Century.* New York: Oxford University Press.

Table 16: Educational Attainment in the People's Republic of China and India

Country and Year	Population Aged 15–64 (million)	No Schooling	Primary		Secondary		Tertiary		Average Years of Schooling
			Total	Completed	Total	Completed	Total	Completed	
			(highest level attained, % of population aged 15–64)						
India									
2010	762	30.1	17.2	16.0	43.9	25.6	8.9	5.3	6.59
2020	908	20.6	14.0	13.6	56.8	35.1	8.6	4.9	7.93
2030	1,005	13.4	9.7	9.6	62.9	41.1	14.0	7.6	9.27
2040	1,072	7.8	6.7	6.7	63.6	43.6	21.9	12.0	10.47
People's Republic of China									
2010	978	2.6	20.8	13.1	71.8	24.7	4.8	2.6	7.96
2020	1,004	1.3	12.7	7.9	73.4	29.2	12.7	6.8	9.05
2030	988	0.7	7.7	4.9	69.1	33.3	22.6	12.2	10.01
2040	909	0.4	3.1	2.0	60.3	35.4	36.3	20.3	11.14

Source: R.J. Barro and J.-W. Lee. Forthcoming. *Education and Modernization Worldwide from the 19th to 21st Century.* New York: Oxford University Press.

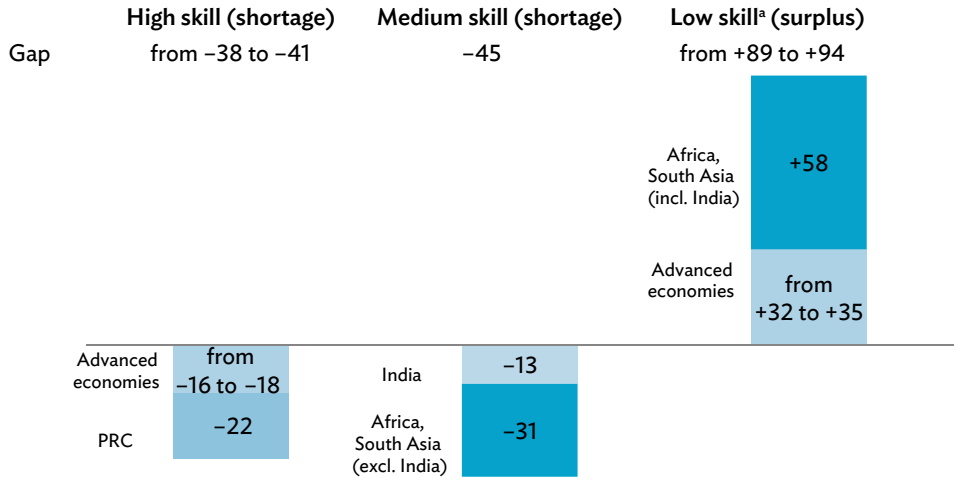
D. Demand and Supply of Workers

Based on current patterns of educational attainment and demand growth, as well as demographic trends, McKinsey Global Institute (MGI) (2012b) projects potential global shortages of 38–40 million highly skilled workers, or 13% of demand for such workers (Figure 32). Meanwhile, employers in advanced economies will face a shortage in college-

educated workers of 16–18 million in 2020, while the PRC will have a demand deficit of 23 million (Figure 33).

As shown in Figure 32, MGI (2012b) estimated that the supply of low-skilled workers may exceed demand by around 10% or about 89–94 million workers. About 27 million of these excess low-skilled workers will be in India in 2020.

Figure 32: Projected Demand and Supply of Workers by Educational Attainment, 2020
(million)



PRC = People's Republic of China.

Notes:

1) Gap refers to the difference between employable labor force and employable demand. Employable labor force = working-age population × labor force participation rate × (1 − natural unemployment rate). Labor demand = (output ÷ labor force productivity).

2) Numbers may not sum precisely because of rounding.

[a] Low-skilled workers are those with no postsecondary education in advanced countries, and those with primary education or less in developing countries.

Source: MGI (McKinsey Global Institute). 2012a. *Manufacturing the Future: The Next Era of Global Growth and Innovation.* McKinsey Global Institute. http://www.mckinsey.com/insights/manufacturing/the_future_of_manufacturing

MGI (2012a) projects that while India will not have enough job opportunities for low-skilled workers, it will likely have a shortage of around 13 million medium-skilled workers, given its low secondary enrollment and completion rates. Meanwhile, other younger, developing economies could have a supply deficit of around 31 million of such workers (MGI 2012b). When combined, this potential shortage (45 million) of medium-skilled workers in developing economies is nearly 15% of the demand for such workers.

There is a temporal mismatch in the labor supply and demand in the PRC. While there are more university graduates in the PRC than it can absorb today, a reversal of the situation

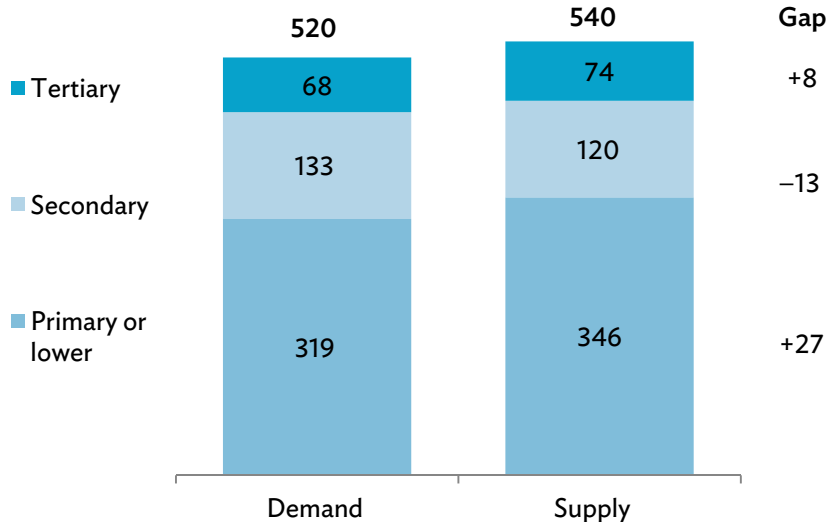
is expected in the coming decade due to the ongoing demographic and sectoral shifts in the economy (Chen, Mourshed, and Grant 2013). By 2020, the PRC is expected to have a deficit of 24 million postsecondary (university and vocationally trained) workers, as local employers require 142 million of such workers (mostly in the services and manufacturing sectors). At the same time, however, the PRC is expected to have a surplus of 23 million workers with primary education or less. Chen, Mourshed, and Grant (2013) estimate that the opportunity costs associated with this skills gap, if not addressed, would amount to $250 billion or about 2.3% of the gross domestic product of the PRC.

In the future, three of the top five hardest-to-fill jobs—technicians, skilled trades workers, and engineers—will be directly related to manufacturing (MGI 2012a). It is very likely that industrial demand for more workers with secondary education and vocational training will increase, as well as the demand for new expertise to support their growth and expansion.

In some industries, access to talent will become a key driver of competitiveness. This creates opportunities for large, emerging economies that can become major research hubs, as well as for regions in advanced economies that retain deep pools of talent (MGI 2012a).

While the rapid growth in knowledge-intensive manufacturing is expected to create shortages of highly skilled workers (such as engineers and scientists) in the PRC, the shortage of medium-skilled workers (such as technicians and factory workers) is expected to be a serious challenge in India by 2030 (MGI 2012a). It is expected that there will be a shortage of 10 million medium-skilled secondary workers in India by 2030 (Figure 33).

Figure 33: Projected Demand and Supply of Workers in India, 2020
(million)



Note: (+) denotes surplus of workers, (-) denotes deficit of workers.

Source: MGI (2012b) based on National Sample Survey Organization data.

CHAPTER 5

Skill Upgrading and Wage Inequality: A Microdata Analysis

This chapter examines the changes in labor supply and demand and wage structure using labor force survey data from the People's Republic of China (PRC) and India. The similarities and differences in their experiences are assessed, and changes in the distribution of workers, by skill level, within each industry and demographic group are also examined.

The section also highlights the implications of skill upgrading, industry structure, and technology development on labor demand and wage inequality in the PRC and India. It also examines an important issue—the role of skills upgrading in the changes in relative labor demand and wage inequality in both countries. Although, education is one of the key factors affecting human and economic development, little is known about how industry demand reacts to increases in supply of educated labor, and how industry influences wage inequality and skill premium.

The section looks at the evolution of wage inequality by skill level and identifies the sources of changes in skill premium. Specifically, it answers the following three key questions using microdata analysis:

(i) Are changes in skill premium causing wage inequality in the PRC and India?

(ii) Is there a difference in skill premium between female and male workers in the PRC and India? Can it be explained by differences in the supply of female skilled workers in each country?

(iii) Is the increased demand for skilled labor causing increased wage inequality in both countries? If so, what is the source of the increased demand?

Increasing wage inequality raises several research questions that have important policy and development implications. Empirical literature suggests that technological changes play an important role in relative labor demand and wage inequality. Berman, Bound, and Griliches (1994) found that the increased use of skilled workers was mainly driven by demand within industries, which was correlated with increased investment in computers and R&D. Berman, Bound, and Machin (1998) also confirmed that pervasive skill-biased technological change caused skill upgrading in similar industries in member countries of the Organisation for Economic Co-operation and Development. Katz and Murphy (1992) found that the increased demand for more skilled workers explained the changes in the wage structure in the United States in the 1980s.

Since the 1960s, demand for skilled male workers has been on the rise in India (Chamarbagwala 2006). Using firm-level data, Berman, Somanathan, and Tan (2005) confirmed that a greater demand for skilled workers in the 1990s was mostly due to the

increasing level of technology in each industry, as well as the increase in output and capital–skill complementarity, combined with rapid capital investment in India.

Skill-biased technological changes in India are seen to cause increasing returns to skills (Kijima 2006). However, this has negative implications on income inequality (Kijima 2006; Mehta and Hasan 2012). According to Mehta and Hasan (2012), 30%–66% of the increase in wage inequality is due to changes in industry wages and skill premiums.

Until the mid-1990s, returns to investment in schooling in the PRC have been very low relative to other developing countries. Fleisher and Wang (2003, 2004) attributed the source of this puzzle to labor market monopsony in rural areas of the PRC. Restriction on worker mobility combined with monopsony in the rural areas compressed skill premium by limiting opportunities to seek better payment outside the economy.

The postreform period (1988–2001) saw a dramatic increase in the returns to education in the urban areas in the PRC (Zhang et al. 2005). The observed increase in wage premium occurred within narrowly defined groups. Zhang et al. (2005) concluded that institutional reforms in the labor market caused the increased demand for skilled workers in the PRC.

Knight and Song (2003b) concluded that the increase in wage inequality between 1988 and 1994 was due to the increasing wage differential in favor of skilled workers. Xu and Li (2008) confirmed this for the period 1998–2000, and suggested that wage inequality was related to the rising skill demand in foreign-owned firms in the PRC.

The increase in education and skill among female workers could narrow the gender wage differential. Gustafsson and Li (2000) suggested that the gender wage gap in the urban PRC was relatively small, but increasing. They attributed this to the deterioration of wages paid to female workers with limited experience and skill. In India, Menon and Rodgers (2008) found that trade liberalization increased the relative wages and employment of women in 1983–2004. They suggested that increased competition caused by trade diminishes costly discrimination against female workers.

A. Data and Empirical Methodology

An examination of the evolution of the wage structure and its relationship with skill level and technology advancement requires good-quality microdata with detailed information on the wages and skill levels of the workers. Availability of longitudinal data that are consistent over time is crucial to determine whether the changes in wage structure are a secular trend and not caused by temporary shocks in the economy. Representativeness of data is also important since the analysis is targeted at two of the largest countries in the world.

For India, the India National Sample Survey (NSS) employment and unemployment data are used, which are reliable and consistent over time, and have a wide coverage (i.e., it covers the whole of India, except Andaman and Nicobar Islands). To examine the long-run trends of wages by the skill level of the worker, the analysis covers five wave datasets (1987–1988, 1993–1994, 1999–2000, 2005–2006, and 2009–2010). Each wave has more than 100,000 samples on average and contains both employed workers in the formal sector and self-employed and/or unpaid workers in the informal sector.

For the PRC, six rounds (1988, 1995, 1999, 2002, 2008, and 2009) of the Chinese Household Income Project Series (CHIPS) datasets[19] are analyzed, focusing on urban areas. These datasets contain labor force information over a large and nationally representative sample of around 60,000–80,000 individuals, covering more than 16 provinces in the major regions of the PRC.

The lack of consensus on the relationship between skill premium and increasing wage inequality in the PRC and India could possibly be due to the shortness in period or the differences in the location and size of areas covered by the existing studies. The CHIPS and NSS data can help address this issue and possibly provide a more comprehensive analysis of the labor markets.

Using microdata, changes in relative supply and demand of skilled labor within each industry and demographic group are examined. As change in returns to skill is a key factor to understand the structure of wage and inequality, the evolution of wage inequality is investigated by the skill group, and the source of change in skill premium is identified. Movements in relative wages and relative supply of labor are analyzed using the methodology of Katz and Murphy (1992) to examine whether the demand for skilled labor has been driving the increases in wage inequality in the PRC and India in recent decades.

Since increasing skill premium can widen gender wage differential if on average, females have lower skill level and shorter experience, trends in gender wage differentials in the two countries over time are likewise examined.

B. Results from the Analysis of Microdata from the People's Republic of China

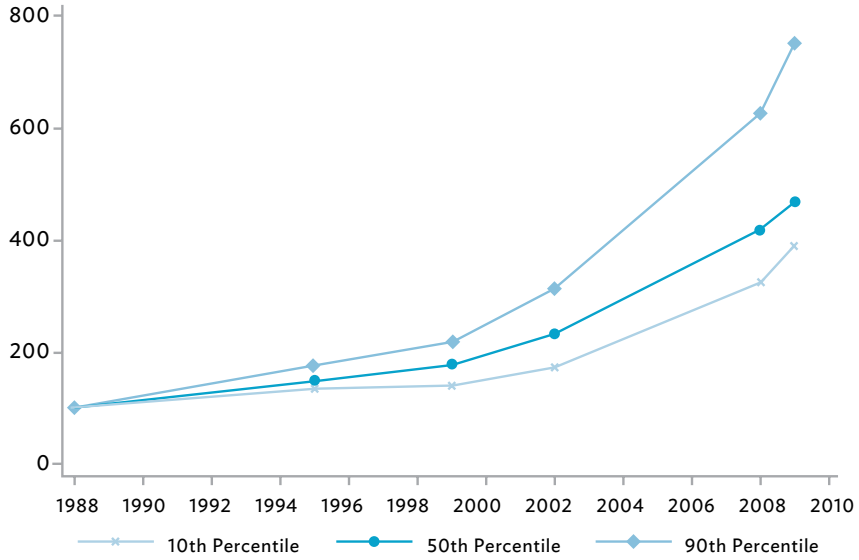
Several indicators for wage inequality, skill premium, and gender wage differentials were constructed for 1988, 1995, 1999, 2002, 2008, and 2009 using wage data of full-time workers in CHIPS.

1. Increase in Wage Inequality

The period of rapid development in the PRC is also characterized by increasing wage inequality. As shown in Figure 34, average real monthly wages in the urban PRC increased at an accelerated pace during 1988–2009, especially during 2004–2009. Economic growth benefited the skilled group the most (proxied here by the 90th percentile). Real wages among the median group (50th percentile) rose, albeit less rapidly than that of the skilled group (90th percentile). The 10th percentile group benefited the least from economic growth during the same period. Figure 35 clearly shows that the overall wage inequality, measured by Gini coefficients, in the PRC increased sharply during 1988–2010 for both male and female workers.

[19] For more details, see Griffin and Renwei (1988); Riskin, Renwei, and Shi (1995); Shi (2002); and IZA, ANU, and Beijing Normal University (2013).

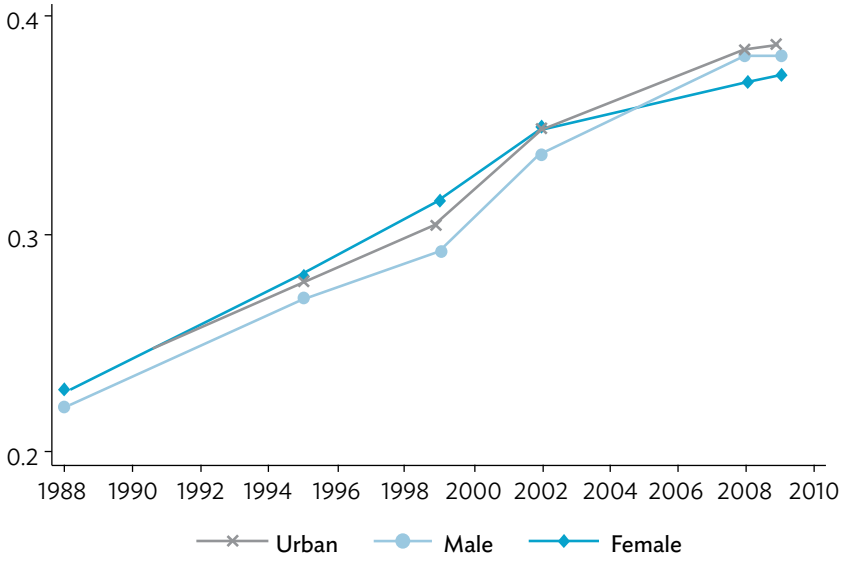
Figure 34: Indexed Real Monthly Wages in Urban Areas in the People's Republic of China
(CNY)



Note: Real wages in 1988 are indexed to 100.

Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

Figure 35: Gini Coefficients for the People's Republic of China

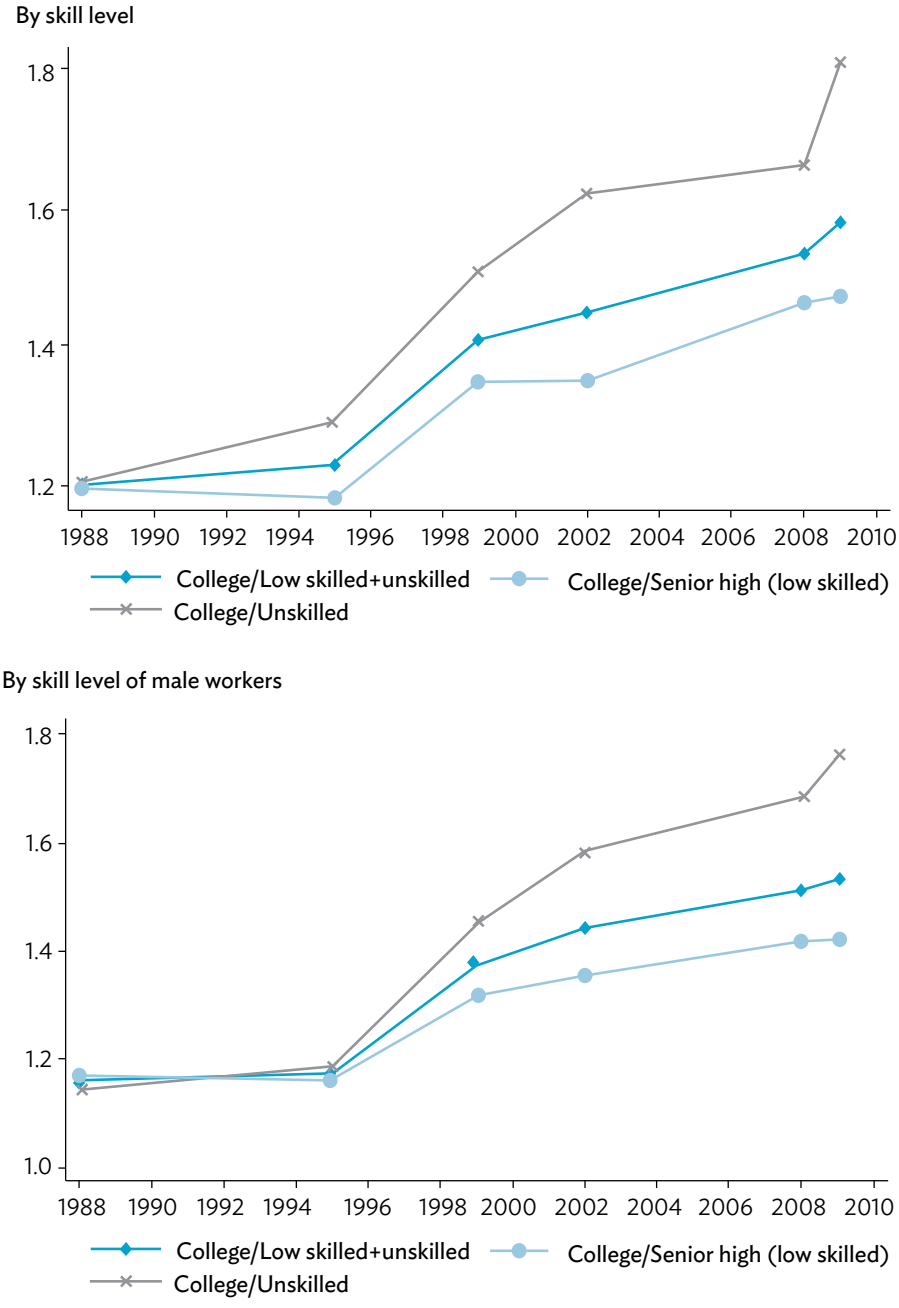


Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

2. Changes in Skill Premium over Time

To assess the recent changes in skill premium related to wage inequality, workers are classified by their educational attainment. Figure 36 shows that compared to the wage of those who attained lower levels of education, college premium significantly increased over time for both male and female workers. These trends seem to imply that an increase in skill premium is a source of rising wage inequality.

Figure 36: Urban Skill Premiums in Urban Areas in the People's Republic of China
(wage ratio)



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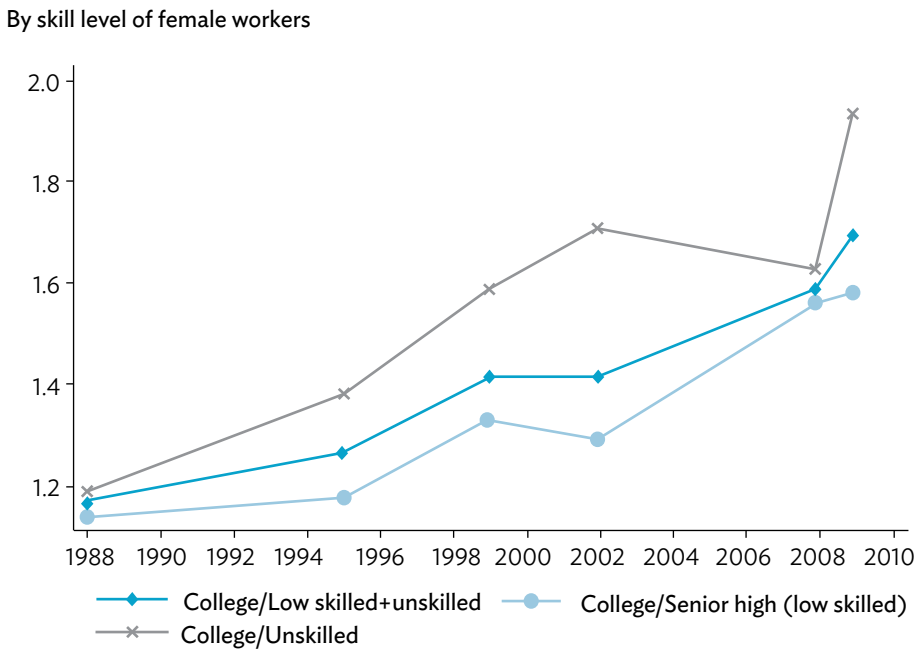


Source: Author's estimates.

3. Residual Wage Inequality

Changes in skill premium are one of the many possible reasons behind increasing wage inequality. Log monthly wage is regressed on experience and its square; education (i.e., years of schooling); and the interaction between experience and a sex dummy variable (experience–sex dummy interaction term and education–sex dummy interaction terms). The residual from this regression captures the dispersion in wages within each demographic group. The difference in the log wages of those at the 90th and the 10th percentiles of the wage distribution is then calculated.

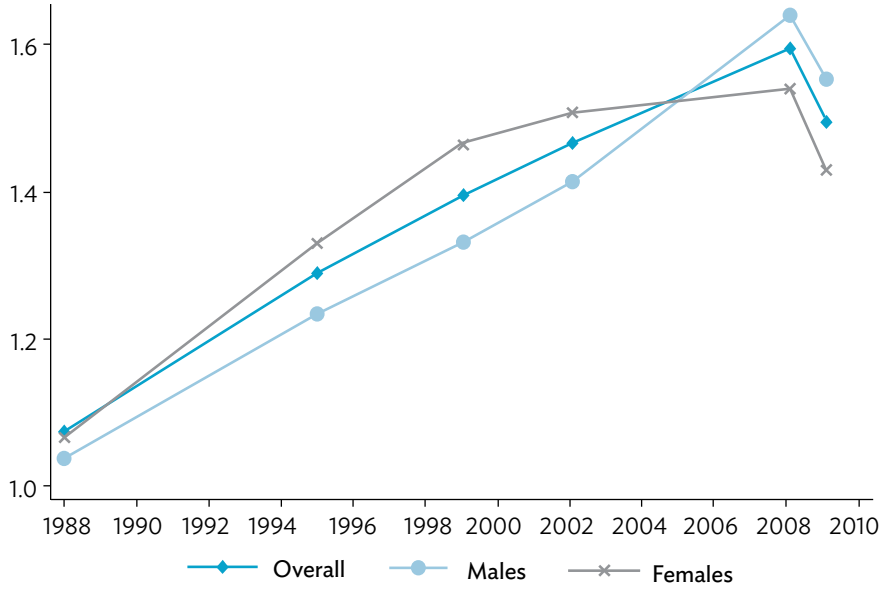
Figure 37 shows that residual wage differentials increased for both male and female workers from 1988 to 2009. The overall wage inequality expanded along with an increase in the within-group wage inequality. The increased within-group wage inequality implies that the low-skilled workers within each category benefited less than the high-skilled ones, except in recent years. During 2008–2009, this trend was reversed as the within-group wage inequality declined.

4. Increase in Gender Wage Gap

Figure 38 tracks the changes in female-to-male wage ratios by education level. These ratios between 1988 and 1994 increased among those who have reached at least senior high school. Nonetheless, there was an overall reduction in female-to-male wage ratios in the urban PRC across different education levels during 1988–2010. Therefore, the gender wage inequality increased significantly over the period when the wage inequality among male and

among female workers increased significantly. The increase in gender disparity indicates that economic growth worked less favorably for female workers.

Figure 37: Residual Wage Inequality by Gender in the People's Republic of China



Note: Log monthly wage residual, 90%–10%.

Source: Author's estimates.

5. Labor Supply–Demand Analysis

Using the methodology of Katz and Murphy (1992), the movements of relative wages and relative supplies are examined for two sets of workers. The first set is the "wage sample" which includes full-time workers who reported to have worked for more than 170 hours per month in their primary job.[20] Samples whose imputed years of schooling based on the education variable were different from self-reported years of schooling were dropped.[21] To make wages comparable across survey years, monthly wages were used, rather than daily or weekly wages, which were not reported in some surveys.

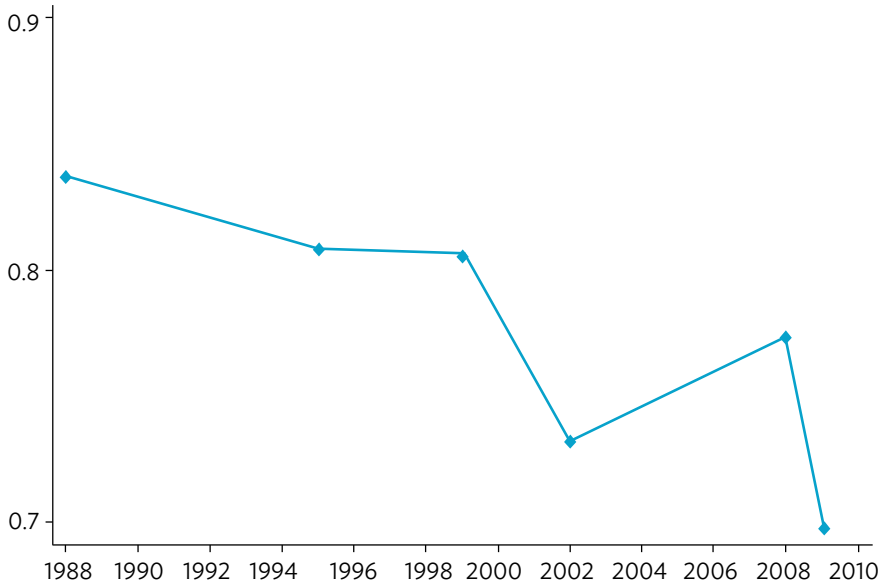
The second set, "count sample," is not restricted to full-time workers but includes all workers whose wage and education level could be identified. This sample allows measurement of relative supply of labor by skill type, that is, size of labor supply in each category classified by education, experience, and gender.

[20] There are some CHIPS survey years where the employment type of workers is not reported.

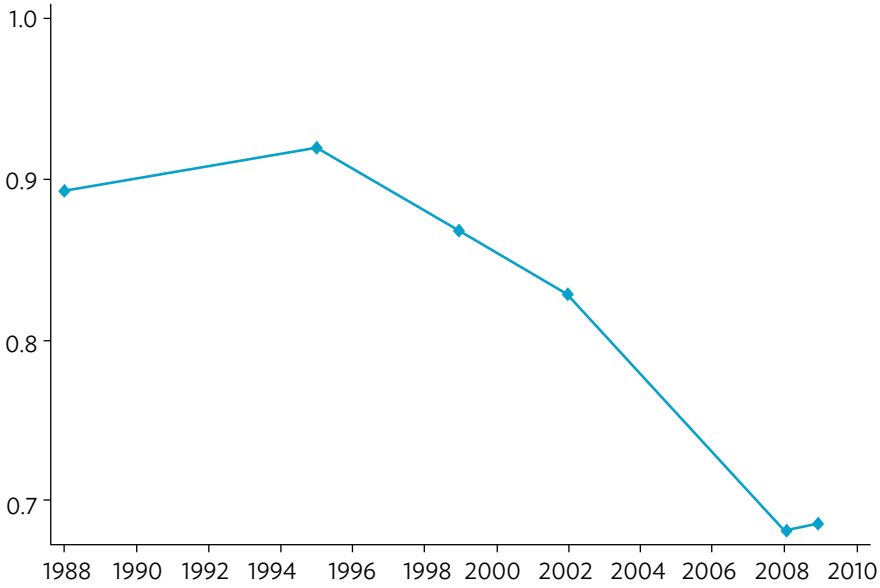
[21] A small number of outliers who reported to work more than 17 hours per day or had zero monthly wages were excluded.

Figure 38: Female–Male Relative Wages in Urban Areas in the People's Republic of China

Junior high school or less



Senior high school



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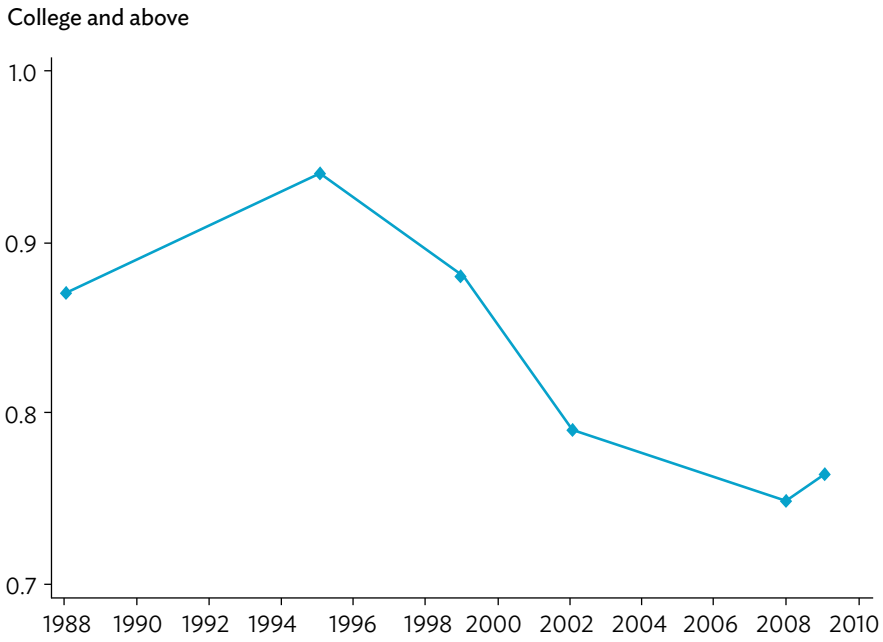


Source: ADB estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

Table 17 presents a profile of the urban labor force in the sample. The sample includes urban laborers only because wage information is not well reported in the rural sample. The data show that the labor market is marked by a significant increase in younger and more educated workers throughout the sample period and a slight decline in the share of female employment.

Table 17: Profile of Urban Labor Force Sample in the People's Republic of China

(%)

Variable	Category	1988	1995	2002	2009
Sex	Male	52.2	52.6	55.3	56.7
	Female	47.8	47.4	44.7	43.3
Education	Elementary–junior high school	51.0	35.4	26.3	20.4
	Senior high school	36.2	41.2	40.7	35.2
	University diploma or higher	12.8	23.4	33.0	44.4
Experience	≤9 years	23.3	20.2	15.3	22.0
	10–20 years	29.6	29.6	30.0	27.9
	20–30 years	29.6	34.5	35.0	31.4
	>30 years	17.5	15.7	19.7	18.7
Sample size (*n*)		17,604	11,963	10,185	6,864

Note: Sample includes all urban area workers aged 18 years and above.

Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

6. Labor Participation Rates

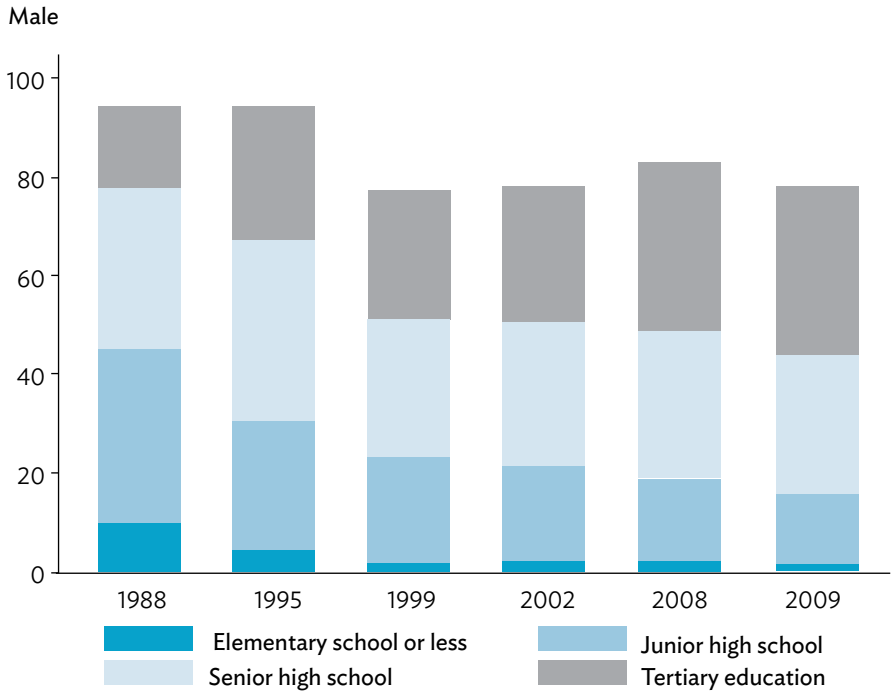
Figure 39 summarizes the change in labor market participation rate by gender during the sample period. Reported labor market participation rate was quite high in earlier surveys, and this may be caused by ambiguity in the survey question about working status. It also reflects inflated labor force participation under the full employment policy of central planning to a postreform market clearing level (see World Bank 2007). In general, the difference in labor market participation rates between male and female workers is relatively low compared with other countries.

It is interesting to note that the share of unskilled workers (workers with education level equal to or lower than junior high school) sharply decreased over time (as the share of skilled workers increased sharply) among both female and male workers.

To examine the movements in relative supply and relative wage of various demographic groups, workers in the sample are classified into 24 categories, that is, by gender, by education level, and by level of work experience. Education level is classified into three categories: junior high school or less, senior high school, and university.

To construct aggregate measures for the wage sample, the average employment share of workers for each of the 24 cells during the entire sample period is used as weights. For the count sample, it is the average relative wage of workers for each of the 24 cells that is used.

Figure 39: Urban Labor Market Participation Rate by Educational Attainment in the People's Republic of China
(population aged 18 years and above, %)



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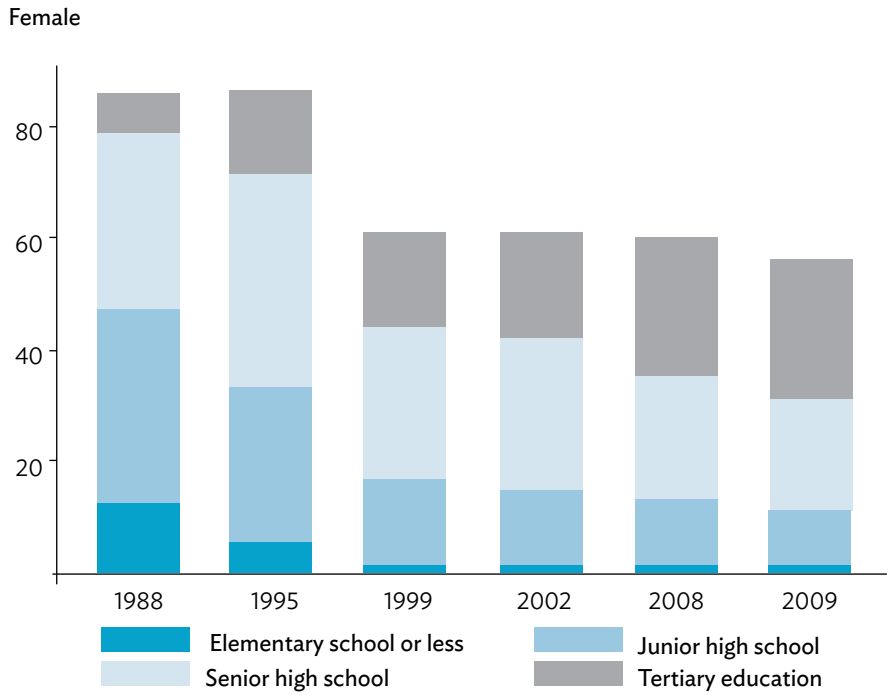

Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

7. Evolution of Relative Wages in Urban Areas

Overall, relative monthly real wages increased by 112% over the sample period, reflecting the rapid economic growth in the PRC during the period (Table 18). However, income growth was not experienced evenly across workers of different skill levels.

Comparing the changes in relative wages by education level, the least educated workers also benefited the least from 1995 to 2002. From 2002 to 2009, it was the middle group, rather than the least educated group, who gained the least in terms of real wage increases. A similar trend can be observed among male and female workers. Overall, male workers earned slightly more than females, while more educated and young workers gained the most.

Table 18: Changes in Real Monthly Wages among Full-Time Urban Workers in the People's Republic of China
(%)

Group	1995–2009	1995–2002	2002–2009
All	111.7	38.9	72.8
By Gender			
Male	120.2	45.0	75.2
Female	100.9	31.1	69.8

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Table 18: continued

Group	1995–2009	1995–2002	2002–2009
By Education			
Elementary or junior high school	95.8	25.2	70.6
Senior high school	103.6	35.6	68.0
University degree or above	133.6	53.7	80.0
By Experience			
1–10 years	133.8	45.5	88.3
11–20 years	126.3	45.1	81.2
21–30 years	97.3	31.9	65.4
≥30 years	91.4	34.8	56.6
By Gender and Education			
Male workers			
Elementary or junior high school	99.2	29.1	70.1
Senior high school	115.2	41.3	73.9
University degree or above	141.3	60.9	80.4
Female workers			
Elementary or junior high school	91.7	20.5	71.1
Senior high school	90.6	28.9	61.1
University degree or above	122.7	43.3	79.4

Note: Annual average monthly wages were computed for each of the 24 sex education experience cells. Average wages for broader groups in each year are computed based on these cell averages using the average employment share per cell for the entire period as weights. All wages are deflated by the consumer price index each year.

Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

8. Evolution of Relative Supply of Skilled Workers in Urban Areas

What caused the increase of skill premium in the PRC? Was there a demand shift toward more skilled workers? To answer these questions, the fraction of change in skill premium due to the changes in the supply side is calculated.

Table 19 shows that while the relative supply of unskilled workers (or those with lower education) declined sharply in the urban PRC, the supply of skilled workers (or the more educated ones) increased rapidly. This suggests that since the supply-side changes cannot explain the decrease in relative wages of unskilled workers, the supply–demand framework may not be able to explain the change in the wage structure in the PRC.

Table 19: Relative Monthly Supply Changes of Employed Workers in Urban Areas in the People's Republic of China
(%)

Group	1995–2009	1995–2002	2002–2009
By Gender			
Men	5.2	3.2	2.0
Women	-8.5	-5.1	-3.4
By Education			
Primary to junior high school	-57.1	-27.8	-29.3
Senior high school	-19.0	-4.5	-14.5
University degree	49.7	25.6	24.1
By Experience			
1–10 years	11.9	-25.5	37.4
11–20 years	-3.0	1.2	-4.3
21–30 years	-9.7	1.5	-11.1
≥30 years	10.2	17.3	-7.1
By Gender and Education			
Male workers			
Elementary to junior high school	-42.8	-13.1	-29.7
Senior high school	-5.5	-1.8	-3.7
University degree	39.3	19.0	20.4
Female Workers			
Elementary to junior high school	-79.2	-50.6	-28.6
Senior high school	-39.5	-8.0	-31.6
University degree	70.0	39.2	30.7

Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

9. Demand Shift toward Skilled Workers

Data presented in Tables 18 and 19 propose the existence of a demand factor increasing both the relative wage and employment of more educated workers. The relative supply of skilled workers increased sharply, especially in the 1990s. At the same time, the relative wage of skilled workers increased faster than that of unskilled workers, suggesting the possibility of a demand shift in the 1990s.

According to the supply–demand analysis of Katz and Murphy (1992), the inner products of changes in relative wages and changes in relative labor supply should be negative, meaning labor supply increase lowers wage. Finding out positive inner products between relative labor supply and relative wages would mean that there is a demand growth factor.

Applying the supply–demand framework, the sample is divided into 24 different labor groups by gender, three education levels, and four experience categories. To reduce the influences of measurement errors and business cycle factors, the 14-year period is aggregated into two

7-year intervals, computing average relative wages and average relative labor supply for each of the 24 groups within these subperiods. The inner products of the changes are calculated in these measures of wages and labor supply between each pair of intervals.

As shown in Table 20, the estimates appear to be consistent with the hypothesis of having a stable labor demand during 2002–2009. In contrast, the results from the earlier periods seem to reject the stable factor demand hypothesis. The inner products of these periods show positive signs, indicating that a demand shift occurred during the fast-paced economic development in the PRC.

Table 20: Inner Products of Changes in Wages with Changes in Supply

Period	1995	2002
2002	0.048	
2009	-0.027	-0.035

Notes: The numbers represent inner products between changes in relative wages and changes in relative labor supply from 24 cells. Each inner product is calculated using changes across the column period and the row period. Relative wage measure is constructed from the sample of full-time workers in the formal sector, while relative supply is calculated from the sample of all workers.

Source: Author's estimates based on the Chinese Household Income Project Series (Griffin and Renwei 1988; IZA, ANU, and Beijing Normal University 2013; Riskin, Renwei, and Shi 1995; Shi 2002).

Demand–supply analyses indicate that demand shifted toward more educated workers during the period of fast development in the PRC. Although the analysis excludes the rural sector, the widening wage differential between more skilled workers and less skilled ones in the urban areas seems to be the source of rising inequality in the 1990s. However, the increase in the supply of skilled workers has exceeded the demand increase in the 2000s, contributing to stabilizing wage differentials.

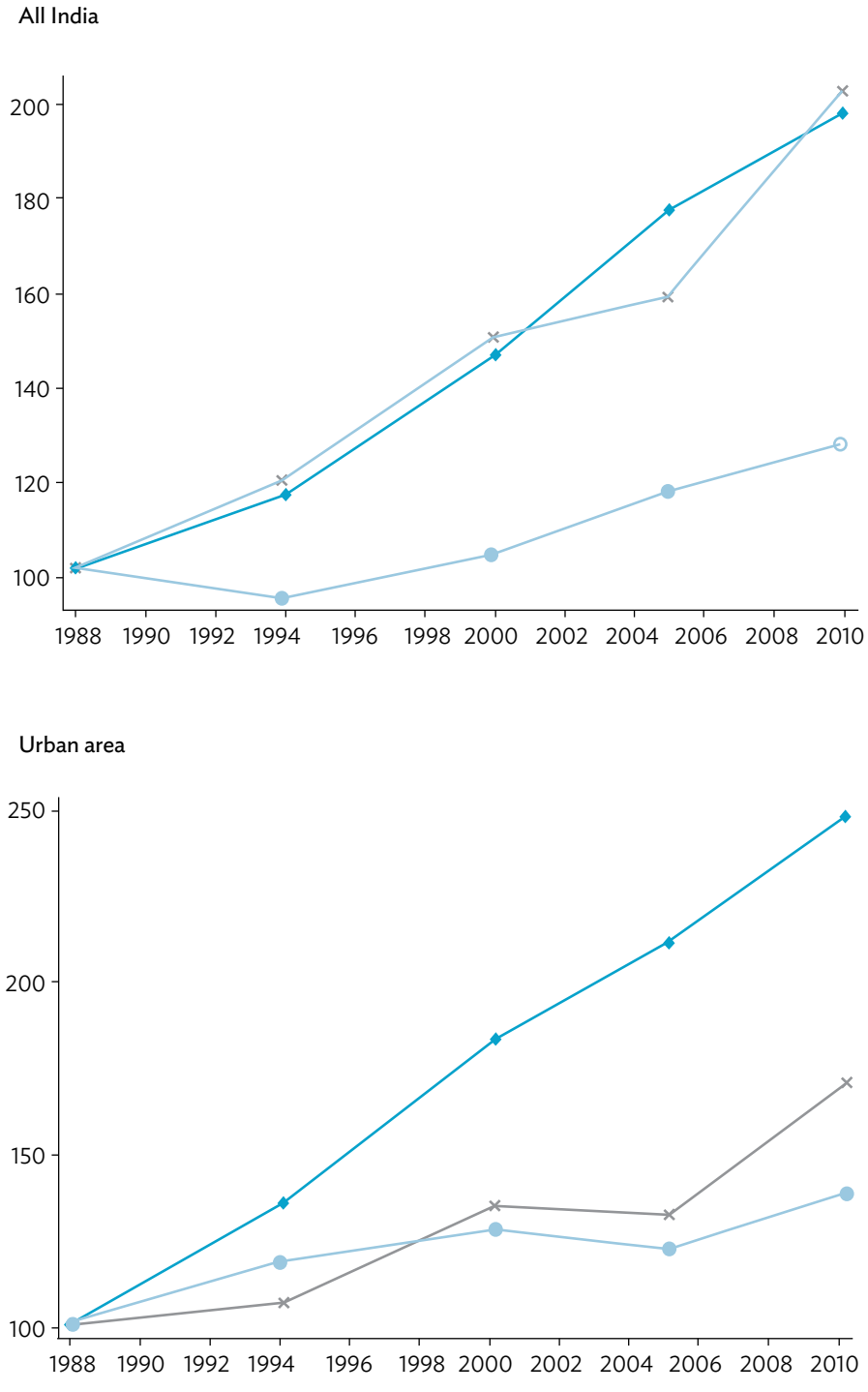
C. Results from the Analysis of Indian Microdata

1. Overall Wage Inequality

Over the past 2 decades, wage inequality in India rose due partly to the collapse of the median group during 1988–2010 (Figure 40). Overall, unlike in the PRC, the median group (the 50th percentile) gained the least benefit from economic growth in India. Meanwhile, the real wages among the skilled and unskilled groups (proxied here by the 90th and the 10th percentiles) rose at the same pace.

In urban India, real wages among the skilled group increased most rapidly, contributing to a rise in wage inequality. Real wages among the median group (50th percentile) also rose, albeit less rapidly than that of the unskilled group (10th percentile). In contrast, real wages among the skilled group only increased slightly in rural India.

Figure 40: Trend of Indexed Real Wage in India
(rupee)



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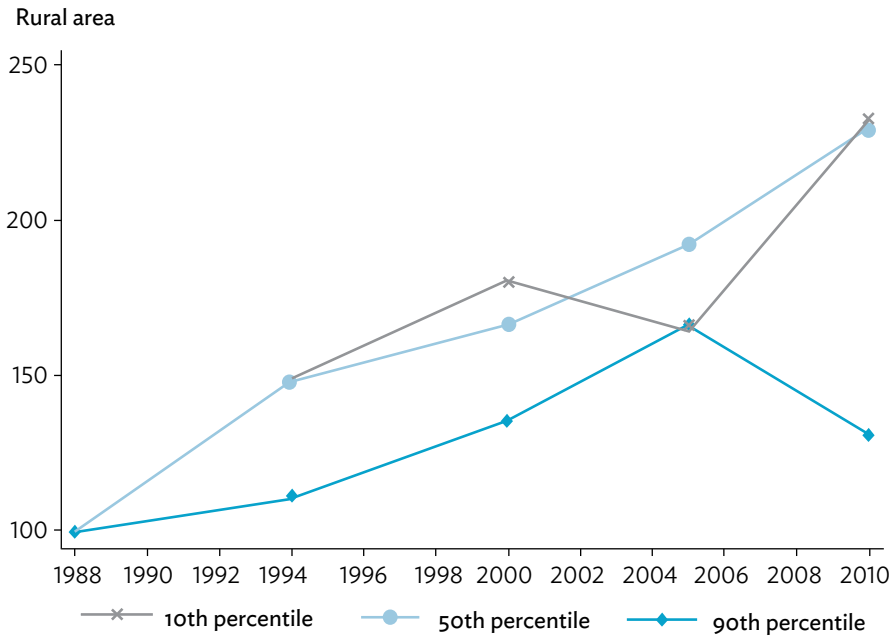
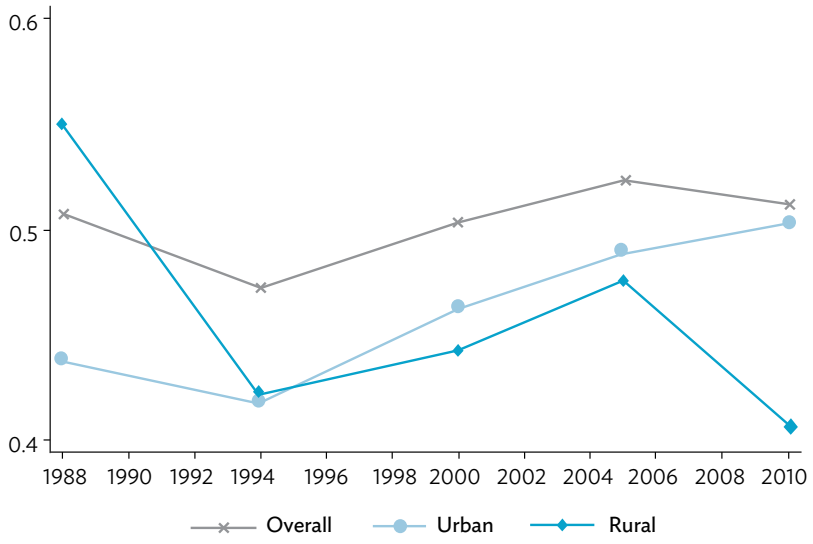


Note: Real wages in 1988 are indexed to 100.

Source: Author's estimates based on the National Sample Survey (various years).

Overall wage inequality rose during 1988–2010 (Figure 41). However, while income inequality rose gradually in urban India, it declined sharply in rural India during the period.

Figure 41: Trend of Gini Coefficient in India



Source: Author's estimates based on the National Sample Survey (various years).

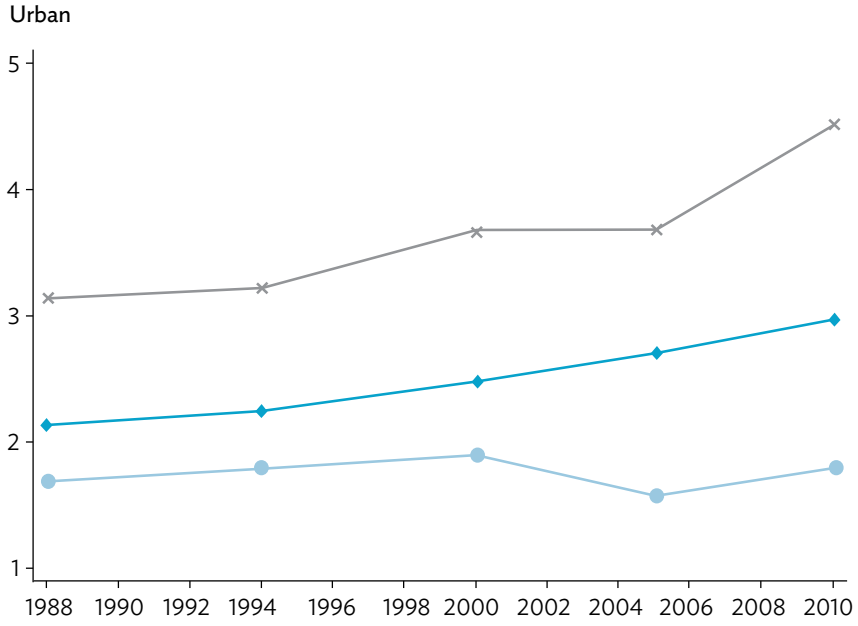
2. Change in Skill Premium

To examine the changes in wage inequality related to the changes in skill premium, workers are grouped according to four main educational categories: (i) those with no schooling; (ii) those who attended primary school or became at least literate through government programs such as total literacy campaigns, nonformal education courses, and adult education centers; (iii) those with secondary education; and (iv) those with at least a college degree.

To examine relative wage benefits of skill acquisition, various skill premiums are calculated. Workers are grouped into two categories: unskilled and skilled or those with at least secondary schooling. Figure 42 shows that the changes in skill premium by region could be recognized as a driving force behind the movement of inequality during 1988–2010.

In urban India, the premium of having a college degree over those with lower education increased significantly, while the skill premium of senior high school rarely moved. In contrast, skill premium of secondary schooling declined in rural India during the same period, but there was no change in college skill premium. Hence, the changes in skill premium can help explain the differences in wage inequality across urban and rural India.

Figure 42: Trend of Skill Premium in India



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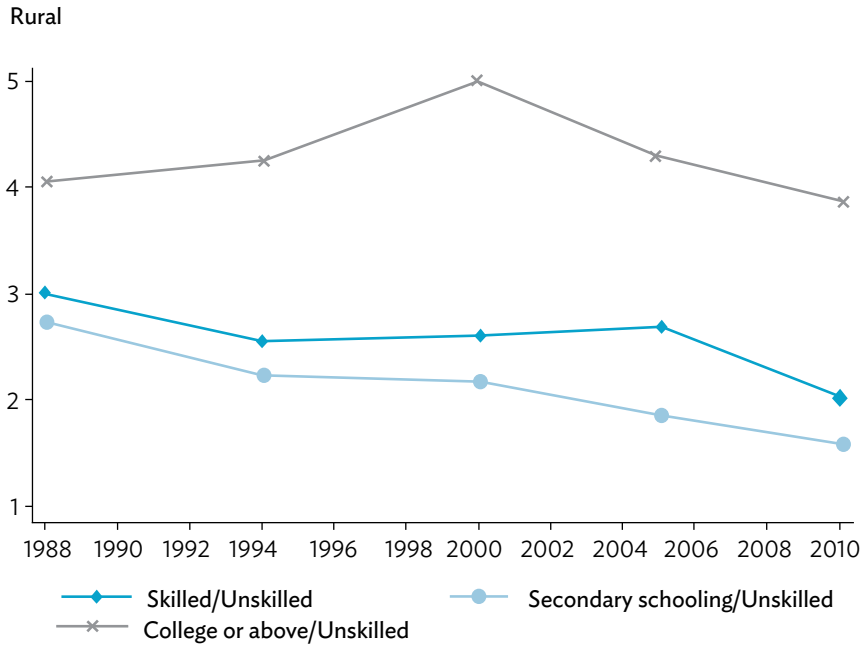


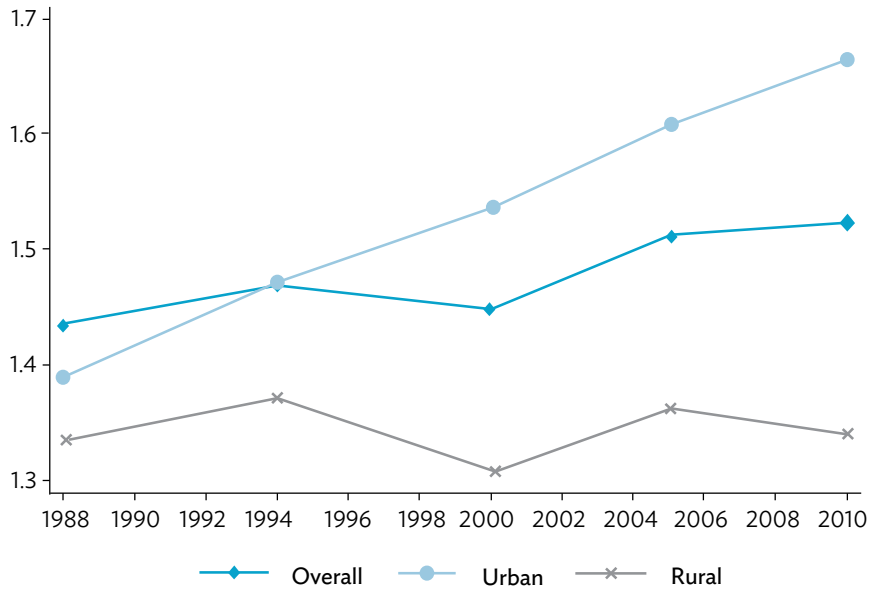
Source: ADB estimates based on the National Sample Survey (various years).

3. Residual Wage Inequality

Using the same regression model used for the PRC, log monthly wage is regressed on experience and its square; education (i.e., years of schooling); and the interaction between experience and a sex dummy variable (experience–sex dummy interaction terms and education–sex dummy interaction terms). The residual from this regression captures the dispersion in wages within each demographic group. The difference in the log wages of those at the 90th and 10th percentiles of the wage distribution is then calculated.

Figure 43 shows a gradual increase in residual wage differentials in urban India in contrast to a mere change in residual wage differentials in rural India during 1988–2010. This indicates a significant change in within-group wage inequality only in urban India.

Figure 43: Residual Wage Inequality in India



Source: Author's estimates based on the National Sample Survey (various years).

4. Relative Female–Male Wage

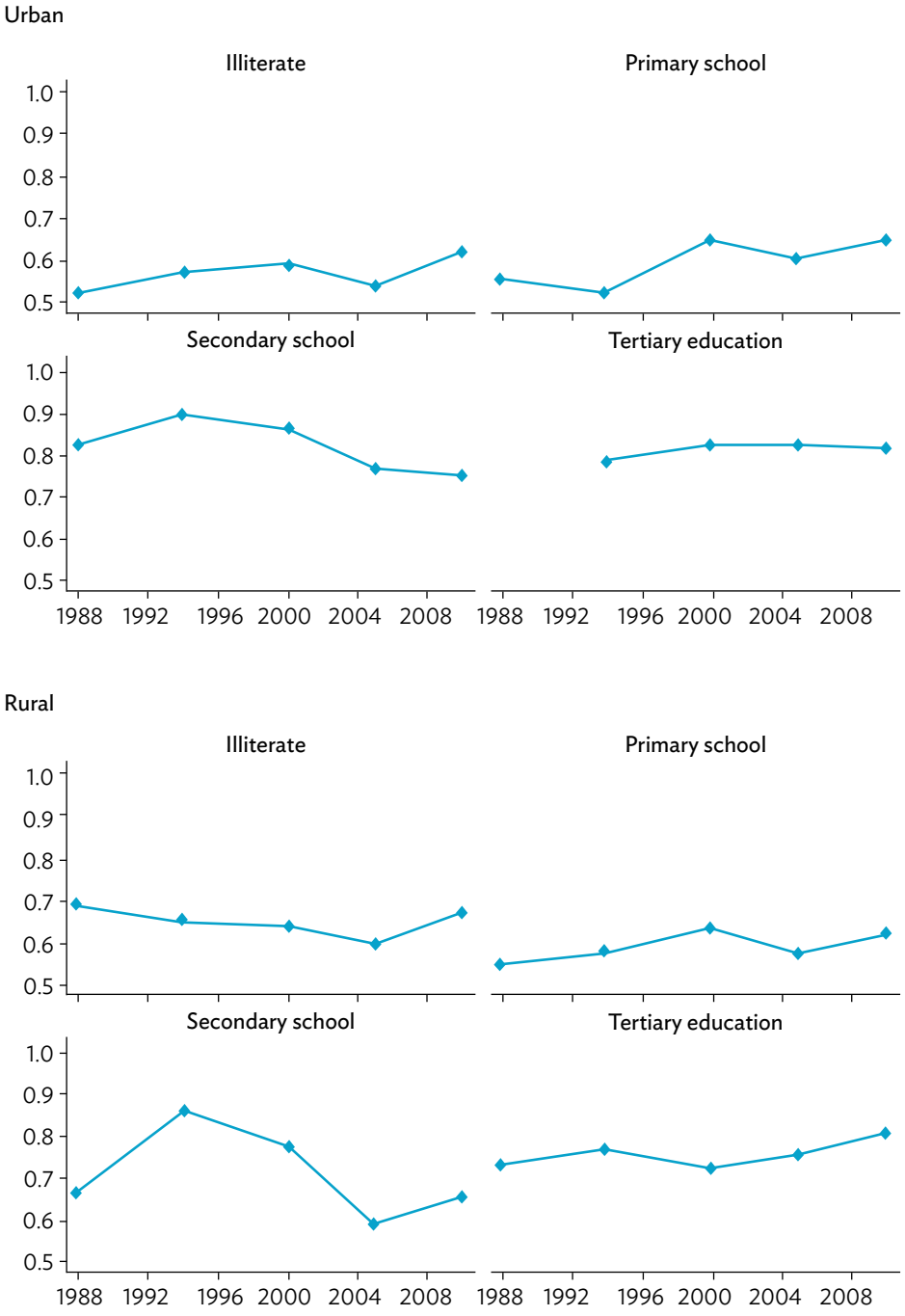
The trends in relative gender wages in urban and rural India are shown in Figure 44.[22] The relative gender wage or the gender wage gap is defined as the ratio of the average wage of female workers to the average wage of male workers. A relative wage equal to 1 denotes equal income and a lower number indicates a wider wage gap in favor of male workers.

The movements in urban gender wage gap over time vary by skill level. Until the early 1990s, female workers with low level of education could only earn less than 60% of the wage earned by male workers with the same level of education. This relative female–male wage gap increased slowly over time. At the tertiary level, the relative gender wage also improved slowly over time. In contrast, the relative gender wage at the secondary level has deteriorated since the 1990s. This could be linked to the collapse of the wage of the median skill group in urban area, as shown in Figure 40. The improvements in relative wages at the lower and higher levels of education and the deterioration at the secondary level are interesting phenomena.

In rural areas, broadly speaking, similar patterns were observed. The relative wage of female workers without any formal education declined over time but improved in the late 2000s. The relative female–male wage with primary and tertiary schooling improved consistently over time. Meanwhile, at the secondary level, there was a dramatic decline in relative wages in the 1990s and early 2000s, but this started to recover in the late 2000s.

[22] The urban gender wage gap at the tertiary level in 1988 is excluded due to the small sample of female workers with tertiary education, which could bias relative wage in any direction.

Figure 44: Relative Wage of Female and Male Workers in India



Source: Author's estimates based on the National Sample Survey (various years).

Overall, high-skilled, university-educated women face less discrimination in terms of their relative wages in India.[23] Improvement of the education level of female workers would have significant effects on overall wage inequality.

5. Labor Supply–Demand Analysis

The methodology of Katz and Murphy (1992) is similarly employed here (as in Section V.B) to analyze the movements in relative wages and relative supplies of labor. Two subsamples are likewise constructed. First, the wage sample includes full-time workers who reported to have worked more than 5 days per week in their primary job, but excludes self-employed or unpaid family workers and anyone who has a second job. Working hours and wages are all in weekly terms. The full-time workers who reported zero weekly wages were treated as missing observations. Second, the count sample includes all workers, between the ages of 18 and 60, with identified education level, which is the basis for determining relative supply of labor.

As shown in Table 21, many of the workers in the sample are not employed in full-time jobs and do not have reported wage variables. According to the data, the proportion of skilled and young workers in urban areas is higher than in rural areas. This is partly due to the high rural–urban migration among skilled workers in India. The data also indicate a sharp decline of the share of workers without any formal schooling during 1988–2010, the sample period. However, the growth of skilled workers with a college degree or higher education is much slower than that of the PRC. The data show a slight decline in the share of female employment and a mere change in the experience distribution of workers.

To examine the movements in relative supply and relative wage of various demographic groups, the sample is divided into 64 categories by gender, region, four education levels, and the level of work experience. Aggregate measures for the wage sample are constructed as a weighted average of the values in each of the 64 cells, using average employment share over the entire sample period per cell as weights. For the count sample, the average relative wage per cell is used as weights.

Table 21: Data Summary Statistics of Wage Workers in the Labor Force in India (%)

Variable	Category	1988	1994	2000	2005	2010
Overall Economy						
Gender	Male	74.6	74.5	75.3	74.0	76.8
	Female	25.4	25.5	24.7	26.0	23.2
Education	Illiterate	53.4	47.2	39.8	35.6	30.0
	Elementary or junior high school	22.2	22.0	20.7	24.1	24.1
	Senior high school	18.9	23.5	29.7	23.6	32.6
	University diploma or higher	5.5	7.3	9.9	16.8	13.3
Experience	≤ 9 years	11.3	13.1	16.4	20.0	20.3
	10–20 years	31.9	29.0	27.4	26.6	26.2

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[23] For more details on the sources of gender wage differentials in India, see Lee and Wie (2015).

Table 21: continued

Variable	Category	1988	1994	2000	2005	2010
	20–30 years	27.4	28.0	27.9	25.6	23.9
	>30 years	29.4	29.9	28.4	28.3	29.7
Sample size	*N*	87,619	79,322	92,009	68,279	66,605

Urban Economy

Variable	Category	1988	1994	2000	2005	2010
Gender	Male	83.1	82.8	83.1	80.7	82.2
	Female	17.9	17.2	16.9	19.3	17.8
Education	Illiterate	23.3	20.9	15.9	15.7	13.4
	Elementary or junior high school	25.9	21.8	18.2	21.1	17.1
	Senior high school	35.8	39.2	44.4	29.9	40.2
	University diploma or higher	15.0	18.1	21.5	33.3	29.3
Experience	≤ 9 years	19.3	19.7	22.5	25.7	26.6
	10–20 years	32.3	31.2	30.0	28.5	28.9
	20–30 years	25.1	26.3	26.0	24.9	23.2
	>30 years	23.3	28.8	21.6	20.9	21.4
Sample size	*N*	36,507	36,279	45,725	31,081	31,056

Rural Economy

Variable	Category	1988	1994	2000	2005	2010
Gender	Male	71.5	71.0	71.3	70.6	74.1
	Female	28.5	19.0	28.7	29.4	25.9
Education	Illiterate	64.4	58.3	52.0	45.7	38.0
	Elementary or junior high school	20.8	22.1	21.9	25.6	27.5
	Senior high school	12.7	16.8	22.1	20.3	28.9
	University diploma or higher	2.0	2.8	3.9	8.4	5.6
Experience	≤ 9 years	8.4	10.4	13.3	16.4	17.3
	10–20 years	31.7	28.1	26.2	25.6	24.9
	20–30 years	28.3	28.7	28.8	26.0	24.2
	>30 years	31.7	32.9	31.8	32.0	33.7
Sample size	*N*	51,112	43,043	46,284	37,198	35,549

Source: Author's estimates based on the National Sample Survey (various years).

6. Labor Market Participation

To examine labor market participation rates across different labor markets and gender, count samples are presented in Figure 45. The figure shows that the difference in labor market participation rates between male and female workers is quite high. Moreover, there was not much improvement in the difference during 1988–2010.

Figure 45: Labor Market Participation Rate and Skill Composition of Workers in India

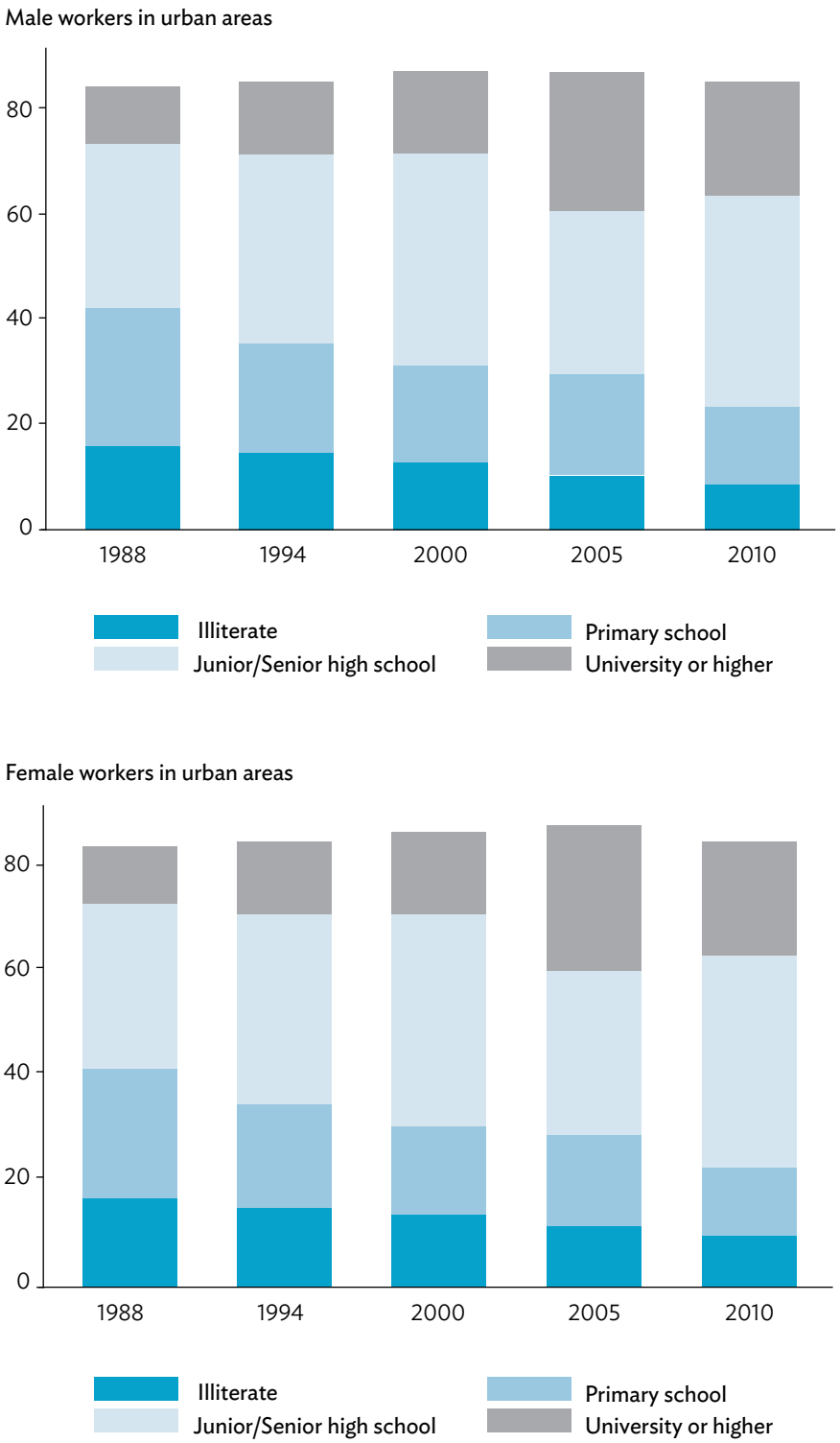

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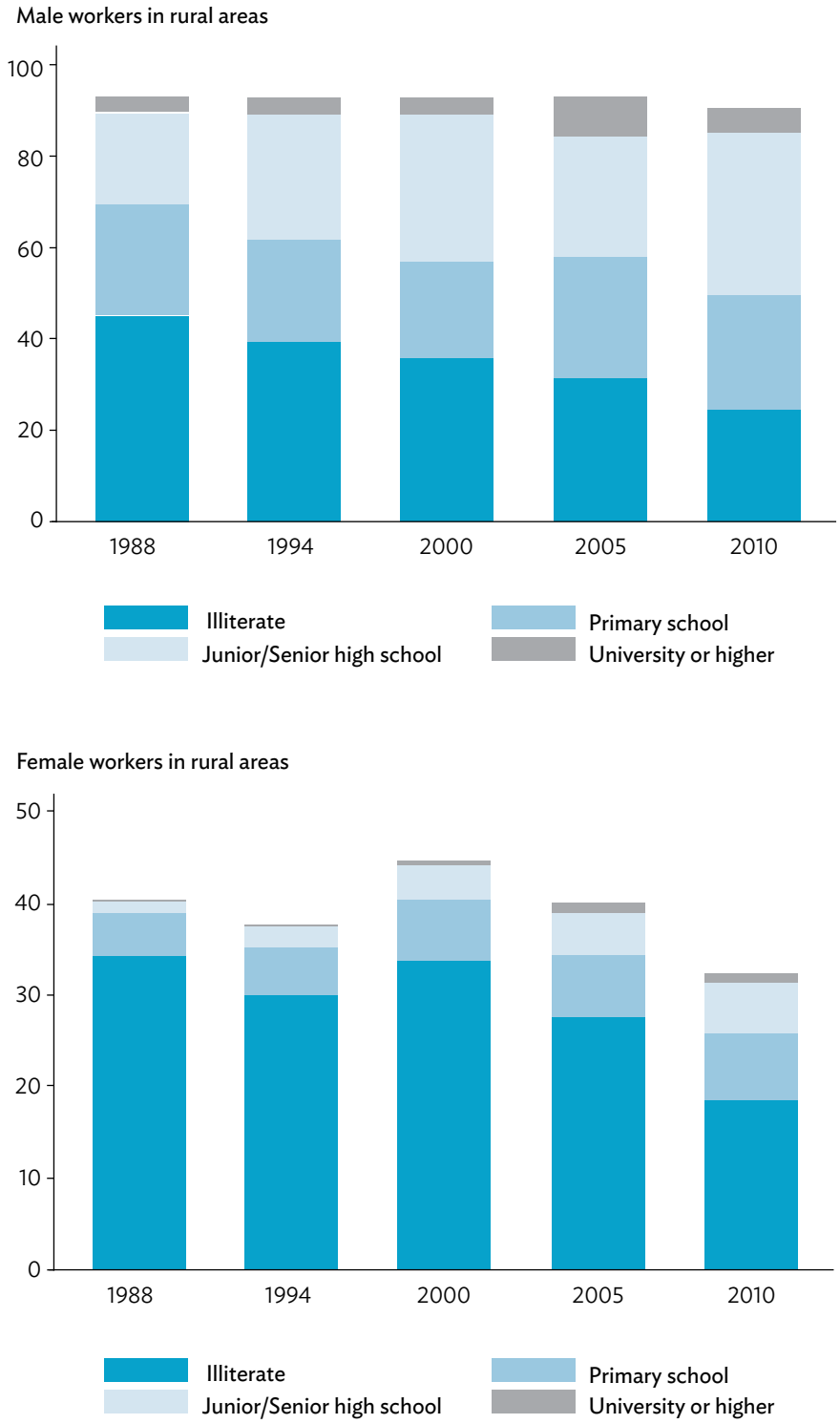
Figure 45: continued



Source: Author's estimates based on the National Sample Survey (various years).

It is interesting to note the changes in the skill composition of the labor force. Among both female and male workers, the share of unskilled workers decreased in both urban and rural areas. The share of skilled workers increased in both areas, but the increase in tertiary educated workers was evident only in urban areas.

Female labor market participation is influenced by income and substitution effects. The income effect indicates a change in the female labor supply with respect to a change in family income, and the substitution effect stands for the effect of own wages on the female labor supply. Female labor market participation rate in urban India is lower than that in rural India, implying that the income effect is a possible driving force behind the low female labor market participation in urban areas. In addition, the underdeveloped labor-intensive manufacturing sectors have limited employment opportunities for urban females.

7. Evolution of Relative Wages

Table 22 shows the changes in relative wages during 1988–2010 in India. Overall, relative wages increased except during 2001–2005. Females and the more experienced workers benefited the most over the whole period. However, during 2005–2010, the younger workers benefited the most, due to their higher skill level, compared with the other experienced groups.

The benefits were not evenly distributed across workers of different skill levels. The growth of relative wages of the least skilled group and of the most skilled group were much greater compared with that of the median group.

Comparing workers by region, there is a difference in the changes in relative wages between rural and urban India. Factoring in educational attainment, the least skilled group gained the greatest in rural areas. On the other hand, the most skilled group benefited most in urban areas.

Table 22: Real Monthly Wage Changes for Full-Time Workers in India, 1988–2010
(log average real monthly wage multiplied by 100)

Group	1988–2010	1988–1994	1994–2000	2000–2005	2005–2010
All	37.2	5.8	17.4	-1.6	15.5
By Region					
Rural	36.5	3.1	16.9	0.2	16.4
Urban	38.5	11.6	18.7	-5.2	13.5
By Gender					
Male	31.5	1.5	17.8	-0.2	12.3
Female	55.3	19.7	16.2	-5.9	25.4
By Education					
Illiterate	52.9	9.3	18.8	1.6	23.2
Elementary school	28.1	-1.0	19.0	2.4	7.7
Secondary school	14.3	3.4	12.0	-8.5	7.4
College or above	51.9	12.7	22.2	-4.8	21.8

continued on next page

Table 22: continued

Group	1988–2010	1988–1994	1994–2000	2000–2005	2005–2010
By Experience					
1–10 years	31.1	0.7	14.9	-4.9	20.3
11–20 years	36.7	7.2	15.0	-2.5	17.1
21–30 years	35.2	5.1	19.8	-1.6	11.9
≥ 30 years	43.0	8.1	19.1	1.4	14.4
By Region and Education					
Rural workers					
Illiterate	54.7	8.2	19.7	1.5	25.3
Primary school	27.7	-4.7	18.5	3.4	10.5
Secondary schooling	2.5	-3.6	8.4	-4.6	2.3
College or above	30.1	14.2	14.9	-8.9	10.0
Urban workers					
Illiterate	41.7	16.0	12.9	2.4	10.4
Primary school	29.3	8.0	20.4	0.0	0.9
Secondary school	27.5	11.2	16.0	-12.9	13.2
College or above	60.9	12.1	25.3	-3.1	26.6

Source: Author's estimates based on the National Sample Survey (various years).

8. Evolution of Relative Supplies

Table 23 shows the changes in relative supply of workers in India. It suggests that the change in the wage structure cannot be explained fully by a supply–demand framework. The change in skill composition of workers is notable. Overall, the least skilled group dramatically decreased in both urban and rural areas. However, the change in skill composition shows some difference across urban and rural areas. In urban areas, workers with tertiary education sharply increased, while in rural areas, not only workers with tertiary education but also workers with secondary schooling increased across the sample period. This suggests that supply-side changes cannot explain the increase of relative wages of workers with tertiary education, especially in urban areas.

The relative supply of female workers increased by a small margin, implying that the increase in the relative wages of female workers could have been driven by a demand shift toward female workers (Table 23). The slight decrease in more experienced workers may be a factor of increasing premium to experience.

Further examination on the decrease of the relative supply of skilled workers in the most recent period is required as this is characterized as the period of global economic crisis. However, it also hints that a supply–demand framework may be able to provide an explanation for the increase in wage of the least skilled group.

Table 23: Relative Monthly Supply Changes for Full-Time Workers in India, 1988–2010

Group	1988–2010	1988–1994	1994–2000	2000–2005	2005–2010
By Region					
Rural	-15.8	-9.7	-4.4	-9.0	7.2
Urban	16.4	10.7	4.2	7.6	-6.0
By Gender					
Male	-0.3	0.6	-0.5	-1.7	1.3
Female	1.8	-3.4	3.1	9.1	-7.0
By Education					
Illiterate	-89.0	-27.2	-17.9	-36.4	-7.6
Elementary school	-30.2	-13.4	-12.7	-5.4	1.4
Secondary school	20.9	13.6	8.6	-36.3	34.9
College or above	66.9	27.9	12.0	51.7	-24.6
By Experience					
1–10 years	42.1	7.2	9.7	26.2	-1.0
11–20 years	-12.2	-7.2	-2.7	-1.7	-0.6
21–30 years	-6.5	4.8	0.8	-7.7	-4.4
≥30 years	-6.1	-0.7	-3.4	-8.4	6.4
By Region and Education					
Rural workers					
Illiterate	-94.7	-29.7	-19.0	-40.2	-5.8
Primary school	-17.2	-10.8	-12.0	-9.0	-14.6
Secondary school	41.3	15.1	11.6	-28.8	43.5
College or above	68.0	22.6	14.0	72.7	-41.2
Urban workers					
Illiterate	-65.6	-16.0	-13.4	-22.7	-13.6
Primary school	-53.9	-17.6	-13.9	0.4	-22.9
Secondary school	3.5	12.6	6.4	-42.4	26.8
College or above	66.5	29.3	11.4	45.2	-19.3

Source: Author's estimates based on the National Sample Survey (various years).

9. Demand Shift toward Skilled Workers

Data in Tables 22 and 23 suggest that there was a demand factor increasing relative wages and employment of more educated workers, especially in urban India. To examine this issue on PRC, as already explained in Section B of this chapter, the supply–demand analysis suggested by Katz and Murphy (1992) is employed. The samples are divided into 64 different labor groups by region, gender, four education levels, and four experience categories. The inner products of the changes are calculated in these measures of wages and supplies between each pair of 5-year-intervals.

The results of the analysis in Table 24 indicate the existence of demand shift in most periods except in the most recent ones. Further research would be necessary to investigate if the demand shift is related to trade or technology transfer.

Table 24: Inner Products of Changes in Wages with Changes in Supplies in India

	Starting Period			
End Period	1988	1994	2000	2005
1994	0.0184			
2000	0.0424	0.0041		
2005	0.0735	0.0286	0.0098	
2010	0.0356	0.0104	0.0026	-0.0176

Notes: The numbers represent inner products between changes in relative wages and change in relative supplies of 64 cells. Each inner product is calculated using changes across the column period and the row period. Relative wage measure is constructed from the sample of full-time workers in the formal sector, while relative supply is calculated from the sample of workers in the formal sector.

Source: Author's estimates based on the National Sample Survey (various years).

According to the demand–supply analyses, there was a demand shift favoring more educated workers in India in the late 1990s and early 2000s. As suggested by the simple supply and demand framework, a widening wage differential between more skilled workers and less skilled workers in urban areas seem to be the source of rising inequality in India.

CHAPTER 6

Policy Challenges and Recommendations for Human Capital Development

Drawing from the analysis presented in the earlier sections, as well as other existing literature, this section reviews the policy challenges related to human capital development in terms of education, skills development, and labor and employment in both the People's Republic of China (PRC) and India. It reviews some of the important strategies that the PRC and India, as well as other developed countries, have pursued to meet the challenges of changing global demands and skill requirements. The section also offers some strategic high-level policy options and research directions to address the current and future human capital development challenges in the PRC and India.

A. Reducing Disparities in Accessibility and Improving Quality of Education

The earlier sections suggest that although the PRC and India are in different stages of human capital development, both should immediately address important education challenges to accelerate their human capital transitions and stay on robust growth paths. Developing a pool of vibrant, educated, and skilled workers and professionals requires improved school completion and transition rates at all educational levels, especially at the primary and secondary levels in India, and at the secondary and postsecondary levels in the PRC.

1. Broadening Access to Basic Education

Apart from being at different stages of human capital development, the PRC and India are also now at different stages of population growth. As discussed in Chapter 4, while the prime working-age population in the PRC is starting to decline, it is still expected to expand in India. To seize the opportunity to harness its "demographic dividend," India should now focus on scaling up its efforts to provide universal access to basic education, while upgrading the quality of education. This is key to making significant improvements in its adult literacy rate, especially among rural women, one of key challenges facing India as suggested in Chapter 2.

Lessons can also be learned from the remarkable success of the Republic of Korea in broadening access to primary and secondary education in just 4 decades after the Korean War despite limited resources (see Box 3). The Republic of Korea implemented universal, compulsory education through a sequential approach: quantitative expansion from elementary to secondary education, and then to tertiary education. At each step, expansion started in rural schools, later extending to urban schools.

Box 3: Sequential Education Development in the Republic of Korea

To achieve its postwar goal of universal primary education at a time when the primary-school-age population was still growing and the education budget was severely constrained, the government pursued a temporary "low-cost approach" for quantitative educational expansion after the postwar reconstruction of schools. Although primary education was made compulsory from 1954, parents had to initially buy textbooks and pay supplementary fees to operate the schools. Fees were later abolished, and free textbooks were provided to poor families, starting with rural schools and later extending to urban schools.

A similar low-cost approach was followed to universalize secondary education in the 1970s, followed by tertiary education in the 1980s. Entrance examinations were abolished for middle schools in 1969 and for high schoolsin 1974 to expand secondary enrollment and ensure progression of students. This also set the stage for extending the scope of compulsory education to include lower-secondary education. Tuition and textbook fees were also done away with at the lower-secondary level, starting with the poor families in remote rural and fishing communities. By 1979, admission to middle schools was universalized—at least 90% of primary school students were enrolled—and 6 years later, this was implemented at the high school level.

When targets for primary and secondary enrollments had been achieved, efforts were directed toward addressing quality issues. Between 1961 and 1980, the Republic of Korea set aside 12.98% of domestic tax revenues for promoting elementary and secondary education through legislation. As a result, aspects related to education, which had deteriorated during the early years of enrollment expansion, were addressed as the economy grew, with remarkable improvements in both primary and secondary levels.

The 1974 High School Equalization Policy reinforced education development by equalizing school inputs, such as operating expenditures, student intake, class size, and education facilities, in both private and public high schools. This ensured that quality differences across public schools or between private and public institutions were diminished. During 1981–2000, the Republic of Korea made another achievement in improving the quality and expanding opportunities for higher education.

To set new directions for education development, the Presidential Committee for Educational Reform was formed in 1995, with emphasis on learner-centered education, diversification of education programs, autonomy and accountability of school operations, and a new information system. Also, a new monitoring and evaluation mechanism was implemented to assess quality of school education in the Republic of Korea.

Source: Based on C. J. Lee. 2008. Chapter 5: Education in the Republic of Korea: Approaches, Achievements, and Current Challenges. In B. Fredriksen and J. P. Tan, eds. *An African Exploration of the East Asian Education Experience.* Washington, DC: World Bank.

After the expansion targets were reached, focus shifted to qualitative improvements, and the same sequential approach was followed. Average student–teacher ratio was reduced significantly, after it ballooned during the expansionary period, and the qualifications of teachers were systematically upgraded (Lee 2008).[24] Today, Korean students are among

[24] Average class size at the upper-secondary level declined from around 60 in 1985 to only 34 in 2005 in the Republic of Korea. Similarly, at the lower-secondary level, it went down to 35 in 2005 from over 60 during 1955–1985.

the top performers in the world in both mathematics and science, as shown by international achievement test results (e.g., Programme for International Student Assessment, and Trends in International Mathematics and Science Study).

Likewise, India should strengthen the quality of its secondary education besides initiating efforts to make high-quality secondary education easily accessible to all (Sabharwal 2013). This will help ensure a steady flow of students who are prepared for higher levels of education and training. To address the surplus of low-skilled laborers and a shortage of medium-skilled workers, as pointed out in Section D of this chapter, India would need to promote both education and job creation, targeted especially at creating medium-skilled workers, on an unprecedented scale. Specifically, India should increase the number of schools with better facilities and more qualified teachers.

In retaining disadvantaged students who have limited access to quality education, it is important to ensure that they are supported in the transition points between educational stages (i.e., from primary to lower secondary, and from lower to upper secondary levels), where they are likely to drop out (Jones and Ramchand 2013).

The experience of more advanced countries has shown that quality of education is more important than quantity of education from the perspective of greater productivity and higher earnings for workers, and economic growth (Hanushek and Woessmann 2007; Zhong 2011). However, as discussed in Chapter 2, apart from educational inequalities between genders, and across social groups and economic strata, disparities in access to quality education remain a serious concern in both India and the PRC.

Given its emerging demographic profile (see Chapter 4, Section A), the PRC should focus on scaling up its efforts toward achieving quality improvements across regions, and at all levels. This is important at the secondary and higher education levels. Discussion in Chapter 2 also implies that besides increasing educational inputs (e.g., teachers and instructional materials) and promoting sustained and inclusive income growth, facilitating universal access to early childhood education (and proper nutrition) has important equity implications in terms of educational performance. This applies to the PRC, India, and other developing countries where wide disparities in access and performance are highly evident across regions and social groups.

The rural–urban disparities in secondary enrollment rates in the PRC still remain substantial and reflect the slow development of the rural economy. As discussed in Chapter 2, Section C, a significant proportion of children of migrant workers do not have access to good-quality public schools for lack of local household registration (*hukou*), and turn to privately operated migrant schools. They have difficulties in completing the junior secondary level and advancing to the senior secondary level.

Although some challenges remain, the rest of the PRC can learn many policy lessons from Shanghai—the leading province in education development—especially in terms of achieving quality improvements. The factors underlying the education quality improvements of Shanghai include quality-oriented education, curriculum reform, assessment, professional development of teachers, institutional factors (e.g., school autonomy, teaching and research network), and cultural factors, among others (Tan

2013). Other than better qualification of teachers, factors responsible for the outstanding performance of the Programme for International Student Assessment in Shanghai were greater attendance in preschool, higher parental education and occupation, and smaller student–teacher ratio, as discussed in Chapter 2, Box 2. However, absenteeism among teachers negatively affects the performance of students.

As also discussed in Chapter 2, although students from richer families tend to perform better, benefits of educational quality improvements in Shanghai percolated to all income groups (Sellar and Lingard 2013). Nonetheless, improving access of children of migrant households to quality schools remains a key challenge for Shanghai, and more so for the rest of the PRC (Chen and Feng 2013; Wang and Holland 2011). More efforts are required, both in terms of policy and research, to address this multidimensional challenge across the different regions of the PRC.

The World Bank (2012) recommends the phasing out of tuition fees at the high school level in the PRC to improve the progression of students to high school and postsecondary level. As discussed in Chapter 2, high fee and non-fee costs tend to limit access to high school, especially in the poorer areas. Lowering costs can help children of poor households to have greater access to senior secondary education. Nevertheless, free tuition or reduced tuition fee may not be the best solution as the primary motive behind the increased allocation of funds for public education is improving the general condition of the schools.

Governments in the PRC and India can instead provide subsidized loans for children of poor households and scholarships for eligible students. More financial institutions and private companies can lend their support to the education loan and scholarship schemes. Furthermore, more systematic research efforts are required to guide public policy in rationalizing public education financing and finding ways to devise mechanisms for targeting disadvantaged schools and students.

2. Improving Tertiary Education

Higher education, which produces highly skilled workers, is an important determinant of the innovative capacity of a country. Both countries are expanding their higher education sector, with a focus on quality. Challenges of funding, ensuring supply of qualified teachers, and building a sustainable academic culture are significant. Nurturing an emerging sector of private higher education and developing masters and doctoral programs are additional pressures. Internationalization is a key factor as well, as both countries seek to expand their global profile and develop strategies for international programs. Development of higher education is central to the future economic growth of these two fastest-growing economies in the world.

According to a comprehensive review of the tertiary education in the PRC (Gallagher et al. 2009), major investments have been made toward modernizing the teaching and research infrastructure in universities. The PRC has also introduced reforms to expand higher education enrollments and upgrade the quality of its top universities (Altbach 2009; Gallagher et al. 2009).

However, more efforts and resources are required to address the scale of the challenges that the PRC is facing, and to improve equity and efficiency of the tertiary education

system in producing graduates. Since access to tertiary education in the PRC is through a competitive, nationally administered examination (the *Gaokao*), addressing inequities in access to quality education at the lower levels effectively improves the progression of students to the tertiary level.

According to the National Bureau of Statistics of China (2001, 2013), the number of higher education institutions in the PRC has more than doubled to 2,442 in 2012 from 1,041 in 2000. As demonstrated by the Republic of Korea and other advanced countries, increasing access to higher education is both necessary and beneficial (see Box 3). However, qualitative improvements are necessary to sustain productivity growth and to advance the level of innovation and sophistication.

In 2003, the PRC introduced a national system of quality assurance at the tertiary level (Qualifications Recognition 2011), which sets the national criteria for standards within the different levels of higher education and provides for an examination of all higher education institutions. However, this system is not yet implemented consistently across all regions and municipalities (Gallagher et al. 2009). Also, it focuses more on input rather than outcome measures, which often results in a wide variation in the quality of higher education across regions and subregions (Gallagher et al. 2009), and mismatches in the labor market, which are costly and undesirable.

As outlined in Chapters 2 and 4, the immediate challenge for sustaining the growth and transition of PRC into a high-income country is to develop human capital with diverse competencies and advanced skills aimed at the development of more skill-oriented industries. To prepare students for more skilled, better job opportunities, the government in the PRC should ensure better recruitment, compensation, and training of teachers, and also promote more decentralized and effective decision making in school administrations. Engagement of local and global employers in the industry, discussed in more detail in Section C, is key to ensuring relevance of education and training programs, and avoiding skill mismatches.

Higher education reform is also important for India. The system of higher education in India has expanded at a fast pace with the addition of nearly 20,000 colleges and more than 8 million students on the rolls from 2000–2001 to 2010–2011. There are few universities that are globally recognized for their standard, but most institutions have poor quality instruction, necessitating improved teacher quality and enhanced accountability of higher education institutions.

Given the scale and spatial distribution of demand for learning in the PRC and India, they can largely benefit from learning technologies, especially in broadening access to secondary and postsecondary education (Gallagher et al. 2009; Gosper and Ifenthaler 2014). In the PRC, for instance, distance learning through television and online open education serves as an important service delivery channel. Continuing distance education offers opportunities for college degrees. In 2007, 500 learning centers of the China Central Radio and Television University connected through multimedia courseware and monitoring systems served around 2.2 million students nationwide (Gallagher et al. 2009).

Aside from using learning technologies, both the PRC and India can gain from promoting international collaborations, as well as from greater mobility of students and faculty (ADB

2012b). Activities such as faculty development and exchange, student exchange, research collaborations, and technology sharing can improve productivity of universities across borders.

3. Strengthening Education Financing

Broadening access to quality education across regions and social groups—an important challenge for both the PRC and India—requires higher and better distribution of public investment, as well as promotion of more private investments. For instance, policies in the PRC favor education investment in urban areas over rural areas, and discriminate against children of migrants. Its average pupil expenditure is low in most provinces and varies largely across regions. As a result, rich provinces tend to produce more human capital per capita than do poor provinces. Greater policy and financial support to the poor is called for in the provinces of the PRC.

Social spending has a positive and significant impact on educational outcomes (Baldacci, Guin-Sui, and de Mello 2003; Psacharopoulos and Patrinos 2004). Expanding public investments in education helps to make access to quality, affordable education services more inclusive in both the PRC and India. In more advanced East Asian economies, such as the Republic of Korea and Singapore, the steady increase in financial commitments to education allowed them to maintain a small class size and keep up with the population growth (Fredriksen and Tan 2008).

Public investments in education have considerably increased in both countries, especially in the past decade. However, public spending on education falls below international standards, both as a share in total public spending (which indicates the relative importance placed by the government on education) and as a share of the gross domestic product (GDP), across all levels of education, especially in tertiary education. For instance, the total public spending for education in the PRC in 2008, and in India in 2009, was only a little over 3% of their GDP, or less than half of the average of 6.2% for countries of the Organization for Economic Co-operation and Development in the same year (OECD 2012b; World Bank 2012). Even with the private sector spending on education, the total spending on education in the PRC is still far lower than in the OECD countries.[25]

Although the Government of India is investing the same proportion of GDP on education as the PRC, the growth of population in India is much faster than the growth in its income, resulting in a slower growth in the total and per capita public investment in India compared with the PRC. Also, public financing in education in the PRC is highly complemented by private financing. In India, increasing public education spending and enhancing the efficiency of spending can help make education more affordable to poor households, especially in large households in rural areas, contributing to improving access and equity in secondary and tertiary levels of education. Currently, schools fund a larger percentage of their operations from tuition fees. Better public financing can also support improvement of quality of teachers, instruction materials, and school facilities.

In the past 15 years, the PRC has experienced rapid expansion in tertiary education despite low public expenditure. In addition to government funding for higher education, other

[25] In 2006, total public and private spending in the PRC totaled only about 4.6% of GDP (Gallagher et al. 2009).

sources of financing, such as university income, and tuition fee and other educational fees (Li, Mengistae, and Xu 2011), have greatly contributed to this expansion in the PRC. In addition, universities and vocational schools can borrow from banks. For example, in 2007, CNY450 billion–CNY500 billion was borrowed by universities from banks (Yongxin 2007).

However, rising tuition fee and living costs are placing disproportionate burdens on some students and their families. For example, tuition cost is about 47.3% of disposable income per urban resident, and 171.2% per rural resident (Gallagher et al. 2009). Additional public expenditure in tertiary education can greatly help provide scholarships to high-performing students from poorer families and facilitate the necessary quality improvements. A higher level of investment can also steer the national quality assurance system toward a more nationally consistent approach to quality control (Gallagher et al. 2009).

B. Skills Development

In an era of increasing globalization and industrialization, international competitiveness requires dynamic workers with adequate skills and competencies capable of supporting industrial growth and expansion to other markets. In addition, as the PRC and India move to a higher level of technological sophistication and innovation, there will be an increasingly progressive demand for more complex skills. This requires not only broad access to good-quality primary and secondary education but also relevant vocational training, higher education, and skills development opportunities for lifelong learning, along with a close matching of skills supply and demand (ILO 2011a).

As discussed in Chapters 2 and 4, equipping the workforce with the level and quality of skills required to meet changing production demands of local and global markets is crucial for increasing employment, productivity, and innovation, thereby supporting a strong, inclusive, and sustainable growth. Better vocational education and skill training programs could improve employability of graduates and the existing human resources to reduce current and future skill supply–demand mismatches in the labor market. In India, for instance, where a surplus of low-skilled labor and a shortage of medium-skilled workers are expected (see Chapter 4, Section D), training programs can significantly complement schools in upgrading the future skill profile of the labor force.

It is also interesting to note that in other Asian economies with more advanced technical and vocational education and training (TVET) systems, training is recognized not as a once-in-a-lifetime event but as a continuous, lifelong learning process, which is key to human resource development (ADB 2014,Fredriksen and Tan 2008). Effective and relevant TVET systems, for instance, have played a key role in the rapid industrialization and economic growth of the Republic of Korea and Singapore. In the 1980s, the Government of Singapore took various initiatives (e.g., Basic Education for Skill Training in 1983, Modular Skills Training in 1987, and Core Skills for Effectiveness and Changes in 1987) for the continuous upgrading of workers' skills (Fredriksen and Tan 2008). Box 4 recounts how the Republic of Korea responded to the different challenges that emerged through the years to maintain the effectiveness and relevance of its TVET system.

Box 4: Developing Technical and Vocational Education and Training through Changing Times—The Republic of Korea

The technical and vocational education and training (TVET) system in the Republic of Korea—a dual system consisting of formal technical and vocational education and occupational training—has undergone various reforms since the 1960s. To stay relevant, efforts were made to keep the system dynamically responsive to the changing demands for skilled human resources in the Republic of Korea, despite emerging challenges (e.g., lack of qualified teachers). For instance, when vocational school graduates found it difficult to obtain decent jobs, the system was streamlined to sharpen its development edge toward meeting the rising human resource needs for the development of the labor-intensive light industry in the early 1960s, and the heavy and chemical industries in the 1970s.

Aside from having well-equipped technical and vocational high schools, the government established public occupational training centers for middle school graduates and high school dropouts. Financing was secured through legislation (1967 Vocational Training Law), and vocational education was treated as an integral part of human and economic development. Student internships in industrial sites were integrated in technical education programs to ensure relevance to industrial needs. While the government focused on expanding enrollment in vocational and technical education, it also implemented programs for quality improvement. With some foreign assistance, a national skill qualification system was introduced to recognize and certify skill grades obtained by individuals.

In the 1980s, advancing science and technology education became necessary to support the upgrade of the manufacturing industry and to enhance its international competitiveness. To complement the initiatives of the education system to support the emerging demand of industries for technical manpower and to respond to the diminishing demand for vocationally trained manpower, various technical high schools were upgraded to junior technical colleges providing 2- and 3-year technical education programs. Similarly, occupational training centers were upgraded to junior technical colleges. Open-technical colleges were also established to address the continuing education needs of high school graduates who were already working in the industry.

In the 1990s, as globalization intensified the need for greater international competitiveness, Korean industries demanded better technically trained human resources. Junior technical college became the central focus of technical–vocational education, pushing vocational high schools out of the picture. After the 1990s, the need for in-service training outpaced the demand for occupational training for unskilled workers.

Source: Based on C. J. Lee. 2008. Chapter 5: Education in the Republic of Korea: Approaches, Achievements, and Current Challenges. In B. Fredriksen and J. P. Tan, eds. *An African Exploration of the East Asian Education Experience.* Washington, DC: World Bank.

1. Reforming Technical and Vocational Education and Training Programs to Meet the Changing Needs

The current TVET programs in both the PRC and India are, however, too fragmented and ineffective to meet the changing demands (ADB 2009, Chenoy 2012). The TVET system in the PRC is faced with several challenges in the following areas: (i) financing, (ii) quality assurance and employability of graduates, (iii) curriculum reform, (iv) industry integration,

and (v) coordination (ADB 2009, CPC 2014, World Bank 2012). For example, a framework for curriculum development that systematically involves inputs and feedback from employers is lacking. Reform to address this, as well as for balancing continued acquisition of general core skills with technical skills is needed. A system for licensing and accreditation of private training providers to expand access to quality training opportunities should be introduced.

Reforms should focus on addressing the mutually enforcing challenges mentioned above to improve the effectiveness and efficiency of the TVET system in the PRC toward supporting its labor market priorities (CPC 2014). An analysis of anticipated changes in the demand for labor at the provincial level is important in the development of more effective TVET systems. For instance, an assessment of training needs by Asian Development Bank (ADB 2011b) in the province of Shaanxi in the central PRC, focusing on generating more skilled labor for manufacturing and services sectors—specifically coal mining, advanced equipment manufacturing and logistics, and tourism—is central to supporting the economic strategy of the province.

Given the strategic position of vocational education in the country, the PRC should accelerate the development of modern vocational education that will not only focus on technological advancement but also improve the core values of workers toward professionalism and excellence. It will serve the training needs of workers in both rural and urban areas. Innovative ideas and mechanisms for developing new talents are needed to address old problems of vocational education in the country, as well as to improve the efficiency of vocational education resource utilization.

Like many low- and middle-income countries, India is confronted with the following skills challenges: (i) lack of scale in public and private vocational training centers, which limits the number of students benefiting from skills training; (ii) lack of financing options and incentives for skills training; (iii) negative perception toward skills training and vocational education; (iv) industry or employer apathy toward skills development in their workers or adoption of an incentive structure that favors skilled workers; and (v) quality issues, with the courses not being responsive to the needs of the industries or employers (Chenoy 2012, Sharma 2010).

Many of the skills development initiatives in India today, led by the National Skill Development Coordination Board, are geared toward addressing these limitations. The board has been actively promoting skills development by creating a supportive environment and engaging the private sector (ADB 2014). It also provides existing and prospective partners with sectoral, as well as district-level, demand and supply perspectives for creating sustainable vocational training capacities based on skills gap studies. In India, nongovernment organizations, educational institutions, and social enterprises are now either establishing courses for skill development or establishing facilities for skills-related training.

In 2010, the Government of India launched a national program—Modules of Employable Skills—that sets standards for skills acquisition and certification in 60 broad occupational

groups,[26] many in the informal sector (ADB 2014). Based on work initiated by the International Labour Organization, each module provides a building block for the acquisition of wider qualifications and outlines short, competency-based programs. There is scope for improving the responsiveness of training institutions to local demands. Guidance and counseling can also be useful in channeling skills to higher demands and overcoming information asymmetries about employment possibilities (ADB 2014).

2. Strengthening Skills Training Capacity

The very low proportion of the labor force with formal training and the high dependence on nonformal vocational training in India highlights its grossly inadequate vocational training system (Government of India 2012c). Each year, there are around 13 million new entrants to the Indian labor market, but the existing capacity to train is only less than 25% (Panth 2013). Given the low employability of students across cities and states, it is necessary to strengthen skills training among the young workforce of India.

Beyond the challenge of providing training to its young graduates, another challenge facing India is to retrain its adult workers who have not completed primary or secondary education and provide them with job-oriented vocational skills. Transitioning from informal to formal job markets is also a big challenge for India. The unorganized sector in India is dominated by workers at the bottom of the skill pyramid, with no mechanism in place to assess and validate the training needs of the workers in this sector (Sanghi and Sensarma 2014).

As discussed in Chapter 4, by 2020, it is projected that there would be a dearth of skilled workers, mostly medium skilled in India, and highly skilled in the PRC. Without strengthening the effective training capacity, both economies will face serious skills gaps across industry sectors, more so in the case of India, where this gap has to be closed or narrowed down to reap its full demographic dividend.

Practical, on-the-job training and short, skill-based programs focused on a set of required skills can improve the employability of new graduates in the PRC (Chen, Mourshed, and Grant 2013). As this will require early involvement by employers in the development of workers, partnership with industry players is key. Employers with highly specialized skill requirements should be encouraged to implement apprenticeship programs.

It should be noted, however, that although government-supported training programs contributed greatly to the enhancement of technological capabilities in the Asian economies, they were not always successful. Case studies show that excessive government control of training programs were sometimes not only ineffective but also discouraged private-firm training (Lee 2001). For instance, when the Republic of Korea introduced a compulsory vocational training and levy system,[27] firms opted to pay the fine rather than implement the firm-level training (Ashton et al. 1999; Lee 2009). Many firms found the bureaucratic control too rigid and the duration involved too long (Ashton et al. 1999). In contrast, the Human Resources Development Fund in Malaysia provides an example of a highly successful demand-driven training scheme that is flexible and participatory (Box 5).

[26] See Government of India Directorate General of Employment & Training Ministry of Labour and Employment website (http://www.dget.nic.in/mes/sectors.htm) for more details.

[27] The Special Law in 1974 required firms with more than 300 workers to provide 6-month training in approved schemes. Under the vocational training levy system, fines were levied if the requirements were not met by firms.

Box 5: The Training Levy and Human Resources Development Fund of Malaysia

Established in 1993 with a matching grant from the government, the Training Levy and Human Resources Development Fund (HRDF) of Malaysia replaced an ineffective training tax scheme to provide training incentives for employers in the private sector so that they will upgrade the skills of their workforce to meet their business requirements. Administered by a secretariat and a council consisting of the employer and government representatives, a 1% levy rate is imposed on employers with 50 or more employees, and 0.5% for small enterprises wishing to participate. After contributing for 6 months, firms are eligible to claim a part of allowable training expenses, and depending on their needs, can choose flexibly from among several programs: (i) preapproved training courses provided by registered external institutions, (ii) ad hoc in-plant or external training courses, or (iii) annual training programs. While courses in the first program are preapproved to reduce administrative burdens on firms, the second and third programs require prior approval from the Human Resource Development Council. In addition, the HRDF provides firms with training development plan grants, courses on training needs assessment, and a variety of programs targeting small enterprises.

Between 1992 and 2006, the HRDF approved training for 5.3 million workers and reimbursed firms more than 70% of the RM2.0 billion collected. A 2001 evaluation study indicated formal training in manufacturing enterprises rose from 47% in 1988 to 64% by 1996, while productivity rose by 23% in small enterprises, and 40% in medium and large enterprises as a result of higher training investments. Productivity impact of skills training was twice higher in firms with new technology as in those without it, which partly explains why larger employers benefited more than smaller ones.

Source: Based on ADB. 2014. *Innovative Strategies in Technical and Vocational Education and Training for Accelerated Human Resource Development in South Asia.* Manila: Asian Development Bank and H. Tan. 2001. *Do Training Levies Work? Malaysia's HRDF and Its Effects on Training and Firm-Level Productivity.* Washington, DC: World Bank Institute.

Lee (2001) emphasized that innovating firms provide training opportunities for workers and that more educated workers participate in more postschool training. Therefore, in an environment where technology upgrade is continuous and where well-educated workers demand training, decentralizing skills training to private firms promotes allocative efficiency by reducing pressure on public funds. Government, in this case, may limit its role as a regulator or service provider.

Nonetheless, public provisions of training programs are justified in many developing countries, such as India, where market failures are prevalent. With strong externalities and high social returns to general training, governments also need to provide incentives for private enterprises to train workers. Given the right incentives, private enterprises should be primarily responsible for skills training. But, even in this case, to make them effective, the state-led programs need to be continuously evaluated and further improved to keep up to date.

Use of learning technologies can play an important role in scaling up skills development and expanding enrolment rates. Distance learning in India administered by the National Institute of Open Schooling receives as much as 20,000 entrants annually (ADB 2014).

Established in 1989 under the Ministry of Human Resource Development, the institute offers 80 academic and vocational courses[28] via distance teaching below the university degree level through 1,425 accredited vocational centers. Teaching materials include self-instructional audiovisual and print materials, supplemented by radio and television, as well as personal contact programs and practical training sessions at the accredited vocational centers.

Since 2000, almost 80,000 learners have been certified in vocational courses. Tuition fees vary according to subject, ranging from Rs1,100 to Rs12,500 for the 1-year package (i.e., multiple skills) courses; from Rs700 to Rs3,000 for the secondary level courses; and from Rs600 to Rs7,000 for the 6-month certificate courses (Government of India 2011b). More efforts to scale up this institution and improve its quality standards and certification could benefit employers, employees, and the economy.

3. Strengthening School–Industry Partnerships to Bridge School–Work Transition

Despite government efforts to improve TVET programs, employability of graduates across regions is still lacking in both the PRC and India, as illustrated in Chapter 2. This calls for a stronger public–private partnership based on shared responsibilities and mutual interest (ILO 2011b), as well as institutional and financial arrangements that support the involvement of employers and workers to ensure a close connection between training and employment policies (ILO 2011a).

As demonstrated by the experience of many economies in Asia, strong school–industry cooperation is required to ensure relevance of education and skills training programs to the changing industry demand. A review of technical and vocational education projects funded by ADB across Asia and the Pacific concluded that linkage with industry is the single most important factor in training success (ADB 2004).

Some of the critical areas for cooperation include curriculum development, internship program implementation, retraining and lifelong learning for human resources, and financing.[29] In Indonesia, for instance, vocational schools rely on industry partners, local government, and the local business community to keep track of the demand. Close partnership with the business community allows schools to maintain program relevance, seek advice on course content, recruit instructors, and tap internships and work placement opportunities for their graduates (ADB 2008).

In India, curriculum reform is also needed to reorient secondary and postsecondary education and make it more relevant to the current and rapidly changing needs of the domestic and international labor markets. Coordinating curriculum development with large enterprises can help education providers reorient their curriculum toward the skill

[28] Including courses on agriculture, engineering and technology, health, home science and hospitality, computers and information technology, business and commerce, and teacher training. Candidates can combine vocational subjects with academic courses to earn certificates at the secondary and senior secondary levels. Admission is year-round, with a minimum age of 14 and no upper limit. Learners have 5 years to progress at their own pace and complete their studies (ADB 2014, Government of India 2011b).

[29] For example, increasing focus on the four priority sectors of the province of Shaanxi, PRC, and close partnership with the employers in these sectors will help improve supply–demand matching, which is beneficial to both employers and graduates.

requirements of employers. Small and medium-sized enterprises can also be linked with large companies to obtain access to their training programs.

Overcoming the common human capital development challenge of developing employable graduates entails integrating internship programs into education and training programs. By requiring students to work at industrial sites for a certain period of time, internship programs provide important hands-on experience in using industrial facilities and developing their technical competency before they graduate. Similarly, employers should foster their partnership with education and training institutions for providing their human resources with continuing education and training opportunities to meet their future labor market needs.

Governments should also develop a broad-based financing strategy that will benefit large corporations, as well as small-scale enterprises, in terms of meeting their current and future labor market needs. The PRC and India should provide efficient institutional arrangements for big corporations to cofinance and benefit from scholarships and training programs. At the same time, they should give small enterprises access to financing for skills training. Malaysia's Human Resources Development Fund (Box 5) and Singapore's Skills Development Fund[30] provide some successful experience on financing through levies.

C. Employment and Labor Markets

As emphasized in Section I, the different development pillars enforce one another. Achieving higher income requires not only having a well-educated and highly skilled labor force but also efficient labor markets that provide broad-based quality employment opportunities and make the best use of the human capital of the country.

Apart from scaling up of education and training given the projected shortages and surpluses at different skills levels, both the PRC and India must improve their labor markets. Both countries should expand quality employment opportunities to address job–skill mismatches, as well as overcome emerging demographic challenges as discussed in Section II.

1. Improving Mobility and Flexibility in Labor Market

The present labor supply–demand gaps in the PRC and India are partly a mismatch in the geographic distribution of labor supply and demand. For instance, large cities in the PRC tend to have more high-skilled labor than they can use, while other midsize and smaller ones have less than what they need (Chen, Mourshed, and Grant 2013). This geographic mismatch is, in turn, partly due to the barriers to labor mobility and an inflexible labor

[30] As part of a broader government industrial strategy toward more capital-intensive system of production, the Skills Development Levy Act requires all employers to pay a monthly skills development levy for each of their employees (Government of Singapore 2008). Collections are channeled into the Skills Development Fund, which provides grants to employers to encourage them to train, certify, and upgrade the skills of their workers according to their approved training plans. It also provides a training leave scheme for older workers, as well as financing and assistance for information technology training of workers in small and medium-sized enterprises. So far, Skills Development Fund has resulted in an overall increase in company-based training programs, as well as the participation of small and medium-sized enterprises and low-skilled workers (Johanson 2009).

market. While developing competent workers by improving the quality of education and skills training can help meet challenges, flexible and secure markets are critical as well.

Lowering barriers to labor mobility across regions can partly address the mismatch. Phasing reforms of the *hukou* system and ensuring portability of pension and social security rights can promote an efficient and effective allocation of human capital in the economy. In the long term, there should be more efforts to build a modern wage-setting mechanism and labor market institutions.

Facing rapid population aging, the demographic transition in the PRC is now headed in an unfavorable direction for economic growth. Its prime working-age population has already begun to decline. As in many developed countries with aging populations, raising the retirement age in the PRC (from 60 among males and 55 among females) can help ensure that older workers, particularly in urban areas, do not exit the labor force prematurely.

While labor force expansion continues in India, the lack of flexibility and security in the labor market has important implications on human capital development. It limits lifelong learning and continuous training, which is necessary for promoting innovation. It also limits the expansion of better income-earning opportunities, which often encourage greater private human capital investments. As ADB (2011b) pointed out, the demographic dividend is not an automatic consequence of favorable demographic changes. Whether a country can take full advantage of the sizable benefits of accelerated growth due to its rising share of the working-age population in the total population—demographic dividend—largely depends on its ability to employ its young and growing labor force into productive use, as the case of the PRC has demonstrated.

Bhagwati and Panagariya (2013) emphasize the need for further labor reforms to accelerate and sustain growth while making it even more inclusive. As demonstrated by the development experience of the PRC and the more advanced East Asian economies, movements of workers out of agriculture into industry and service, growth of labor-intensive manufacturing, progressive shift of workers from the informal to the formal sector within industry and services, and more rapid urbanization were the key phenomena during their early and rapid modernization. Several constraints arising from the multiple layers of regulation in the labor markets constrain the progress in structural transformation in India (Bhagwati and Panagariya 2013). These include the slow growth and poor performance of labor-intensive manufacturing, the heavy concentration of Indian workforce in small firms, and the extreme and the ever-increasing reluctance of Indian entrepreneurs to employ unskilled workers, among others.

In India, legal protections covering regular workers in the organized sector are extremely high, even exceeding those in most developed countries. The bureaucratic procedures entailed in hiring regular workers are also difficult and costly to follow. They have deterred Indian entrepreneurs from employing unskilled workers and developing labor-intensive manufacturing (Bhagwati and Panagariya 2013). Firms also tend to hire contract workers and, as a result, informal employment proliferates. Consequently, expansion of formal job opportunities in the organized sector has been limited, as indicated by the lower proportion of large, labor-intensive enterprises in states with inflexible labor regulations than those in states with more flexible regulations (Hasan and Jandoc 2012).

India needs to reform its outdated and complicated labor laws not only to promote economic competitiveness and the investment climate but also to expand employment opportunities in labor-intensive industries. Employers and workers should be involved, including those who are in the informal sector, in redesigning new and simpler labor legislations. The exact role of labor inflexibility on the limited growth of labor-intensive manufacturing and large enterprises has been controversial in policy debates in India. More specific policy recommendations on deregulating labor markets in India require more firm-level analysis to understand which labor laws are limiting job growth in the formal sector.

2. Harnessing Quality Employment Opportunities

The PRC and India should narrow present and future labor supply–demand gaps as described in Sections II and IV. Structural transformation and employment requirement changes are also an important element in the labor supply and demand mismatch.

The analysis in Chapter 4, Section D shows that the rapid growth in knowledge-intensive manufacturing is expected to create shortages of high- and medium-skilled workers in the PRC. In contrast, in India, the shortage of medium-skilled workers and the oversupply of low-skilled workers are expected to be challenges.

To create sufficient jobs for its low-skilled workers, India would need to achieve a step change in growth of its labor-intensive sectors. It needs to improve its regulatory framework, expand infrastructure construction, and advance planned urbanization to improve the investment climate and competitiveness of the export sectors. At the same time, promoting off-farm rural employment, especially for those unlikely to migrate to urban areas in India (as well as in the PRC), can be also be helpful to maintain and promote higher labor participation in rural areas.

In the PRC, the supply of highly skilled workers will be needed, as the economy transforms into more technology-intensive industries and develops knowledge-intensive services sectors. Though some evidence suggests a current oversupply of university graduates in the PRC, the reverse is expected in the coming decade due to ongoing demographic and sectoral shifts in the economy. Measures to promote access to quality postsecondary education and training, as discussed in the previous chapters, can partly bridge the future skills gap in the PRC.

D. Conclusion

This paper underscores the fact that since the impact of human capital development policies hinges on other economic and development reforms, a country-specific integrated approach to addressing important challenges in education and skills development is recommended.

The PRC has shown strong and sustained output growth averaging over 9.5% annually in the past 35 years. It has driven the unprecedented transformation of a rural, command economy into a global economic superpower. Advancing from upper-middle-income to high-income status, the PRC is now striving to develop more technologically sophisticated

industries. However, advancing to a high-income status is not straightforward. Many countries have tried but failed, stagnating at middle-income levels.

As discussed in Chapter 1, strong human capital is key to transitioning from middle-income to high-income status, thereby avoiding the "middle-income trap" (Eichengreen, Park, and Shin 2013). Clearly, the PRC must expand access to educational opportunities for all, and develop high-quality human capital that can adequately support advances in technology and higher-value industries to achieve sustained growth and transition to a high-income status.

Compared with that of the PRC, the economic performance of India has been less remarkable. India's economic growth began to accelerate dramatically since the early 1990s when economic reforms and open-trade policies were introduced. But it hit the limit. Growth has fallen to 4%–5% per year (World Bank 2014). The per capita income gap between India and the PRC has widened. In 2013, the PRC's per capita income of $11,850, adjusted for purchasing power, was twice more than that of India at $5,350 (World Bank 2014).

The "demographic dividend" of India has a clear catch-up advantage. However, the favorable demographics of India alone will not suffice to achieve the rapid growth of the PRC in the earlier years. India should utilize its human resources more effectively and also address critical bottlenecks to economic competitiveness discussed earlier (Chapter 1) that influence human capital development. This requires a comprehensive plan to adequately expand opportunities in labor-intensive industries; upgrade education and skills of workers; and address said bottlenecks in institutions, macroeconomic environment, and technology innovation.

The report highlights the importance of human capital development from various perspectives. At the individual level, higher levels of education and skills provide higher wages and income; at the country level, better human capital is associated with higher productivity and economic growth. In Chapter 1, most of the global competitiveness indicators are associated with the need for better human capital to deal with increasing sophistication. Countries moving up the value chain have a higher stock of human capital given the need to transition increasingly to a knowledge-based economy that requires more sophisticated application of skills.

The paper proposes several policy actions and research areas toward more productive and inclusive human development:

(i) broadening access to basic education across regions and social groups, while upgrading its quality, in both the PRC and India;

(ii) strengthening education financing to increase the affordability of quality education for children of poor households, especially the ones living in rural areas of both the PRC and India, and the ones from migrant families in the PRC, as well as to improve the quality of teachers and school facilities;

(iii) improving higher education, as well as strengthening TVET programs, to support the transition to more skill-oriented industries in the PRC, while aiming at the creation of more medium-skilled workers and job opportunities in India;

(iv) reforming the focus of TVET programs toward supporting the changing market demands for diverse skills and competencies, and strengthening the integration and

effectiveness of the institutional arrangements in financing, coordination, incentive system, and quality assurance that support it;

(v) expanding training capacities to strengthen skills training for the growing young workforce, especially in India; and to meet the challenge of shortage of skilled workers, mostly medium skilled in India, and highly skilled in the PRC;

(vi) strengthening school–industry cooperation to improve matching between skills and jobs;

(vii) improving the mobility and flexibility in labor markets to reduce geographical mismatches in labor supply and demand across regions, industries, and demographic groups; and

(viii) harnessing quality employment opportunities to narrow the present and future labor supply–demand gap in different skills, as well as further develop labor-intensive manufacturing and off-farm rural employment, especially in India, and knowledge-intensive manufacturing and services sectors, especially in the PRC.

Within the framework of these broad policy recommendations, more careful and systematic design, implementation, and evaluation of human development policies at the national, regional, and provincial levels are recommended to ensure that they are consistent with the development policies, and relevant to the changing demand.

For a better understanding of the factors driving human and economic development in each country, more systematic studies need to be conducted. Analysis using micro-level data is an appropriate way to draw comprehensive but specific policy directions corresponding to each social group. As an example of the analysis, it is possible using data at the household level to assess the factors determining school participation and the progression of students to higher levels of education, among children from different levels of household income, both in the PRC and India. The results can be used to design broad-based, as well as targeted interventions such as promoting greater education investments among richer households and financial support to poorer ones.

Conducting firm-level studies will help to figure out the role of different types of firms in encouraging greater investments in human capital development and the channels of specific policies and regulations in the PRC and India to affect the employment and training decisions of the firms. It would also allow formulating policies on the demand side that will complement the various quantitative and qualitative human capital policy interventions on the supply side of labor markets.

Further studies based on randomized evaluations and other similar studies can be helpful to design and implement more effective policies on human capital development specific to the targeted group of each country. Various randomized experiments have been effective in addressing specific issues such as school participation constraints in rural areas.[31] They have

[31] For example, Banerjee et al. (2005) found through a randomized evaluation study that a computer-assisted learning program can effectively assist students in learning mathematical concepts by playing educational games. This is to address the widespread shortage of qualified teachers in the community. Banerjee et al. 2005 also showed that young women from the community can be employed to help children learn basic competencies. More systematic efforts such as these are required to find effective ways to ensure that disadvantaged children benefit from quality improvements.

been used in identifying the factors affecting quality of education in India,[32] as well as other developing countries, and provided insights in achieving better quality education outcomes.

The analyses based on cross-country comparisons enable one to grasp the differences and similarities in human development between the PRC and India and draw useful implications for further improvement. Also, in-depth research on the advanced East Asian economies such as the Republic of Korea and Singapore, reflecting on their experiences, would provide lessons for the PRC and India as well as other developing economies in Asia.

Designing and implementing more effective policies on human capital development specific to the targeted group in each country could be improved through further studies based on randomized evaluations and other similar methodologies, focusing on their effectiveness in addressing specific issues such as school participation constraints in rural areas.

[32] According to Banerjee et al. (2007, 2010), these factors include school attendance of teachers and students, class size, teacher skills and training, monitoring, community-based learning, school meals, and other health-related factors.

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Human Capital Development in the People's Republic of China and India
Achievements, Prospects, and Policy Challenges

This report was prepared with the primary objective of drawing insights on how Asian economic giants India and the People's Republic of China leveraged education and skills development to advance economic growth. The analysis presented similarities and differences in human capital development strategies and their outcomes that helped define development pathways between the two countries. It also outlined the prospects for human capital development in the sustainability of the two countries' economic growth. The report was completed in 2014 under the Development Partnership Program for South Asia: Innovative Strategies for Accelerated Human Resource Development in South Asia (TA-6337 REG).

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