Human Capital in China
2016

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Central University of Finance and Economics

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This project is funded by

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A Brief Introduction to

China Center for Human Capital and Labor Market Research

Established in March 2008, the China Center for Human Capital and Labor Market Research (CHLR) at the Central University of Finance and Economics (CUFE) is an integral part of the Advantageous Program Platform in Economics and Public Policy at the CUFE. It is an international research center for the study of human resources, labor markets, and their impact on economic development, focusing on China and related economies.

The CHLR has master's, doctoral and post-doctoral programs. Nobel Laureates Kenneth J. Arrow and James Heckman, and Professor Dale W. Jorgenson of Harvard University and the founder of the income-based method for measuring human capital, serve on the Advisory Board.

The major research areas in the Center include but are not limited to human capital and skill measurement, human capital investment, human capital mobility, human capital and innovation, and health economics.

All faculty and research fellows of the CHLR hold a Ph.D. degree in economics from major universities in North America and some are tenured professors at U.S. universities. The CHLR Special-term Director, Dr. Haizheng Li, is Professor in the School of Economics, Georgia Institute of Technology. Currently the Center has 1 "Changjiang Fellowship" Scholar, 6 full-time faculty members, 7 special-term professors, 11 senior research fellows.

The Center's graduate programs are internationally oriented. The curriculum and instruction are rigorously designed following research universities in North America. All courses are taught in English. By 2016, 1 post-doctoral student, 4 doctoral students and 80 master students have graduated. Currently, there are 27 students: 21 master students and 6 doctoral students.

The Impact of China's Human Capital Project

The research project, "China's Human Capital: Measurement and Index Construction," is conducted by the China Center for Human Capital and Labor Research Center (CHLR), and funded by the National Natural Science Foundation of China and the Central University of Finance and Economics. The project aims at establishing China's first scientific and systematic human capital index, quantitatively describing China's human capital distribution, trend and dynamics. It constructs important measurements for further evaluating human capital and its contribution to economic development, and provides policy-makers with important information on the nation's human capital development.

The project is part of the international effort to establish comparable national human capital measurement across nations and to eventually incorporate human capital into the National Income and Product Accounts (NIPA) system.

The project is led by the Director of the CHLR, Professor Haizheng Li. The research team includes Professor Barbara Fraumeni (a pioneer scholar in developing the Jorgenson-Fraumeni method of human capital calculation), other full-time and special-term professors, graduate students, and administrative staff at the CHLR. Since the inaugural issue of the China Human Capital Report in 2009, the project has generated great social impact, and drawn the attention of academia and governments both at home and abroad.

I. Papers/Books/Book Chapters published based on China Human Capital Report (in reverse chronological order):

- "Human Capital Estimates in China: New Panel Data 1985-2010", *China Economic Review*, Volume 30, pp.397-418, 2014.

- "Human Capital Comparison among Beijing, Tianjin and Hebei Province" in: Beijing Human Resources Development Report 2013-2014, Beijing Human Recourses Bluebook Series, edited by Zhiwei Zhang, Social Science Literature Press, Beijing, China, in Chinese, 2014.

- "Regional Difference in perspective of the quality of labor force human capital", *Journal of Central University of Finance and Economics*, in Chinese, Volume 1(8), pp. 72-80, 2015.

- "China's Human Capital Measurement: Method, Results and Application", *Journal of Central University of Finance and Economics*, in Chinese, Volume 1(5), pp. 69-78, 2014.

- "Regional Distribution and Development of Human Capital in China", *Economic Research Journal*, in Chinese, Issue 7, pp. 49-62, 2013.

- "Human Capital in China, 1985-2008", *Review of Income and Wealth*, Volume 59(2), pp. 212-234, 2013.

- "The Rural-Urban Disparity of Human Capital in China," Chinese Economists Society Presidential Forum, in: Economic Reform and Future Development Directions, Nankai University Press, pp.209-227, 2012.

- "Human Capital In Beijing-A Measurement Based on the Jorgenson-Fraumeni Income Approach" in: Beijing Human Resources Development Report 2010-2011, Beijing Human Recourses Bluebook Series, edited by Zhiwei Zhang, Social Science Literature Press, Beijing, China, in Chinese, pp. 57-79, 2011.

- "Human Capital Index in China," in: <u>The Changing Wealth of Nations</u>, Washington, DC: World Bank, Chapter 6, pp. 105-114, 2010.

- "Human Capital Measurement and Index Construction in China," *Economic Research Journal*, Issue 8, 2010. (Reprinted in *China Social Science Digest*, 2010, No. 12.)

- "Human Capital Index in China," National Bureau of Economic Research, working paper (http://papers.nber.org/papers/w15500).

II. Invited Speeches and Presentations:

- The 2016 China Conference of the Chinese Economists Society, "Regional Distribution and Trend of China's Human Capital 1985-2012: The Impact of Urbanization, Education, and Population Aging", Shenzhen, China, June 12, 2016.

- The Seventh International Symposium on Human Capital, Plenary Session Presentation, "Measuring China's Human Capital-2015", Beijing, China, December 12, 2015.

- The 5th Changqing Commonweal Lecture, as a Keynote Speaker, "Human capital and pre-college education", Beijing, China, June 16, 2015.

- Shaanxi Normal University, International Symposium: Human Capital and Challenge of economic growth in China, as a Keynote Speaker, "Rural human capital in China and the economic growth in future", Xi'an, Shaanxi, June 6-7, 2015.

- The 6th International Symposium on Human Capital and Labor Markets and the Release of the China Human Capital Report, Plenary Session Presentation, "Human Capital in China 2014", Beijing, China, 2014.

- University of Chicago, Symposium on China's Economy and Governance, "Reginal Distribution of Human Capital in China" Chicago, USA, August 27, 2014.

- The 26th Annual Meetings of the Chinese Economics Society of Australia, as a Keynote Speaker, "Regional Distribution and Growth of China's Human Capital 1985-2010: Urbanization, Education, and Aging," Monash University, Melbourne, Australia, July 6-9, 2014.

- The Chinese Economists Society (CES) President Forum, "Reform of China's Graduate Education" Guangzhou, China, June13, 2014.

- Fudan University and The Chinese University of Hong Kong, Shanghai-Hong Kong Development Institute conference on "Human Capital Distribution and Trend in China: Where does Shanghai Stand?" Shanghai, China, May 28, 2014.

- The Third World KLEMS Conference: Growth and Stagnation in the World Economy, invited presentation, "Human Capital Estimates in China: New Panel Data 1985-2010," Tokyo, Japan, May 19-20, 2014.

- American Economic Association Annual Meeting, "Human Capital Estimates in China, New Panel Data 1985-2010", Philadelphia, USA, January 3-5, 2014.

- International Symposium on "Labor Aspect of Corporate Social Responsibility and Public Policy," organized by the United Nations ILO Training Centre in Turin and Nanjing University of Finance and Economics, "Human capital per labor of China," Nanjing, China, May10-13, 2013.

- University of Southern California, US-China Institute conference on "The

State of the Chinese Economy: Implications for China and the World," Los Angles, "Human Capital in China," February 24-25, 2011.

- High-Level Working Group on Skills and Human Capital hosted by the Lisbon Council, Invited Speaker, "Measuring Human Capital in China."Brussels, November 16, 2010.

- The 31th International Association for Research in Income and Wealth（IARIW）, as a Speaker, "Estimation of China human capital.", Switzerland，August 2010.

- The 25th Anniversary of the Sino-US Exchange on Economics Education (Ford Class) Renown Scholar Forum, Renmin University of China, invited speaker, "Human Capital in China", Beijing, China, July 23, 2010..

- The 31st IARIW General Conference of the International Association for Research in Income and Wealth, invited plenary session presentation, "Human Capital in China", St. Gallen, Switzerland, August 23-28, 2010.

- Plenary Session Chair and co-organizer, Beijing municipal government conference, "World Talent, World City," Beijing, May 28, 2010.

III. Related Funded Projects:

- The National Natural Science Foundation of China supported the human capital measurement project for the years 2010-2012, and will continue to support it for the four years 2013-2016. The new grant title is, "China Human Capital Index System Improvement and Applications," (project No.71273288).

- In 2012, the CHLR was invited to join the European Union project

(2012-2015), "Lifelong Learning, Innovation, Growth and Human Capital Tracks in Europe," to study human capital, skills and outcomes with other eight research teams from various countries/regions.

- State Administration of Foreign Experts Affairs, "A Study of Evaluation Mechanism for International Talents," invited project, May, 2012.

- State Administration of Foreign Experts Affairs, "A Study of Compensation Mechanism for Recruiting International Talents," invited project, May, 2011.

- Ministry of Education, "A Study of the Contribution Rate of Human Capital to Economic Growth," invited project, May 2010.

- OECD Director of Statistics Directorate, Mr. Paul Schreyer, officially recommended to the Director of China National Bureau of Statistics Mr. Jiantang Ma, that the CHLR human capital research team should participate in the OECD human capital consortium as China's officially designated representative, 2010.

- State Councilor Yandong Liu visited the CHLR and praised the Center's achievement in human capital research in October, 2009, and made the remarks that "China is in a transition from a country with huge population to a country with strong human capital, and therefore it is very important to conduct research on China's human capital."

- "China Human Capital Report 2009" and its summary was requested by the Ministry of Education as references, 2009.

- "China Human Capital Report 2009" and its summary was requested by the Organization Department as materials for policy making, 2009.

Acknowledgement

Revisions and Improvements in the 2016 Report

Main revisions and improvements based on the 2015 report include:

- Updated human capital estimation to 2014

- Calculated human capital based on six education levels for all provinces from 1985 to 2014.

- Updated data on school enrollment by region and gender based on new data sources for 1985-2014.

- Updated and unified age distribution of school enrollments at each education level.

- Updated population estimation for 1987 and 2005 national sampling survey.

- Unified population estimation method at the national and province level, and re-calculated national human capital.

- Estimate both national and provincial physical capital stock for 1985-2014.

- Estimate cross-province living cost adjustment index (purchasing power parity index) for 1985-2014.

Brief Description

Abbreviations

- Provinces:

BJ=Beijing	TJ=Tianjin	HeB=Hebei
SX=Shanxi	NMG=Inner Mongolia	LN=Liaoning
JL=Jilin	HLJ=Heilongjiang	SH=Shanghai
JS=Jiangsu	ZJ=Zhejiang	AH=Anhui
FJ=Fujian	JX=Jiangxi	SD=Shandong
HeN=Henan	HuB=Hubei	HuN=Hunan
GD=Guangdong	GX=Guangxi	HaN=Hainan
CQ=Chongqing	SC=Sichuan	GZ=Guizhou
YN=Yunnan	XZ=Tibet	SaX=Shaanxi
GS=Gansu	QH=Qinghai	NX=Ningxia
XJ=Xinjiang	HK=Hong Kong	TW=Taiwan

- HC: Human capital
- LFHC: Labor force human capital

Definition and Description

- Total human capital： age 0-55 for female， age 0-60 for male
- Labor force human capital：age >16，unretired labor force excluding students.
- Average growth rate: the mean growth rate for all years.
- Ratio of human capital to GDP: using current values.
- Ratio of labor force human capital to GDP: using current values.

Contents

Executive Summary

We adopt and modify the widely used Jorgenson-Fraumeni lifetime income approach (hereafter referred to as the J-F approach) to calculate China's human capital stock and estimate its distribution and trend.

Due to lack of data, the J-F approach cannot be directly applied to the measurement of human capital in China. Following widely accepted methods based on the theory of human capital, we combine micro survey data with macro data and modify J-F approach to fill in missing values in the Chinese data. Our approach allows us to systematically estimate China's human capital stocks at both the national and provincial levels. We use the results of these calculations to also build various human capital indexes.

In this report we present our calculations of China's human capital stocks of China at the national level from 1985 to 2014, including total human capital and human capital per capita for rural and urban residents, males and females, and analyze their distributions and trends. In addition, human capital stocks are estimated and analyzed for 33 provinces and municipalities: Beijing, Tianjin, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Shaanxi, Gansu, Shanxi, Qinghai, Inner Mongolia, Xinjiang, Tibet, Yunnan, Fujian, Hebei, Ningxia, Hong Kong and Taiwan.

We calculate a series of new provincial indexes for the year 2016, i.e., labor force average age, labor force average schooling years, and proportions of the labor force at different levels of education. We also compare various measures of the labor force among the Mainland, Hong Kong and Taiwan. Our results comprise more precise and up to date

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measures of the composition of the labor force across provinces and regions than have been available to date.

Our report presents s China's human capital data as a panel available for intensive research. We also provide estimates at the national level and provincial level of China's physical capital stock for the same period. We also provide a living cost adjustment index (i.e., purchasing power parity index) useful for cross-province comparison of money values.

The entire data set of human capital, physical capital and related provincial data living cost adjustment index. And all the raw and processed data will be released to the public for research purposes at now change. Users can download the data at:

http://humancapital.cufe.edu.cn/plus/list.php?tid=61

The main findings in the 2016 report are summarized below. (All real values are based on 1985 prices and growth rates are based on real values unless otherwise specified.

1. China's human capital reached RMB 1503.6 trillion in 2014. Urban and rural human capital was RMB 1223.0 and RMB 280.6 trillion, respectively, accounting for 81% and 19%, respectively of the total human capital.

2. Human capital per capita reached RMB 1,327,000 in 2014. Urban and rural human capital per capita were RMB 1,930,100 and RMB 561,900, respectively. Human capital per capita for males and females was RMB 1,623,900 and RMB 988,500, respectively.

3. Total human capital in 2014 was 6.80 times its level in 1985 (RMB 318.06 trillion compared to RMB 40.74 trillion). Total human capital grew at a higher annual rate than human capital per capita (7.08% and

6.5% average, respectively).

4. During 1985-2014, rural human capital grew at an average annual rate of 3.24%, while urban human capital grew at 9.40% annually. Growth rates of both urban and rural areas accelerated since 1997, to annual rates of 11.80% and 4.98%, respectively, for 1997-2014. Total urban real human capital surpassed total rural human capital in 1990, and has remained higher since then.

5. Rural human capital per capita grew at an average annual rate of 4.54% over the period 1985-2014, while per capita urban human capital grew at an annual rate of 5.67% reflecting China's rising rural-urban economic gap.

6. At the national level, the ratio of human capital to physical capital decreased rapidly up to 1995 and then began to rise slowly, as human capital growth began to exceed the growth of physical capital.

7. At the national level, the ratio of China's GDP to human capital has grown over time, suggesting growing efficiency of human capital in production.

8. Human capital at the provincial level generally displays a trend similar to that of national human capital. However, since provinces differed in their population, education structure and market mechanism, and their human-capital dynamics in human capital also showed some differences.

9. Among the 31 provinces of Mainland China for which we have estimated, the top three provinces in terms of real human capital stock in 2014 were Guangdong, Shandong and Jiangsu; ranked by per capita human capital, the top three were Beijing, Tianjin and Shanghai.

10. While China has a large total human capital stock, its human capital per capita is relatively small compared to that in developed countries.

11. During 1985-2014, the national labor force average age increased from

32 to 36 years. Rural labor force average age increased from 32 to 37 years, while the urban counterpart increased from 32 to 35 years.

12. During 1985-2014, the national average labor force schooling years increased from 6.38 to 10.05. Rural average labor force schooling years increased from 5.67 to 8.61, while that of urban counterpart increased from 8.53 to 11.17.

13. During 1985-2014，the proportion of workers with education at the level of high school or more increased from 14% to 36%; that of the rural labor force increased from 8% to 14%, while that of the urban labor force increased from 31% to 50% The national labor force population proportion of college graduates and above also increased substantially, from 2% to 16%, For the rural labor force, the proportion of workers with at least a college degree increased from 0.2% to 3%, while that of the urban population grew from 5% to 25%.

14. In Taiwan, during 1985-2014, the average annual growth rate of real human capital was 1.87%. The average annual growth rate of real human capital per capita was 1.60%.

15. In Hong Kong, during 1985-2014, the average annual growth rate of real human capital was 3.95%. The average annual growth rate of real human capital per capita was 3.23%.

16. During 1985-2014, in Hong Kong and Taiwan, average labor force age grew from 34 to 38 years and from 32 to 37 years, respectively.

17. During 1985-2014, for all of China, the real stock of physical capital grew from RMB 1.68 trillion to RMB 39.50 trillion, respectively, in 1985 prices, reflecting an average annual growth rate of 10.90%. The ratio of the nominal human capital stock to that of nominal net wealth stock of physical capital reduced from 24.28 in 1985 to 8.1 in 2014.

Chapter 1   Introduction

Since the concept of human capital was introduced to modern economic analysis by Schultz (1961) and Becker (1964), it has been widely used in academic studies and policy analysis. An Organization for Economic Co-operation and Development (OECD) publication defines human capital as "The knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" (OECD, 2001, page 18). Human capital has been called probably "the most important and most original development in the economics of education" in the second part of the 20th century (Coleman, 1990, page 304). Human capital according to a recent report accounts for 54% of total capital on average between 1990 and 2010 (UNU-IHDP and UNEP, 2014, page 29).

It is generally believed that human capital is an essential source of economic growth and innovation, and an important factor for sustainable development and reducing poverty and inequality. Detailed analyses of human capital in many advanced economies, including the United States, all show that human capital is a key source of economic growth.[1] The Stiglitz Commission report (Stiglitz, et. al. 2009). noted the importance of human capital as a "beyond Gross Domestic Product" measure of economic and social progress.

The Chinese economy has grown at a dramatic rate since the start of economic reforms, and human capital has played a significant role in the Chinese economic miracle (see, for example, Fleisher and Chen, 1997, and

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[1] In particular, we refer to studies that expand and refine measures of human capital in total wealth and relate these measures to economic growth. Such studies include Jorgenson-Fraumeni (J-F) accounts for Canada (Gu and Ambrose 2008), New Zealand (Li, Gibson, and Oxley 2005), Norway (Greaker and Liu 2008), Sweden (Alroth 1997), and the United States (Jorgenson and Fraumeni 1989, 1992a, 1992b, and Christian 2010,2014,2015).

Démurger, 2001), with strong impacts on both productivity growth and reducing regional inequality. (Fleisher, Li and Zhao, 2009).

Despite its critical role in the Chinese economy, there has been almost no comprehensive measurement of the total human capital stock in China until now. Human capital measures for China are central to any understanding of the global importance of human capital for a number of reasons. Measures of human capital will facilitate a deeper understanding of the contribution of human capital to growth, development, and social well-being in empirical and theoretical research, not only in China, but in the world at large, in part because of dramatic changes in its magnitude and composition. First, China has undergone substantial demographic changes in the past 65 years that included first encouragement of large families, subsequent discouragement of population growth the one-child policy, dramatic improvements in health and longevity, and massive interregional migration, and urbanization. Second, there has been a massive elimination of illiteracy and, more recently, a rapid expansion of education at higher levels. It is difficult to find a natural experiment based on such substantial changes in the magnitude and composition of a critical source of economic growth anywhere in human history or across nations.

Until now, only imperfect representations of human capital, such as measures of formal education and workforce experience have been available for China. Developing comprehensive measures of human capital in China provides the necessary groundwork for China's joining the international OECD initiative to facilitate international comparison of human capital accumulation and growth across nations.

Additional benefits of developing human capital measures include the provision of useful information for policy makers' assessment of how education, health, and family support policies of central and local governments affect the accumulation of human capital. In the area of schooling, for example,

there has been a remarkable increase in the educational attainment of the Chinese population, which in 1985 was largely concentrated in the "no schooling" and "primary school" categories (Figure 4.2.5). By 2010 the largest population group was found in the "junior middle" school category (Figure 4.2.7). Policy makers need a clear view of the current gap that remains in the overall education status between the rural and urban areas, especially for high school education and above. Our measures illustrate the significance of this gap and point to the long-term gains of bringing human-capital investment to the areas where it is still needed desperately.

There is an ongoing international effort in developed countries to measure a nation's total human capital stock and to develop Jorgenson-Fraumeni (J-F) national human capital accounts. Our work is part of this movement. The U.S. Bureau of Economic Analysis has recently supported research on human capital (Abraham 2010 and Christian 2010,2015). Statistics Canada (Gu and Wong 2008), the Australian Bureau of Statistics (Wei 2008), and Statistics Norway (Greaker and Liu 2008) have established similar research programs on the measurement of human capital using agency researchers. In addition, seventeen countries (Australia, Canada, Denmark, France, Italy, Japan, Korea, Mexico, Netherlands, Norway, New Zealand, Poland, Spain, the United Kingdom, the United States, Romania, and Russia), and two international organizations, Eurostat and the International Labor Organization, joined an OECD consortium to develop human capital accounts.[2] [3] The work of this consortium will facilitate cross-country comparisons. Developed countries

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[2] See Liu (2011).

[3] J-F human capital accounts have been constructed for several other countries independent of the consortium efforts. These countries include Argentina (Coremberg, 2010), India (Gundimeda, Sanyal, Sinha, and Sukhdev, 2007), New Zealand (Le, Gibson, and Oxley, 2005), and Sweden (Ahlroth and Bjorkland, 1997). O'Mahony and Stevens (2004) applied J-F methodology to evaluate government provided education in the United Kingdom.

have obviously realized the importance of monitoring human capital accumulation, while most developing and emerging countries, including China, are only beginning to embark on such projects.

Although systematic measures of the total human capital stock in China have not been completed, there are a few studies on human capital measurement published in Chinese journals. For example, Zhang (2000) and Qian and Liu (2004) calculated China's human capital stock based on total investment (the cost side); others, such as Zhu and Xu (2007) and Wang and Xiang (2006), estimated human capital from the income side. Zhou (2005) and Yue (2008) used weighted averages of some human capital attributes to construct a measure. Most studies generally measure only parts of human capital based on some education characteristics such as average years of education, for example, Cai (1999), Hu (2002), Zhou (2004), Hou (2000), Hu (2005), etc.

The limitations of past studies have precluded implementation of internationally recognized methods for human capital estimation based on China's data. The methodology used studies preceding the work reported here has been limited by data availability, feasibility of parameter estimation, and some technical treatment difficulties. It is for these and related reasons that we have no measures of changes of human capital in rural and urban areas and for males and females. .

We construct a comprehensive measure of human capital in China by applying the methods used in other countries after modifying them to fit China's particular situation. We estimate total human capital at the national level and provincial level, for males and females, for urban and rural areas from 1985 to 2014. Our estimates include nominal values, real values, indexes, and quantity measures. We adopt, where possible, the Jorgensen-Fraumeni (J-F) lifetime income based approach, which has been widely used in other countries.

Adapting and implementing the J-F approach to China's data to estimate the human capital series involves combining micro-level survey data to mitigate the lack of comprehensive earnings data in China. In particular, we apply the well-known Mincer equation to estimate earnings from available household surveys where comprehensive data are not available. By obtaining imputed earnings for the entire population, we are thus able to integrate the changes of returns to education and experience (on-the-job-training) that are reflected in incomes during the course of economic transition into our estimates of the human capital stock.

In separating the calculation of human capital for urban and rural areas, we capture changes caused by rapid urbanization and y the large scale rural-urban migration that has taken place since the beginning of economic reform. This framework is important for any transitional economy because of concomitant changes in economic structure and distribution of the population which in part reflect investments in migration—an important component of human capital often missed in ongoing research.

The rest of this report is arranged as follows. Chapter 2 discusses our methodology for human capital measurement. Chapter 3 describes the J-F method and its application and modifications for China. Chapter 4 reports China's population and education dynamics. Chapter 5 reports description statistics of some indicators for the national and provincial labor population. The estimated national results of human capital are reported in Chapter 6. Chapter 7 presents the cross-province comparison results, followed by the disaggregated human capital results for Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Hong Kong and Taiwan from Chapter 8 to Chapter 40.

Chapter 2　　Methodology

In general, human capital can be produced by education, training, and child bearing and rearing, as well as by job turnover and migration that help to realize the full potential value of human capital. Like physical capital, the human capital stock can be valued using two methods: i) it can be valued as the sum of investment, minus depreciation, added over time to the initial stock; ii) it can be valued as the net present value of the income flow it will be able to produce over an expected lifetime. The first method - the perpetual inventory method--is used in the cost approach, for example, Kendrick (1976); while the second method is used in the income-based approach, for example Jorgenson and Fraumeni (1987, 1992a, 1992b). When human capital is measured using the perpetual inventory approach, only costs or expenditures are included in investment. When physical capital is measured in this way, investments are valued at their purchase price which is not generally available for human capital.

These and other measures of human capital have been used by researchers in many studies:

(1) The lifetime income approach of Jorgenson and Fraumeni (1989, 1992a, 1992b);

(2) The cost approach of Kendrick (1976);

(3) The indicator approach as exemplified by The Lisbon Council's estimates (2006);

(4) The attribute approach as exemplified by Laroche and Merette (2000);

(5) The World Bank residual approach (2006).

The approach of Jorgenson-Fraumeni is discussed further in the next section.

2.1 Jorgenson-Fraumeni income-based approach

The Jorgenson-Fraumeni (J-F) method estimates human capital stock as the expected future lifetime income of all individuals. If human capital could be traded in the market like physical capital, the asset price would be the net present value of the individuals' lifetime labor income.[1] The lifetime income approach can reflect the importance of long-term investments, such as education and health, in human capital accumulation.

The J-F income-based approach is the most widely used method in estimating human capital stock, and has been adopted by a number of countries in constructing human capital accounts (see the previous section for examples). The advantages of this approach are that it has a sound theoretical foundation and that the data and parameters are relatively easier to obtain than they are for other approaches.

When estimating lifetime income to calculate human capital, an important issue is that income (or implicit income) can be generated from both market and nonmarket activities. Market activities of individuals

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[1] In China, the labor market may still be at a stage where wage income does not fully reflect the marginal productivity of labor. Therefore, in the studies involving wages, there may be a certain degree of distortion. When estimating human capital using the wages income, one must recognize that this problem may exist. Therefore, our study is clearly limited by the current development level of the labor market mechanism in China. The income approach is the most commonly used method for measuring human capital. Even in the United States and other developed countries, wages do not fully reflect the marginal productivity, because its labor market is not perfectly competitive. Even so, wages are still representative of the human capital gains from an individual perspective, and still a measure of human capital in that sense. With the improvement of market mechanism in China, this limitation will gradually decrease. According to estimates of the current literature, wages are generally lower than the marginal productivity (see Fleisher, Li and Zhao, 2010). Therefore, from this perspective, our calculation can be interpreted as a conservative estimate of human capital.

produce goods and services, foster innovation and growth through managerial and creative activities, and generate income that allows for the acquisition of market goods and services. Nonmarket activities of individuals include household production, e.g., cooking, cleaning, and care-giving. Investment is generated from both market and nonmarket activities. Because household production activities are difficult to quantify and value and require time-use estimates, we have opted to exclude them in this first approximation to estimating China's human capital.[2]

2.2 Cost approach

Kendrick is an early pioneer in the construction of human capital accounts. Kendrick (1976) estimates both tangible and intangible human capital. Tangible human capital includes child rearing costs. Intangible human capital includes education, training, medical, health and safety expenditures, and mobility costs. Human capital stocks are created using a perpetual inventory method where investment expenditures are cumulated and existing stocks are depreciated. Implementation of a Kendrick approach for China is difficult as Kendrick's human capital investment is the sum of a long list of human capital related costs, and reliable data on such information is only available for the most recent decades.

Tangible human capital investment is lifetime rearing costs including expenditures on food, shelter, health, schooling, and so on. The cost of parental

[2] Among the most recent human capital estimates, i.e., Mira and Liu (2010), Gu and Ambrose (2008), Greaker and Liu (2008) and Christian (2010), only Christian, for the United States, includes a full set of nonmarket activities and estimates human capital for those too young to go to school or to perform market work.

time is not included in this measure. Intangible human capital investment in formal and informal education includes both private and government costs. Private formal education costs include net rental for private education sector's plant and equipment and students' expenditures on supplies. Estimate for the total cost of rentals of books and equipment and opportunity cost depends on a student's imputed potential compensation. Government formal education costs include all types of expenditure, including those for construction. Personal informal education expenditures include a portion of those for radio, TV, records, books, periodicals, libraries, museums, and so forth. Business and institutional expenditures include a portion of those for media expenditures. Religious education expenditures are imputed from figures on religious class attendance and imputed interest on plant and equipment of religious organizations. Government expenditures include those for library, recreation costs and military education expenditures.

Intangible human capital investment in training values initial nonproductive time and nonwage costs and includes explicit training expenditures. Both specific and general training is captured, as well as military training. A substantial fraction of medical, health and safety expenditures, which are split between investment and preventive expenditures, are by governments. Annual rental costs for plant and equipment are imputed when not available.

Kendrick considers his human capital mobility investment estimates to be tentative. These include unemployment, job-search, hiring, and moving costs, for both residents and immigrants. Depreciation is estimated using the depreciation methodology most widely used at the time of his research: A double declining balance formula with a switch to a straight-line method. Lifetimes in these formulas are assumed to be the reciprocal of the percentage of persons in the group.

Kendrick estimate of nominal human capital is about five times Gross

Domestic Product. However, the J-F human capital estimate is substantially larger than Kendrick's.[3] The Kendrick approach covers detailed aspects of human capital formation from the cost side and provides a very complete menu for summing up all related costs to estimate the value of human capital. Yet, the data requirements are enormous, for example, we may need to get government statistics ninety years back to do the calculation. This is impossible, given the People's Republic of China is only 61 years old in 2010.

Additionally, the Kendrick approach gives no clear rationale for some important assumptions, such as for the split of health expenses between investment and preventative costs. For all these reasons, we do not adopt this approach for our calculation.

2.3 Indicator approach

An example of an indicator approach is the Human Capital Index of The Lisbon Council. It is a human capital input cost, or cost of creation approach. This index has been constructed for the 13 European Union (EU) states and 12 Central and Eastern European states.[4] The Human Capital Endowment measure is an input to two of the other three components of the overall European Human Capital Index. The Human Capital Endowment measure sums up expenditures on formal education and the opportunity cost of parental education, adult education, and learning on the job. Parental education includes teaching their children to speak, be trustful, have empathy, take responsibility, etc. The Human Capital Utilization Index is the endowment measure divided

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[3] See table 37 of Jorgenson-Fraumeni (1989).

[4] See Ederer (2006) and Ederer *et. al.*(2007). The 2006 paper states that the index was developed by the German think tank Deutschland Denken. In addition the paper states that it is part of a research project undertaken by several individuals in the think tank and with the institutional support of Zeppelin University.

by total population and the Human Capital Productivity Measure is Gross Domestic Product (GDP) divided by the endowment employed in the country.

Finally the Demography and Employment measure estimates the number of people who will be employed in the year 2030 in each country by looking at economic, demographic, and migratory trends.[5]As it has cost components and index components, it is best viewed as a blend of a cost approach and an indicator approach. Since the technical details for this approach have not been released, we do not apply it here in our calculation.[6]

2.4 Attribute-based approach

The attribute-based approach is usually considered to be a variant of the income-based approach (Le, Gibson and Oxley 2003, 2005). However, it constructs an index value of human capital instead of a monetary value as in other income-based methods. The primary advantage of an index value is that it nets out the effect of aggregate physical capital on labor income, therefore this measure captures the variation in quality and relevance of formal education across time and country.

Based on the pioneer work of Mulligan and Sala-i-Martin (1997), Koman and Marin (1997) applied the attribute-based method to Austria and Germany. However, our method is akin to Laroche and Merette (2000) in that we also incorporate work experience into the model along with formal education. That is, we also emphasize informal channels, such as work experience, in the accumulation of human capital.

Specifically in this method, the logarithm of human capital per capita in a

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[5] Ederer (2006), p. 4 and p. 20.

[6] We have discussed with Dr. Ederer a possible collaboration to apply The Lisbon Council methodology to China in the future.

country at any time is computed using the following formula：

$$\ln\left(\frac{H}{L}\right) = \sum_{e}\sum_{a}\omega_{e,a}\ln\left(\rho_{e,a}\right) \tag{1}$$

$$\omega_{e,a} = \frac{e^{\sum_{s}\left(\beta_{s}e + \gamma_{s}Exp + \delta_{s}Exp^{2}\right)\varphi_{s,a}}\dfrac{}{}L_{e,a}}{\sum_{e}\sum_{a}e^{\sum_{s}\left(\beta_{s}e + \gamma_{s}Exp + \delta_{s}Exp^{2}\right)\varphi_{s,a}}L_{e,a}} \tag{2}$$

where e and a denote years of formal schooling and age, respectively. $\rho_{\varepsilon,a} = L_{\varepsilon,a}/L$ is the proportion of working age individuals of age a with e years of schooling. $\omega_{\varepsilon,a}$ is the efficiency parameter defined as proportion of wage income of workers of age a with e years of schooling in the total wage bill of the economy. *Exp* represents work experience, which is defined as *a-e-6*, a gender index and $\varphi_{\varepsilon,a}$ is the share of men and women of age a in the population. Parameters β, γ and δ are estimates from a standard Mincer equation. The parameter β is often considered to be the rate of return to one more year of formal education.

In order to implement this method, we need to construct a population data set by age, gender and educational attainment for each year we study. Secondly, we need two sets of estimates from Mincer equations for each year, one for each gender. It is feasible to calculate a human capital measure based on this approach. The major issue is that in this setup, the measurement is actually a Cobb-Douglas formula. In other words, the proportions of different education groups by construction are not "perfect substitutes." When the share of one education group increases, it could cause the total measurement to decline. For example, if we increase the proportion of population with higher education, the measurement should increase as the overall education get higher, but it could decline due to the Cobb-Douglas formulation. This happened in our experimental calculation. Since we believe that an education-based human capital measurement should be a monotonically increasing function of the

overall education, we do not report the results of the attribute-based approach. In our future work we plan to modify the structure, using, for example, average years of schooling.[7]

2.5 Residual approach

The World Bank (2006) uses a residual approach to estimate human capital for 120 countries. Due to data and methodological limitations, total wealth in the year 2000 is measured as the net present value of an assumed future consumption stream. The value of produced capital stocks is estimated with the perpetual inventory method. Produced capital includes both structures and equipment. Natural capital is valued by taking the present value of resource rents. Natural capital includes nonrenewable resources, cropland, pastureland, forested areas, and protected areas. Intangible capital is equal to total wealth minus produced and natural capital. Intangible capital is an aggregate which includes human capital, the infrastructure of the country, social capital, and the returns from net foreign financial assets. Net foreign financial assets are included because debt interest obligations will affect the level of consumption. Intangible capital represents more than 50% of wealth for almost 85% of the countries studied.

Using a net present value approach to estimate total wealth requires assumptions about the time horizon and the discount rate. The World Bank chooses 25 years as the time horizon as it roughly corresponds to one generation. It chooses a social discount rate rather than a private rate as governments would use a social discount rate to allocate resources across generations. The social discount rate is set at 4%, which is at the upper range of

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[7] This suggestion was confirmed as a reasonable modification by email communication with Dr. Reinhard Koman.

estimates it reviewed for industrialized countries. The same rate is used for all countries to facilitate comparisons across countries.

A Cobb-Douglas specification is employed to estimate the marginal returns and contribution of three types of intangible capital in the model. The model's independent variables include years of schooling per capita of the working population, human capital abroad, and governance/social capital. Human capital abroad is measured by remittances by workers outside the country. Governance/social capital is measured with a rule of law index. Although the marginal return to human capital in the aggregate is the highest of the three included intangible capital components, the contribution decomposition demonstrates that the relative contributions can differ significantly across countries (World Bank, 2006, chapter 7).

2.6 Approach Conclusion

To sum up, taking into account the data availability in China, we believe that the J-F income approach is most suitable for measuring China's human capital. Moreover, this method is widely used internationally, so using it facilitates comparisons of China's human capital level with other countries'. At the same time, it is easier to calculate and implement scientifically and accurately in China. For all these reasons we will use the method of J-F to measure human capital in China.

Chapter 3   J-F Method and its application for China

The J-F approach imputes expected future lifetime income based on the probabilities of survival, educational enrollment, and the employment. The expected future wages and income are estimated from the currently observed wages and income of cross-sectional individuals who are older than a given cohort at the time of the observation. Future income is augmented with a projected labor income growth rate and discounted to the present value with a constant interest rate. Estimation is conducted in a backward recursive fashion, from those aged 60, 59, 58, and so forth to those aged 0.[1] When it's applied to China, we made some modifications and assumptions about the method and parameters used accordingly.

3.1 Estimate lifetime income by backward recursion

To apply the J-F income-based approach, we need real world data-or estimates of individual's annual market labor income per capita. Lifetime income is calculated in stages, where stages depend on whether an individual goes to school, works, or is retired. It is calculated by a backward recursion, from the fifth stage backwards to the first stage, from the oldest individuals to the youngest. A modified J-F income-based approach is used mainly because of China data availability. The equations used for calculating the lifetime expected income are as follows.

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[1] The J-F inclusion of nonmarket lifetime income and expected lifetime income for youngsters produces human capital estimates that are notably higher than those in the studies mentioned above who have adopted the J-F methodology.

The first stage is for no school and no work (0-4 years old):

$$mi(y,s,a,e) = sr(y,s,a+1) *mi(y,s,a+1,e) *[(1 + G)/(1 + R)], \qquad (1)$$

where the subscript y, s, a, and e denote year, sex, age and educational attainment respectively, sr is the survival rate, defined as the current year probability of becoming one year older, mi is the lifetime market labor income per capita, G is the real income growth rate, and R is the discount rate.[2] The market income of individuals who do not attend school when they are older receive the discounted and income growth rate adjusted market income of someone with no education who works when they are 16. For example, for an infant who never attends school when older, but works at age 16:

$$mi(y,s,a,e) = sr(y,s,age1to16) *mi(y,s,a+16,e) *[(1 + G)/(1 + R)]^{16}$$

where $mi(y,s,a+16,e)$ is the market income of someone who is 16 in the current year and $sr(y,s,age1to16)$ is the cumulative survival probability:

$$sr(y,s,age1to16)=sr(y,s,a+1)*sr(y,s,age+2)*sr(y,s,age+3)*…*sr(y,s,age+16) \qquad (2)$$

The second stage is for school but no work (5-15 years old). The equations for students varies depending upon the level of enrollment. For those enrolled in the first year of primary, junior middle, or senior middle school, because of data constraints, lifetime income depends on the percentage of students enrolled in the current first level who subsequently enrolled in the first year of the next level several years later.[3] How many years later varies as primary school takes six years to complete, while junior and senior middle school take 3 years to complete. For someone enrolled in the first year of primary school:

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[2] Survival probability is available for every year for every age, e.g., the probability that someone lives from age 50 to 51 can be different in 2000 and 2001. Jorgenson and Fraumeni only had one set of survival probabilities for all years, so that the probability of survival for a specific age is constant over time.

[3] Jorgenson and Fraumeni had enrollment probabilities by individual level, e.g., 1, 2 3, …., 16, and for graduate school: 17 or more.

$mi(y,s,a,primary1)=[senr(y,s,a,primary1tojunior1)*mi(y,s,a+6,junior1)+$
$notenr(y,s,a,primary1tojunior1)*mi(y,s,a+6,primary\ completed)]*$
$[(1+G)/(1+R)]^6$ (3)

where the first part of the right-hand side expression before the plus sign is relevant for those who go onto junior middle school and the rest of the expression is relevant for those who do not.4 Senr(y,s,a,primary1tojunior1) is the average ratio of the number of students in junior middle grade 1, six years later when the student is six years older, to the number of students in primary grade 1, mi(y,s,a+6,junior1) is the lifetime income of someone in the current year who is six years older and enrolled in junior middle school grade 1, notenr(y,s,a,primary1tojunior1) is the probability that someone who does not enroll in junior middle school lives to complete primary school, and mi(y,s,a+6,primary completed) is the lifetime income of someone in the current year who is six years older who completes primary school, but is not enrolled in junior middle school 1. There is no need to adjust senr(y,s,a,primary1tojunior1) by a survival rate as anyone who is enrolled in the next level has survived to that point. The term notenr is adjusted by survival rates:

$notenr(y,s,a,primary1tojunior1)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*s$
$r(y+3,s,a+4)*sr(y+4,s,a+5)*sr(y+5,s,a+6)-senr(y,s,a,primary1tojunior1)$

(4)

For a student who was enrolled in the second year of primary school, the current year equation becomes:

$mi(y,s,a,primary2)=[senr(y,s,a,primary2tojunior1)*mi(y,s,a+5,junior1)+$
$notenr(y,s,a,primary2tojunior1)*mi(y,s,a+5,primary\ completed)]*$

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[4] Jorgenson and Fraumeni used enrollment probabilities for individuals who were older in a given year, say 2000, rather than using the actual enrollment the number of years later it would take to finish a level, e.g., 2006, to finish primary school. Here actual enrollments in 2006 are used as enrollment probabilities are changing significantly over time in China, whereas they are changing little over the time it takes to complete a level in the United States.

$[(1+G)/(1+R)]^5$ (5)

and:

notenr(y,s,a,primary2tojunior1)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*sr(y+3,s,a+4)*sr(y+4,s,a+5)-senr(y,s,a,primary2tojunior1)

(6)

where senr(y,s,a,primary2tojunior1) is the average ratio of the number of students in junior middle school grade 1 five years later when the student is five years older to the number of students in primary grade 2 and mi(y,s,a+5,junior1) is the lifetime income of someone in the current year who is five years older and enrolled in junior middle school 1, and notenr (y,s,a,primary2 tojunior1) is the probability that someone who does not enroll in junior middle school five years later lives to complete primary school. The equations for subsequent ages and primary levels follow a similar pattern.

For someone enrolled in the first year of junior middle or senior middle school, the equations follow a similar pattern except that the number of years until they enter the first year of the next level is three. They are specified as equation (7) to (12).

mi(y,s,a,junior1)=[senr(y,s,a,junior1tosenior1)*mi(y,s,a+3,senior1)+notenr(y,s,a,junior1tosenior1)*mi(y,s,a+3,juniorcompleted)]*[(1+G)/(1+R)]^3

(7)

mi(y,s,a,junior2)=[senr(y,s,a,junior2tosenior1)*mi(y,s,a+2,senior1)+notenr(y,s,a,junior2tosenior1)*mi(y,s,a+2,juniorcompleted)]*[(1+G)/(1+R)]^2

(8)

mi(y,s,a,junior3)=[senr(y,s,a,junior3tosenior1)*mi(y,s,a+1,senior1)+notenr(y,s,a,junior3tosenior1)*mi(y,s,a+1,junior completed)]*[(1+G)/(1+R)]

(9)

mi(y,s,a,senior1)=[senr(y,s,a,senior1tocollege1)*mi(y,s,a+3,college1)+notenr(y,s,a,senior1tocollege1)*mi(y,s,a+3,seniorcompleted)]*[(1+G)/(1+R)]^3

(10)

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mi(y,s,a,senior2)=[senr(y,s,a,senior2tocollege1)*mi(y,s,a+2,college1)+ notenr(y,s,a,senior2tocollege1)*mi(y,s,a+2,seniorcompleted)]*[(1+G)/(1+R)]^2 (11)

mi(y,s,a,senior3)=[senr(y,s,a,senior3tocollege1)*mi(y,s,a+1,college1)+ notenr(y,s,a,senior3tocollege1)*mi(y,s,a+1,seniorcompleted)]*[(1+G)/(1+R)] (12)

The third stage is for school or work (16-26 years old), as it is assumed that anyone who goes to school does not work, even part-time.[5] This stage ends at age 26 because of data limitation, the age distribution of college and above are calculated by senior age distribution. For individuals who work:

mi(y,s,a,e) = ymi(y,s,a,e) + sr(y,s,a+1) *mi(y,s,a+1,e)*[(1 + G)/(1 + R)] (13)

where *ymi* denotes annual market income per capita.

Since there is no level above college or university, the equations for those enrolled in higher education are different than those for lower levels. The assumption is made that anyone who begins the first year of college or university completes all years of that level if they survive.

mi(y,s,a,higher1)=sr(y,s,a+1)*sr(y,s,a+2)*sr(y,s,a+3)*senr(y,s,a,higher1)*mi(y,s,a+3,highercompleted)*[(1+G)/(1+R)]^3 (14)

where

senr(y,s,a,higher1)=enroll(y+3,s,a+3,higher1)/ (sr(y,s,a+1)*sr(y-1,s,a)*sr(y-2,s,a-1)*enroll(y-3,s,a-3,senior1)) (15)

The multiplication by the three survival rates in equation (14) determines whether an individual enrolled in the first year of college or university

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[5] As students in the United States frequently work as well as go to school, particularly when they are enrolled in higher education, Jorgenson and Fraumeni allowed individuals to work and go to school. As students in China rarely work, in this modified approach it is assumed that no students work.

survives until he graduates, assumed to be in three years, then to receive the higher lifetime income in the first year after completion of the degree: *mi(y,s,a+3,highercompleted)* is the lifetime income of someone in the current year who is three years older and has completed college or university. For someone who survives to enroll in the second year of higher education:

$$mi(y,s,a,higher2)=sr(y,s,a+1)*sr(y,s,a+2)*senr(y,s,a,higher2)*$$
$$mi(y,s,a+2,highercompleted)*[(1+G)/(1+R)]^2$$

(16)

Equations for the last enrollment year parallel this equation, except that the level of enrollment varies and the number of years until higher education is completed is reduced to one.

$$mi(y,s,a,university1)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*sr(y+3,s,a+4)*mi(y,s,a+4,universitycompleted)*[(1+G)/(1+R)]^4$$

(17)

$$mi(y,s,a,university2)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*$$
$$mi(y,s,a+3,universitycompleted)*[(1+G)/(1+R)]^3$$

(18)

$$mi(y,s,a,university3)=sr(y,s,a+1)*sr(y+1,s,a+2)*$$
$$mi(y,s,a+2,universitycompleted)*[(1+G)/(1+R)]^2$$

(19)

$$mi(y,s,a,university4)=sr(y,s,a+1)*mi(y,s,a+1,university\ completed)$$
$$*[(1+G)/(1+R)]$$

(20)

$$mi(y,s,a,college1) = sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*$$
$$mi(y,s,a+3,collegecompleted)*[(1+G)/(1+R)]^3$$

(21)

$$mi(y,s,a,college2)=sr(y,s,a+1)*sr(y+1,s,a+2)*mi(y,s,a+2,college\ completed)*[(1+G)/(1+R)]^2$$

(22)

mi(y,s,a,college3)=sr(y,s,a+1)*mi(y,s,a+1,collegecompleted)*[(1+G)/(1+R)] (23)

For individuals in junior or senior level, they have the same as equation from (7) to (12).

The fourth stage is for work but no school (26-59 years old for males and26-54 years old for females).　The equation for this stage is the same as equation 13.

The final stage is for retirement, or no school or work (older than 59 years old for males and older than 54 years old for females):

$$mi_{y,s,a,e} = 0 \qquad (24)$$

Let $L_{y,s,a,e}$ stand for the population in the respective categories; the expected lifetime income in a country, i.e., the total human capital stock, can be written as:

$$MI(y) = \sum_s \sum_a \sum_e mi_{y,s,a,e} L_{y,s,a,e} \qquad （25）$$

Similar equations can be applied to estimate lifetime nonmarket labor income,[6] which can be added to lifetime market labor income to obtain total lifetime labor income:

$$LIFE(y) = \sum_s \sum_a \sum_e (mi_{y,s,a,e} + nmi_{y,s,a,e}) \cdot L_{y,s,a,e} \qquad （26）$$

3.2 Estimate current income using Mincer models

One important component of the income approach is the estimation of future potential earnings for all individuals in the population. To apply the J-F

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[6] Nonmarket activities include household production, e.g., cooking, cleaning, and childrearing and other nonmarket activities such as education and health-related activities. In our calculation we exclude the nonmarket lifetime income because it is difficult to quantify.

income-based approach, we first need real world data or their estimates for individual's annual market labor income per capita. We conduct estimation and make projection based on the basic Mincer (1974) equation. It has been shown that there are significant differences in the structure of the earning equation across gender and between the rural and urban population. To ensure our income estimates as accurate as possible, we estimate the parameters for the rural and urban population by gender and year using survey data in selected years and derive their imputed values for missing years over the period from 1985 to 2014.

The data used for estimating the parameters of the earning equation come from five well-known household surveys in China. The first is the annual Urban Household Survey (UHS) conducted by the National Statistical Bureau of China over the period from 1986 to 1997. The second data set we used is the China Health and Nutrition Survey (CHNS) for the year of 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011. The third data set we used is the Chinese Household Income Project (CHIP) for the year of 1988, 1995, 1999, 2002, 2007. The fourth data set we used is the China Household Finance Survey (CHFS) for the year of 2010. The fifth data set we used is the Chinese Family Panel Studies (CFPS) for the year of 2009, 2011. CHIP (except 2009), CHNS, CHFS and CFPS cover both urban and rural population, but UHS covers only the urban population.

UHS is a representative sample of the urban population. The sample size varies from year to year, ranging from small number of respondents of 4,934 in 1986 to large number of respondents of 31,266 in 1992. Individual earnings are annual wage income, which include basic wages, bonuses, subsidies and other work-related income. Years of schooling are calculated using the information on the level of education completed: primary school equals 6 years of schooling, junior middle school equals 9 years of schooling, senior middle school equals 12 years of schooling, vocational school equals 11 years

of schooling, and community college equals 15 years of schooling, and college and above equals 16 years of schooling. Suppose that schooling begins at age 6, work experience is estimated as age minus years of schooling minus 6. As the minimum legal working age is 16 and the retirement ages are 60 and 55 for males and females respectively, we restrict our sample to individuals who are currently employed and are between 16 and 60 years old for male workers and between 16 and 55 for female workers. Self-employed and temporary job holders are excluded, so are those who did not report wage income or educational attainment. Appendix B.3.1 provides a complete description of the income and education definitions and sampling standards. Table B.1.1 of Appendix B lists the descriptions of all the statistics.

Chinese Household Income Project (CHIP) survey, reports income, consumption, job, production and other related information for urban and rural population. Appendix B.3.2 provides a complete description of the income and education definitions and sampling standards. Table B.1.3 of Appendix B includes the descriptions of all the statistics.

CHNS is an international project that aims to learn more about the impacts of China's transitional economy and society on social economy, population and health behaviors in urban and rural areas. Appendix B.3.3 provides a complete description of the income and education definitions and sampling standards. Table B.1.2 of Appendix B lists the descriptions of all the statistics.

CHFS is a nationwide survey conducted by the Survey and Research Center for China Household Finance in Southwestern University of Finance and Economics. The main purpose of the survey is to collect information on household financial information at the micro level, which includes housing assets, financial wealth liabilities, credit constraints, income, consumption, social security, insurance coverage, intergenerational transfer payments, demographic characteristics, employment payment habits, and other relevant

information. The rural sample of this database includes 22 provinces. The urban sample in this database also includes 22 provinces. The survey was conducted in 2011. Information of the statistics on household income starts from the year of 2010. The urban sample includes only personal income data, comprising wage income and social security income. Rural income includes personal income and household income. Personal income primarily consists of wage income and social security income. Household income is mainly from the net agricultural income. As the family income is calculated at the household unit, we need to allocate the income to individual household members to obtain personal income. Family net income of agricultural production is divided by the number of labor force engaged in agricultural household production. Years of education is determined by the level of education according to the survey. Work experience is calculated as age minus years of education and then minus 6. We restrict the sample to males of 16-60 years old and females of 16-55 years old, who reported information on education and income status. AppendixB.3.4 gives the complete definitions of income, education, other variables and also the sample selection criteria of CHFS. Table B.1.5 of Appendix B lists the descriptive statistical indicators of CHFS.

CFPS is a nationwide longitudinal survey conducted by the Institute of Social Science Survey (ISSS) at Peking University. The survey focuses on economic, as well as non-economic well-being of Chinese children and adults. A wide range of domains are covered, including economic activities, education outcomes, family dynamics and relationships, migration, and health. In the 2010 survey, CFPS interviewed around 15,000 families with over 40,000 individuals. Information on household income starts from 2009. Urban income includes wage income and social security income. Rural income includes agriculture production income and social security income. We restrict the sample to males of 16-60 years old and females of 16-55 years old.

AppendixB.1.4 gives the complete definitions of income, education, other variables and also the sample selection criteria of CFPS. Table B.1.4 of Appendix B lists the descriptive statistical indicators of CFPS.

We use Taiwan Family Income and Expenditure Survey covering both urban and rural population for the analysis of Taiwan. The survey is completed by the research center. We restrict our sample to individuals who are currently employed and are between 16 and 60 years old for male workers and between 16 and 60 for female workers. Individual income includes main job income, minor job income, other income, and current transfers from enterprise.

The data sources for the analysis of Hong Kong are Hong Kong 1% Sample Population Census 1981, Hong Kong 1% Sample Population By-Census 1986, Hong Kong 5% Sample Population Census 1991, 2001 and 2011, and Hong Kong 5% Sample Population By-Census 1996 and 2006 collected by Hong Kong Census and Statistics Department. The main purpose of the survey is to collect information on population, society and economic characteristics in Hong Kong. Work experience is estimated as age minus years of schooling minus 6. We restrict our sample to individuals who are currently employed and are between 15 and 65 years old for male workers and between 15 and 60 for female workers. Individual income includes main job income and minor job income.

3.2.1Estimate current income using Mincer models at the national level

We first estimate the basic Mincer equation:

$$\ln(inc) = \alpha + \beta \cdot e + \gamma \cdot Exp + \delta \cdot Exp^2 + u \qquad (27)$$

Where ln(inc) is the logarithm of earnings, e is years of schooling, Exp and Exp^2 represent years of work experience and experience squared respectively, and u denotes a random error. The coefficient α is the estimate

of the average log earnings of individuals with zero years of schooling and work experience, β is the estimate of the return to an extra year of schooling, and γ and δ measure the return to investment in on-the-job training.

Equation (10) has been widely adopted in empirical research on the determination of earnings. It has been estimated on a large number of data sets for numerous countries and time periods. Many studies have applied the model to Chinese data and found evidences that are consistent with the human capital theory. Notable studies include Liu (1998), Maurer-Fazio (1999), Li (2003), Fleisher and Wang (2004), Yang (2005), and Zhang *et al.* (2005). Following the convention of literature, we estimate equation (10) by ordinary least squares[7].

We use UHS, CHIP, CHNS，CHFS and CFPS to estimate parameters of the basic Mincer equation, and obtain the fitted values for the intercept, return to education, and coefficients on experience.

The intercept measures the base wage for the population without schooling or working experience. Figure 3.2.1 shows the intercept gap between urban and rural population during 1985-2014. The intercept in urban is higher than that in rural. Meanwhile, the intercept for males is higher than the intercept for females in urban areas, while there is no big difference between males and females in rural areas.

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[7] Griliches (1977) finds that accounting for the endogeneity of schooling and ability bias does not alter the estimates of earnings equation. Ashenfelter and Krueger (1994) also conclude that omitted ability variables do not cause an upward bias in the estimated parameters of equation (1).
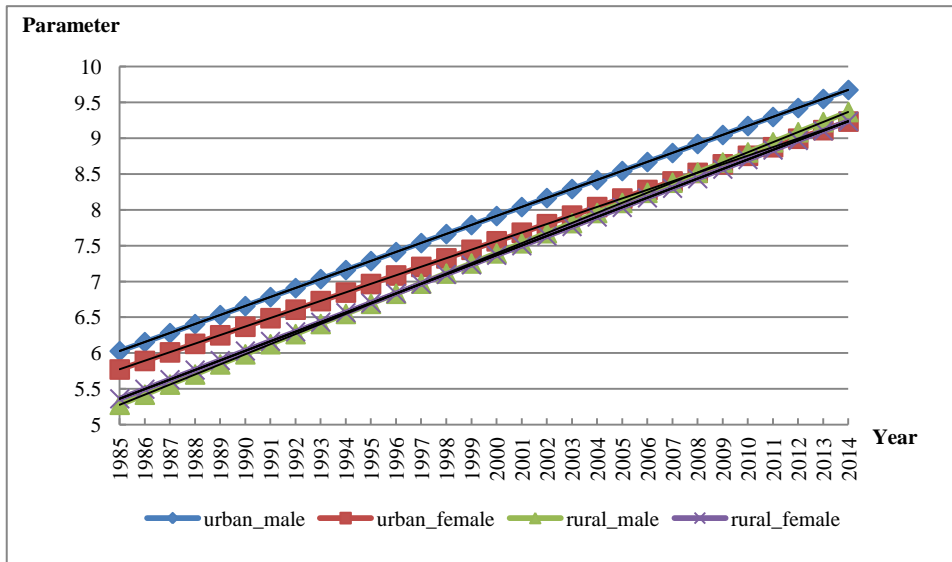
Figure 3.2.1   Mincer Intercepts by Gender and Location

Regression parameter of years of schooling and quadratic term of years of schooling measures return rate to education. Considering the current development of Chinese economy and education, we assume that return rate to education grows as nonlinear trend. Figure 3.2.2 shows the trend of the return to education for males and females in rural and urban areas. Returns to schooling are positive and firstly increasing and then decreasing over the sample years, and the decreasing trend is more obvious in urban areas than in rural areas. Besides, we found that return rate to education for male was lower than that for female in urban areas, and return rate to education for male is higher than that to female in rural areas. When the Soviet-type wage grid was replaced by market wages (Fleisher, Sabirianova, Wang 2005), increasing return rate to education is a common phenomenon. But many studies recently show that return rate to education in urban follows a decreasing trend due to the increased enrollment. Wang, Fleisher, Li(2009) also find that female rates of return dominate male returns, and they argued that rising returns to education have been an ubiquitous phenomenon in

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transitional economies.
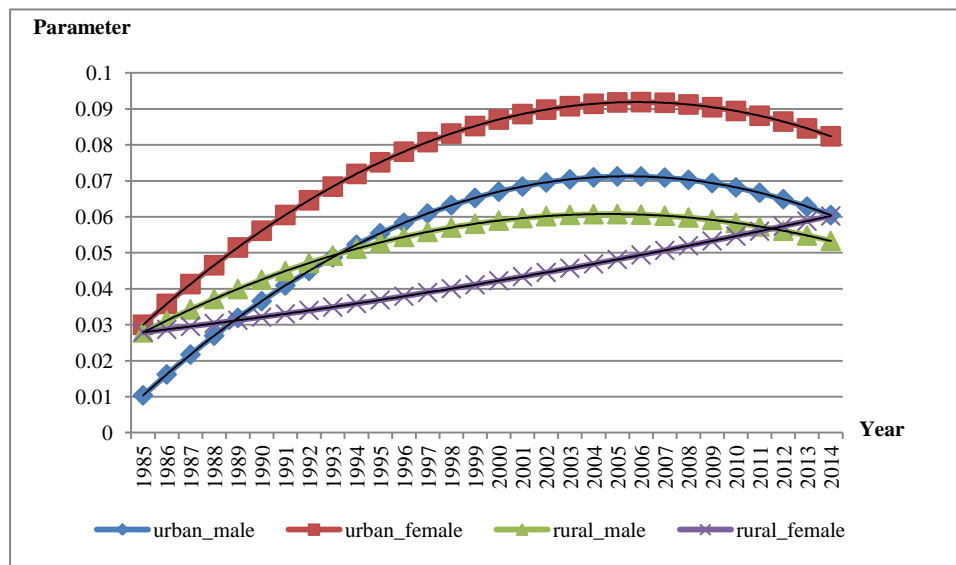
Figure 3.2.2 Rates of Return to Education by Gender and Location

We find that earnings increase with work experience but at a decreasing rate—a pattern found in most existing studies. Figures 3.2.3-3.2.6 show the trends of return rate to experience by gender and region. The curve shifts downward which means that return rate to experience is decreasing over time. In urban, return to experience for male is higher than that for female in the whole. In rural, return to experience for female is higher than that for male in early years and the return to experience for female didn't change a lot between 2005 and 2014, while return to experience for male decreased a lot at that period.
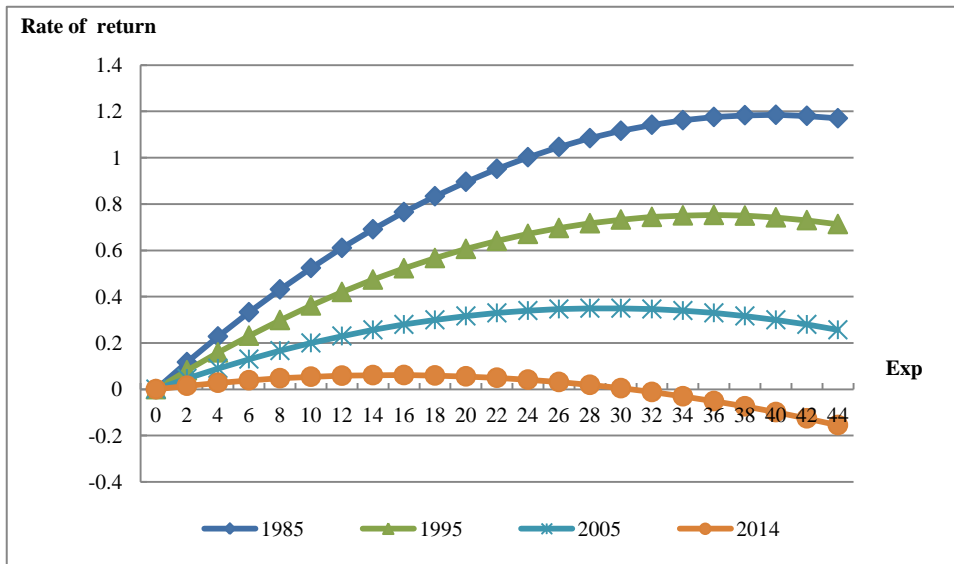
Figure 3.2.3   Return to Experience for Urban Males
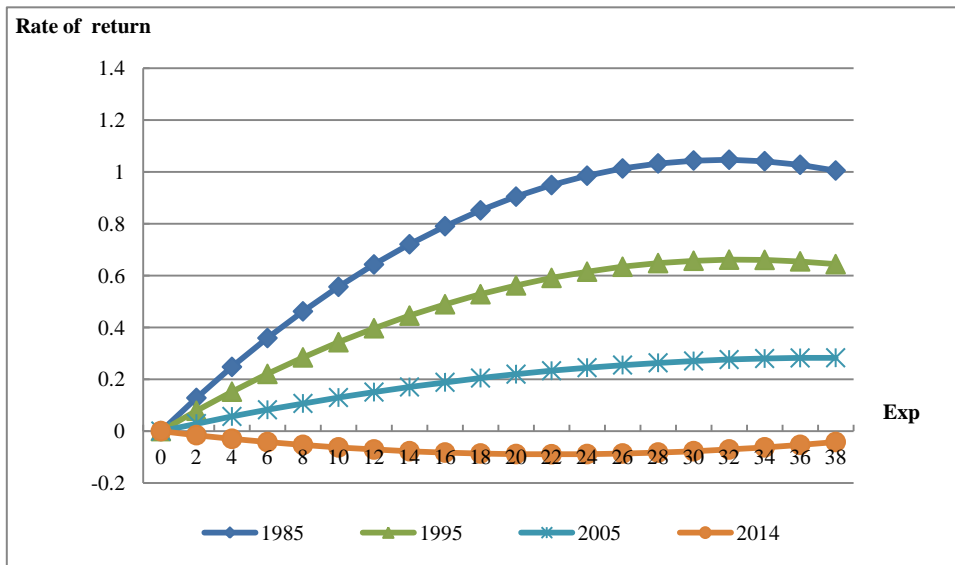
Figure 3.2.4   Return to Experience for Urban Females
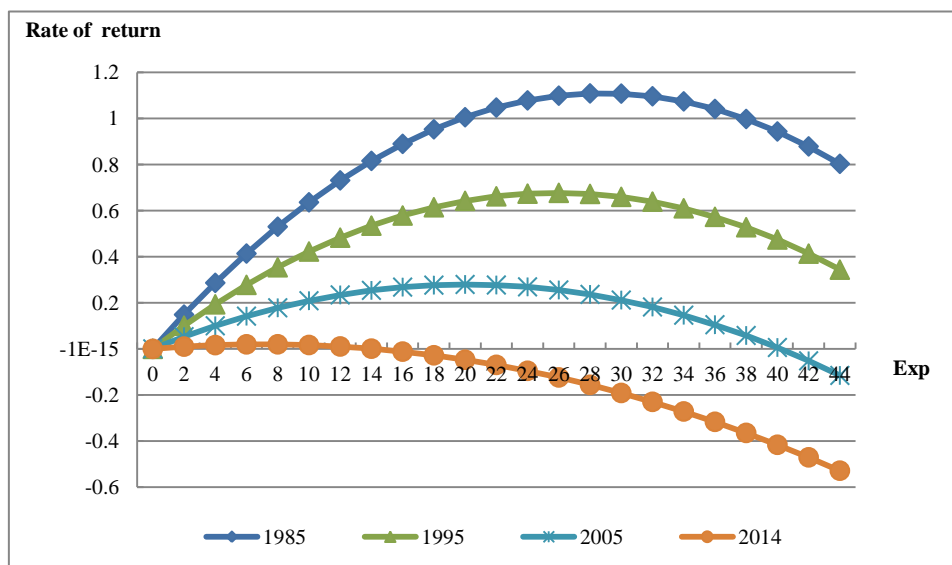
Figure 3.2.5   Return to Experience for Rural Males
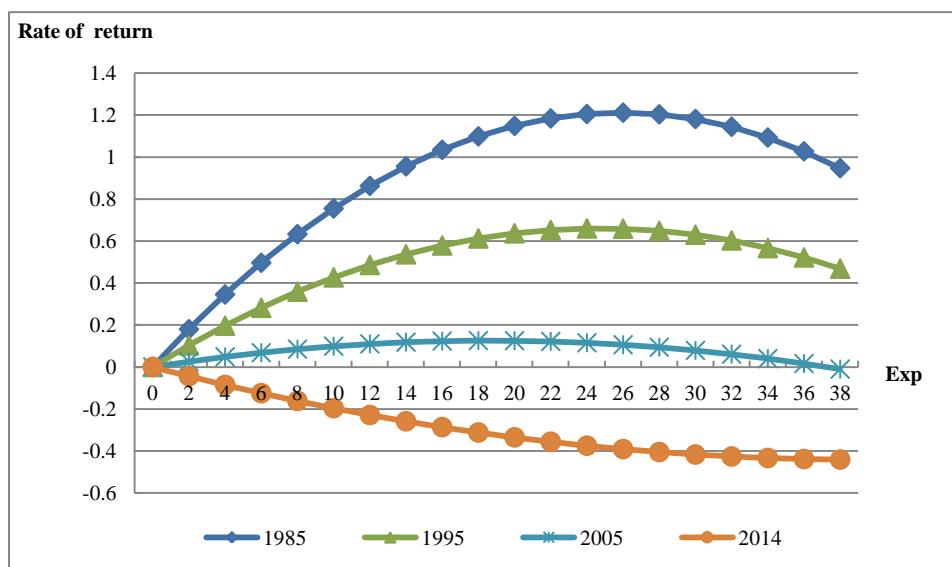
Figure 3.2.6   Return to Experience for Rural Females

3.2.2 Estimate current income using Mincer models at the provincial level

As for the estimation at the province level, based on the Mincer equation, we use macro data for adjustments. We estimate the following Mincer equation:

$$\ln(inc) = \beta_0 + \beta_1 \cdot \ln(Avwage) + \beta_2 \cdot Sch + \beta_3 \cdot Sch \cdot Avgdp + \beta_4 \cdot Sch \cdot Ratio + \beta_5 \cdot Exp + \beta_6 \cdot Exp^2 + \mu$$

（28）

Where $\ln(inc)$ is the logarithm of earnings, Sch is years of schooling, Exp and Exp^2 represent years of work experience and experience squared respectively, and u denotes a random error. $Avwage$ represents the average employee nominal salary for the rural and urban population. It could reflect earning gap between different provinces. $Avgdp$ stands for nominal GDP per capita. $Ratio$ means the primary industry employment ratio of the total working population. The parameters of Sch $Avgdp$ and Sch $Ratio$ could reflect the job market situation of the educated population. We add $Avwage$ into the intercept term, an interaction term of $Avgdp$ and Sch, and an interaction term of the first industry employment ratio of the total working population and Sch into the equation. Adding these additional variables into the conventional Mincer equation not only makes better use of the existing data and helps solve the missing data problem in parameter estimations, but also makes the estimation results more realistic.

In the model, $\beta_0 + \beta_1 \cdot \ln(Avwage)$ is the logarithm of the base wage for the population without schooling or working experience $\beta_2 + \beta_3 \cdot Avgdp + \beta_4 \cdot Ratio$ represents the return to education, β_5 and β_6 measure the return to experience. For Shanghai, it only has urban

parameter estimates. Moreover, we assume males have different returns to experience in urban and rural areas, but they share the same parameter for *Exp* and *Exp²* across all provinces; we use the same way in estimations for females.

As national Mincer parameter estimation, provincial data used for estimation also come from UHS, CHIP, CHNS，CHFS and CFPS. We use ordinary least squares (OLS) to estimate equation (11). When all data sets are available for a sample year, we drop CHNS and use UHS, CHIP, CHFS and CFPS due to the relatively low quality of CHNS income measures. The estimates are weighted for obtaining a larger and representative sample making estimates closer to the real value. We adopt the same sampling standards as in the national estimation. We use the fitted trend lines to generate imputed values of the parameters for each gender by year over the period from 1985 to 2014. Graphs show that when we plot each of the parameter estimates against time, they are generally trended. We adopt the linear trend model to obtain the fitted values of parameters, that is $Y = \alpha_0 + \alpha_1 \times time + \mu$. Under the assumption that the effect of *Avwage*, *Sch*, *Exp*, *Exp²* on income growth grows at a fixed rate, we use the linear trend fitting method for all the parameters.

3.3 Other data and Parameters used

Besides annual population data with age, sex and educational attainments, which are adjusted by the age distribution of education and survival rate, the J-F method requires additional information on lifetime income, enrollment rate, employment rate, growth rate of real wage, and discount rate. We will briefly discuss how we construct these supplemental data sets in this section. Some parameters have to be set at values appropriate

for China. Detailed information can be found in the appendices.

3.3.1 Age distribution

We use data from the China Educational Statistical Yearbook: 2003-2014 to estimate the age distribution (1982-2014) of new enrollments. We have the data of new enrollment in primary school by age, region, and sex, and the data of new enrollment in junior middle school by age, grade, sex and region from 2003 to 2014. Detailed information can be found in the appendices.

As for Hong Kong, we have data of total number of students in school by age, sex, and education from 1980 to 2014. First, we compute numbers of students of every grade in school. Then, we compute age distribution by using the number of students of first grade in school.

As for Taiwan, we have data of the number of first grade students in school by age, sex, and education from 2005 to 2014 and the total number of students in school by age, sex, and education from 1980 to 2004. First, we compute numbers of students of every grade in school. Then, we compute age distribution by using the number of students of first grade in school.

3.3.2 Survival rate

We get survival rate (1-death rate) by age and sex. With population and death rate, both by age and gender, from the population sampling data for each year, the number of deaths of those aged 65 and over for each year can be calculated. Dividing the number of deaths by the corresponding total population gives the death rate of those aged 65 and over. Since there is no population sampling data for 1983-1986, 1988 and 1991-1993, the death rate of the closest year with available data is used for these missing years.

As for Hong Kong, the data sources of growth rate are Hong Kong Life

Tables. We get survival rate (1-death rate) by age and sex. With population and death rate, both by age and gender, from the population sampling data for each year, the number of deaths of those aged 65 and over for each year can ``be calculated. Dividing the number of deaths by the corresponding total population gives the death rate of those aged 65 and over.

As for Taiwan, the data sources of growth rate are Taiwan Life Tables. We get survival rate (1-death rate) by age and sex. With population and death rate, both by age and gender, from the population sampling data for each year, the number of deaths of those aged 65 and over for each year can be calculated. Dividing the number of deaths by the corresponding total population gives the death rate of those aged 65 and over.

3.3.3 Enrollment rate

Following J-F as previously described, an individual may be categorized into one of the following six statuses at any time: no school or work (age 0-4), school only (age 5-15), work and school (age 16-26), work only (26 to retirement), and retirement (age 60+ for male and 55+ for female). Each status implies a different pattern of age-income profile, and therefore the method of computing lifetime income will be different.

We first estimate a standard Mincer equation (i.e., a regression of annual income on years of schooling, working experience, and working experience squared) with microeconomic data sets (the China Household Income Project, the China Health and Nutrition Survey, and the Urban Household Survey). We use annual employment rates by age, sex, and educational attainment (from the China Population Statistical Yearbook and the China Population Census) to convert annual income into annual market income. Then the lifetime income for each age/sex/educational category can be calculated using the method described in the previous section.

For the in-school population, we carefully derive the number of

individuals in each educational level with data on new enrollment, mortality rate and attrition rate. We consider the following five categories of schooling: no schooling, primary school, junior middle school, senior middle school and college and above, or for six categories of schooling where we break down college and above into college (less than 4 years) and university (at least 4 years) and above. We compute lifetime income for each grade at each educational level, taking into account how likely the individual will continue into the next grade and the next educational level. For the five categories of schooling estimation, college and above is the highest educational level. And for the six categories of schooling estimation, college or university and above are the highest educational levels. We do not allow for the possibility that one can go to college and then to university.

Because data are not available for some age groups and some educational levels, additional imputations and assumptions are needed. Imputations of data sets for certain age groups and initial age of enrollment are described in Appendix A, while enrollment and grade advancement imputations and assumptions are described in this section.

The imputation of two components of the J-F human capital estimates is described in this section: 1) the number of years until an educational category is completed, and 2) the probability of advancing to the next higher educational category. We assume that all students complete an educational level (if they continue) in the same number of years: 6 for primary, 3 for junior middle, and 3 for senior middle school. It is also assumed that no drop-outs return to school, no grades are skipped, and that education continues without a break. These assumptions are also made by J-F. The probability of advancing to the next higher educational level is estimated as the average ratio of the sum of all students of any age in a year who are initially enrolled to the sum of all students of any age initially enrolled in the next higher educational level 'X' years later. "X" depends on the number of years it takes to complete an educational level.

These imputations and assumptions allow for the appropriate discounting of a future higher income level.

In each case, continuing students are tracked from their age of initial enrollment, through individual grade levels, until they advance to the next higher level. The number of years discounted until they realize higher level of lifetime income depends on the number of years it takes to advance given the current grade of enrollment.

Then, we treat the terminal educational level as a probabilistic event, and therefore lifetime income is a forecast based on the contemporary information set, except that the probability of advancing depends on initial enrollments at a higher educational level in the subsequent years. For instance, the lifetime income of a student who is in the first year of junior middle school, assuming that the student will live to finish junior middle school and go onto senior middle school, depends upon an adjusted lifetime income of someone who is currently three years older and whose educational attainment is senior middle school. The adjustments include those for three years of labor income (wage) growth and three years of discounting.

3.3.4 Employment rate

To calculate employment rate, $empr(y, s, a, e)$ by age, sex and educational for individuals older than 16, we use the average of the employment rates in 1995 and 2000. We assume that the employment rate of college graduates is the same as that of university graduates.

The formula used to calculate the employment rate is:

$$empr(y, s, a, e) = [employed(y, s, a, e)]/pop(y, s, a, e)$$

The data sources of employment rate are listed in the table below:

Data	Sources
The employed by age,sex and educational in 1987	"China Population Census 1987"
Population by age, sex and educational in 1987	"China Population Census 1987"
The employed by age, sex and educational in 1995	"China Population Census 1995"
Population by age, sex and educational in 1995	"China Population Census 1995"
The employed by age, sex and educational in 2000	"China Population Census 2000"
Population by age, sex and educational in 2000	"China Population Census 2000"

Note: The 1% sample population in 1995 is converted into the whole population by the actual sampling percentage of 1.04%.

The employed in "China Population Census 2000" for each province, autonomous region and municipality directly under the central government are aggregated to the whole population employed by the actual sampling percentage of 10%.

As for Taiwan, employment rate $empr(y, s, a, e)$ includes data by age, sex and educational for individuals older than 15 from 1985 to 2014. The data we use are the employed by sex and education from 1985 to 2014 and the employed by age from 1985 to 2014. The formula used to calculate the employment rate is:

$$empr(y, s, a, e) = [employed(y, s, a, e)]/pop(y, s, a, e)$$

As for Hong Kong, employment rate $empr(y, s, a, e)$ includes data by age, sex and educational for individuals older than 15 from 1985 to 2011. The data sources of employment rate are Hong Kong Population Census 1991, 2001, 2011 and Hong Kong Population By-Census 1996, 2006.

The formula used to calculate the employment rate is:

$$empr(y, s, a, e) = [employed(y, s, a, e)]/pop(y, s, a, e)$$

For these missing years, the employment rate in year 1991 is used for the employment rate from year 1985 to 1990. We calculate employment rate of 1992, 1993, 1994 and 1995 by linear fitting employment rate of year 1991 and 1996, etc.

3.3.5 Growth rate

To measure lifetime earnings for all individuals in the population, we need to project income for future years and discount the income back to the present. We use the following method to estimate the real income growth rates for urban and rural areas respectively.[8]

The data used to calculate rural growth rate are rural CPI and average pure income of rural residents. Calculation method: rural real income is equal to average pure income of rural residents divided by rural CPI. Rural growth rate in period T-1 is equal to the income gap between rural real income in period T and T-1 divided by rural real income in period T-1.

The data used to calculate urban growth rate are urban CPI and average wage of urban employees. Calculation method: urban real wage is equal to average wage of urban employees divided by urban CPI. Urban growth rate in period T-1 is equal to the income gap between urban real wage in period T and T-1 divided by urban real wage in period T-1.

The result shows that, for the 30-year period from 1985 to 2014, the growth rate is on average 6.10% and 8.50% annually in the rural and urban sectors, respectively. Those growth rates will be used in the J-F calculation.[9]

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[8] In China, there are also growth rates of real annual income in urban areas reported in the series of the *China Statistical Yearbook*, but this income only includes labor wage for those who work in or get paid from the state-owned, urban collective, joint venture, joint-stock, foreign and Hong Kong, Macao and Taiwan invested companies and their subsidiaries. Thus, this cannot reflect the overall income level in China, as Chinese enterprises have other ownership forms.

[9] Those rates are considerably higher than the growth rate of 1.32% (Jorgenson and

We use the same method to calculate the provincial income growth rates for Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang; their growth rates for urban and rural areas are shown in Figure 3.3.1. We assume that the growth rate in each province grows at a fixed annual rate.

Table3.3.1 Provincial Growth Rate

Province	Urban	Province	Rural
Beijing	10.06%	Zhejiang	7.46%
Shanghai	9.71%	Fujian	7.30%
Tianjin	9.06%	Henan	7.00%
Inner Mongolia	9.00%	Jilin	6.91%
Anhui	9.00%	Shandong	6.80%
Shandong	8.76%	Hebei	6.77%
Hubei	8.67%	Jiangsu	6.75%
Chongqing	8.60%	Heilongjiang	6.65%
Jiangsu	8.54%	Tianjin	6.58%
Zhejiang	8.53%	Jiangxi	6.52%
Guizhou	8.48%	Anhui	6.43%
Hainan	8.45%	Chongqing	6.26%
Sichuan	8.44%	Sichuan	6.19%
Fujian	8.43%	Inner Mongolia	6.19%
Jiangxi	8.26%	Guangdong	6.15%
Hebei	8.20%	Liaoning	6.08%
Liaoning	8.12%	Hubei	6.01%
Henan	8.10%	Shaanxi	6.01%
Jilin	8.08%	Ningxia	5.97%
Guangxi	8.04%	Guangxi	5.97%

Yun, 1990) used in the OECD human capital calculation because the Chinese economy has grown much faster. Although the rate is based on 32-year moving average, it is still unclear whether it can represent long-run growth rate in China.

Shaanxi	8.00%	Shanxi	5.86%
Ningxia	8.00%	Hunan	5.44%
Guangdong	7.98%	Hainan	5.44%
Shanxi	7.89%	Beijing	5.28%
Heilongjiang	7.75%	Yunnan	5.26%
Hunan	7.62%	Guizhou	5.20%
Yunnan	7.62%	Gansu	5.01%
Xinjiang	7.57%	Xinjiang	4.94%
Tibet	7.43%	Qinghai	4.85%
Gansu	6.93%	Tibet	4.21%
Qinghai	6.16%		

As for Hong Kong, the data used to calculate growth rate is average wage index and we can adjust it to real wage index. Calculation method: growth rate in period T-1 is equal to the income gap between real wage index in period T and T-1 divided by real wage index in period T-1. The result shows that, growth rate on average is 3.02% annually in Hong Kong.

As for Taiwan, the data sources of growth rate are listed in the table below:

Data	Sources
Consumer Price Index (1960-2014, 2010=100)	Taiwan Directorate General of Budget, Accounting and Statistics
Regular salary (1980-2014)	Taiwan Directorate General of Budget, Accounting and Statistics

The formula used to calculate the growth rate is:

$$real\ regular\ salary\ = \frac{regular\ salary}{Consumer\ Price\ Index(rebase\ 1978 = 100)}$$

$$the\ growth\ rate\ of\ real\ regular\ salary\ at\ year\ T-1$$

$$=\frac{real\ regular\ salary\ at\ year\ T-real\ regular\ salary\ at\ year\ T-1}{real\ regular\ salary\ at\ year\ T-1}$$

The result shows that, the growth rate on average is 2.68% annually in Taiwan.

3.3.6 The discount rate

The discount rate that is used to value future income into present term should reflect the rate of return that one expects from investments over a long time horizon. We adopt the discount rate of 4.58% which is also used by Jorgenson and Fraumeni (1992a). This discount rate was derived by Jorgenson and Yun (1990) based on the long-run rate of return for the private sector of the U.S. economy. As in the case of other calculations using discount rate, the result will be sensitive to the choice of the discount rate. We also use alternative discount rates for the purpose of comparison, including the average interest rate on the 10-year government bonds issued to individual investors in China over the period from 1996 to 2007, net of the average rate of inflation over the same period, 3.14%[10], the average benchmark lending rate over 5 years in China from 1996 to 2009, 5.51%[11], and the social discount rate based

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[10] The details could be found in the *China Human Capital Index Analysis Report* 2009 Version. However, the ideal discount rate should include market risk, and someone may question that coupon rate does not reflect it. We used the yield to maturity of the 10-year book-entry bonds issued to individual investors that are circulated in the stock exchange market and commercial banks as a comparison and found that the difference of the results is minor.

[11] The People's Bank of China sets and adjusts the benchmark lending rate, which plays a key role in the money market. We excluded the serious inflation period from 1993 to 1995, and started from 1996 to avoid negative discount rates.

on the method from the World Bank, 8.14%.[12]

Discount rate reflects the time value of currency and is derived based on the return to long-term investments. The discount rate, 4.58%, used in Jorgenson and Yun (1990) and Jorgenson and Fraumeni (1992a), is based on the rate of return to long-term investments in the private sector of the U.S. economy. This is also the rate adopted by the OECD consortium (OECD 2010). We adopt it as well.

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[12] We calculated the average growth rate of individual consumption over the period from 1985 to 2008 based on World Bank's method. More details are available in "*Where is the wealth of nations? Human capital and economic growth in China*", and from the World Bank, "A Social Discount Rate for the United Kingdom" in *Environmental Economics: Essays in Ecological Economics and Sustainable Development*, ed. D. W. Pearce, 268–285. Cheltenham: Edward Elgar Publishing.

Chapter 4   China population and education dynamics

4.1 Population imputation

In order to implement the various methods of estimating human capital, according to fumula (8) and (9) in Chapter 3, we need annual population data by age, sex, and educational attainment. We construct the data sets according to the following procedure.

Data sets are available for years 1987, 1995, and 2005 from the 1% Population Sampling Survey and for years 1982, 1990, 2000 and 2010 from the Population Census. The data sets also contain disaggregated numbers for urban and rural populations categorized by age and gender.

For all other years, based on the existing 7-year data sets of population, we combine birth rate, mortality rate by age and sex and enrollment at different levels of education and regions to impute yearly population by age, sex and educational attainment for urban and rural areas. We define the levels of educational attainment as following: illiterate (no schooling), primary school (Grade 1-6), junior middle school (Grade 7-9), senior middle school (Grade 10-12), and college and above. Since year 2000, the availability of additional statistical information has made it possible to separate the population at the level of college and above into two categories: college, and the university and above.

Specifically, we use the following perpetual inventory formula to impute population by age, sex and educational attainment in the missing years:

$$L(y,e,a,s)=L(y-1,e,a,s)*(1-\delta(y,a,s))+IF(y,e,a,s)-OF(y,e,a,s)+EX(e,a,s)$$

$$(13)$$

$L\ (y,\ e,\ a,\ s)$ is the population in year y at education level e, with age a and sex s. $\delta(y,\ a,\ s)$ is the mortality rate in year y, with age a and sex s. $IF\ (y,\ e,\ a,\ s)$ and $OF\ (y,\ e,\ a,\ s)$ are inflow and outflow of this particular group. For example, inflow includes individuals who achieved this level of education in that given year, while outflow includes those who achieved the next level of education in that given year. $EX\ (e,\ a,\ s)$ is a discrepancy term.[1] Moreover,

$$IF(y,e,a,s) = \lambda(y,e,a,s) \cdot ERS(y,e,s) \qquad (14)$$

$$OF(y,e,a,s) = \lambda(y,e+1,a,s) \cdot ERS(y,e+1,s) \qquad (15)$$

$$\sum_a \lambda(y,e,a,s) = 1 \qquad (16)$$

ERS is the matriculati on at education level e, and λ is the age distribution at education level e. In order to obtain an accurate estimate for λ, we use macroeconomic data sets (China Education Statistical Yearbook, 2003-2013). Details can be found in Appendix A.

4.2 Trend of population and education distribution

Here we present several features of China's population growth, based on the imputed population by educational attainment, age, sex, and location (i.e. urban and rural). First of all, during our sample period, China's total population increased from 1.008 billion in 1982 to 1.374 billion in 2014. The urban population increased by 540 million, while the rural population decreased by 174 million (Figure 4.2.1).

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[1] For example, the discrepancy can be caused by migration, but we do not have the data.
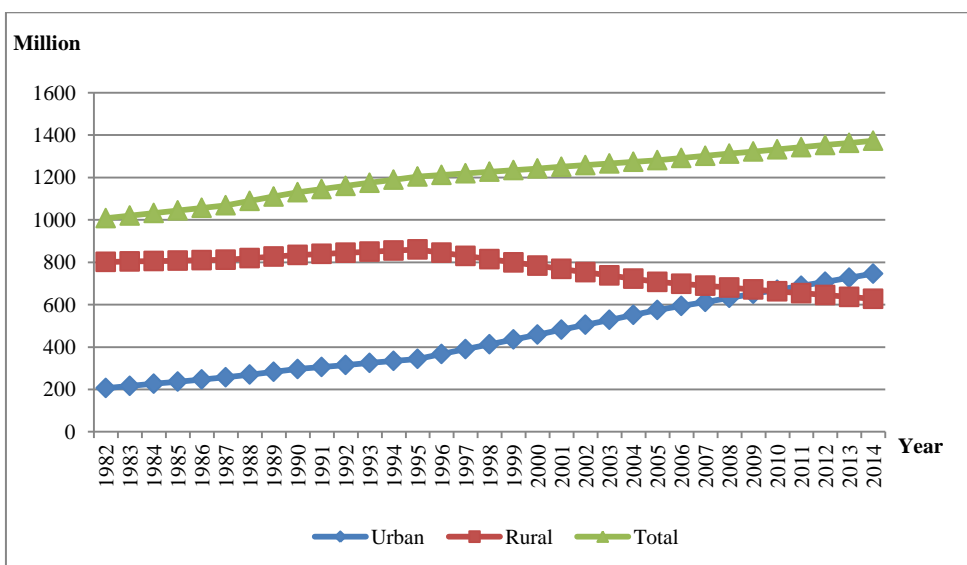
Figure 4.2.1 Population in China by Region 1982-2014

Figure 4.2.2-4.2.4 show the trend of national, urban and rural population classified by educational attainment from 1982 to 2014. The illiterate population fell by half from 401 million in 1982 to 196 million in 2000, but it was relatively stable from 2000 to 2014. The number of primary school graduates increased from 357 million in 1982 to the peak of 465 million in 1995, then declined gradually to 360 million in 2014. This decline is expected as more primary school graduates continue to receive higher education, which is reflected by the rapid growth of junior middle school graduates.

The number of junior middle school students experienced the largest growth among all education levels: it increased from 178 million in 1982 to 511 million in 2014. The number of senior middle school and that of college and above both started at very low numbers and grew significantly. Senior middle school graduates increased from 66 million in 1982 to 201 million in 2014, while college and above increased from only 6 million in 1982 to 140 million in 2014. The numbers of these two education levels have remained a

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fast growth rate since mid-1980s, especially after the implementation of college expansion planin 1999. Although the population of these two education levels still accounts for only a small part of the whole polulation, the increased population in these 15 years is much more than the population of these two education levels in 1980s and 1990s. Moreover, for the senior middle school and college and above levels, the growth in rural areas is much slower than that in the urban areas.
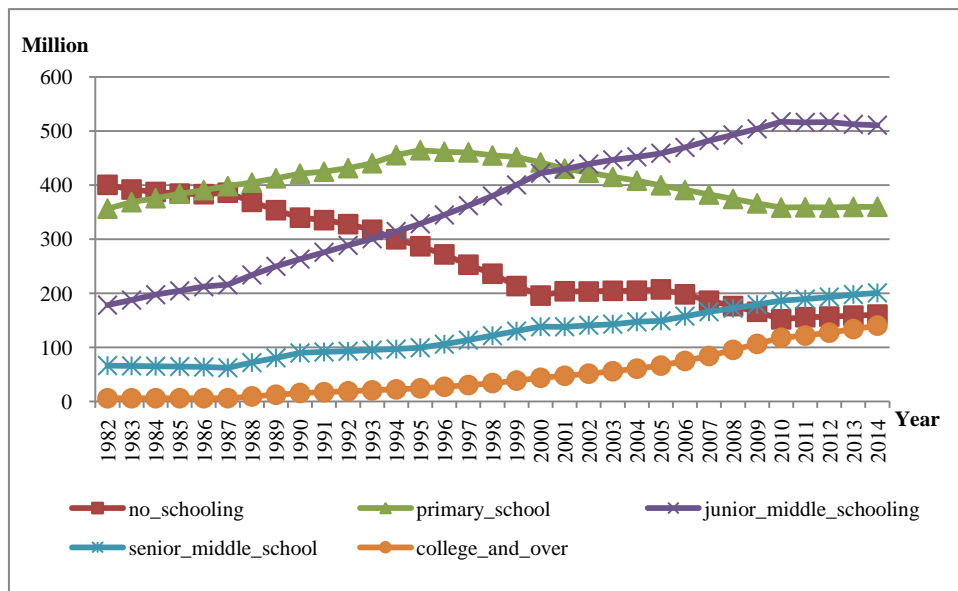
Figure 4.2.2 Population by Education Attainment in China 1982-2014
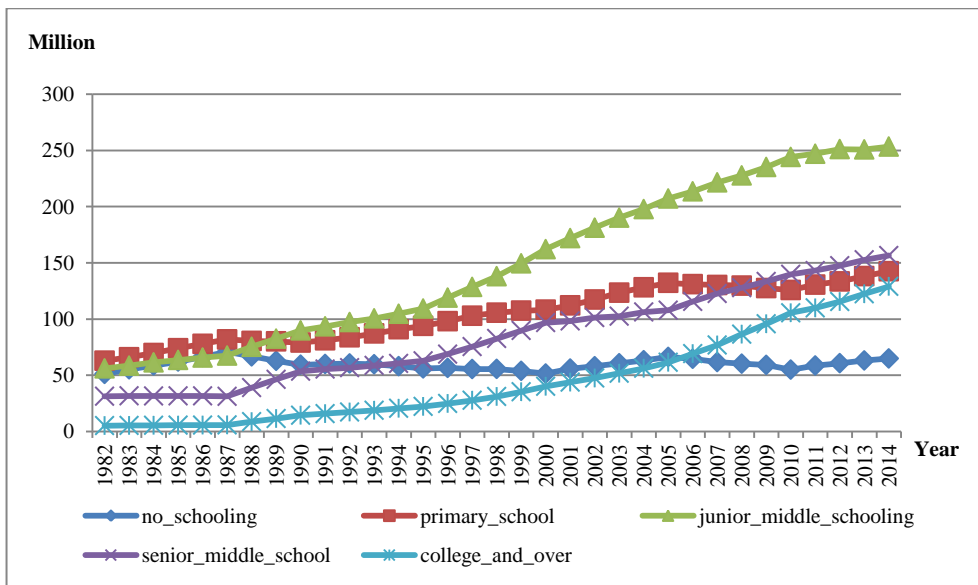
Figure 4.2.3 Urban Population by Educational Attainment 1982-2014
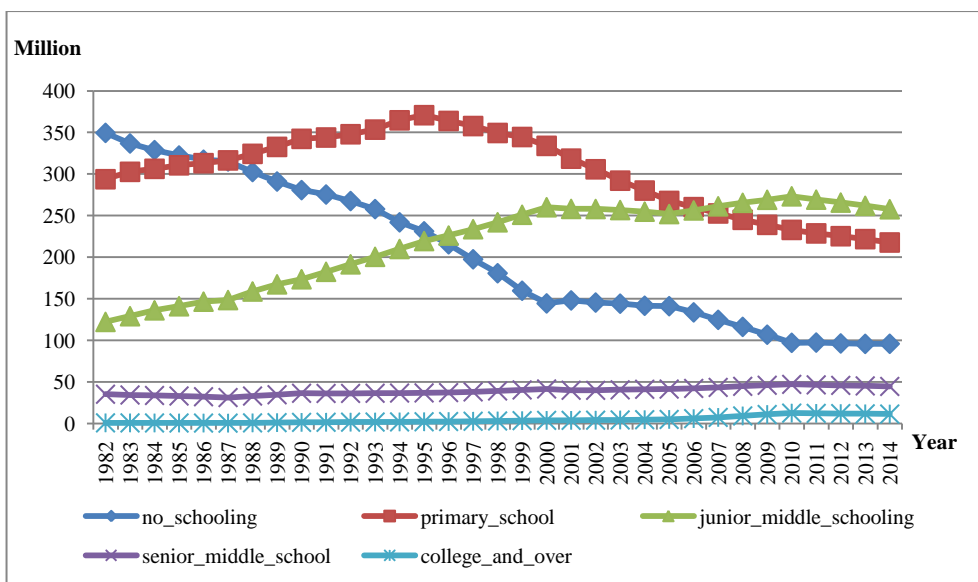
Figure 4.2.4 Rural Population by Educational Attainment 1982-2014

We now take a closer look at the changes in the distribution of educational attainment in the population at different time points. We do the comparison among the population of year 1985, 1995 and 2010 categorized by gender and region.

Figures 4.2.5 to 4.2.7 show the rightward shift of the educational attainment distribution in the population over time. In 1985, among the five education levels, the proportion of population being illiterate or just receiving primary education dominated the distribution. The 1995 distribution is dominated by people with primary and junior middle education, i.e. the distribution remains heavily skewed to the left. By 2010, junior middle has become the dominant education level. The distribution is still skewed to the left, but it is much less so compared with the pattern in 1985. Moreover, female educational attainment has improved more relative to that of males; the number of illiterate females decreased faster than that of illiterate males, and the gender gap at high education levels also shrank considerably. Started with a very large difference in 1985 the female educational attainment distribution becomes similar to that of the male.
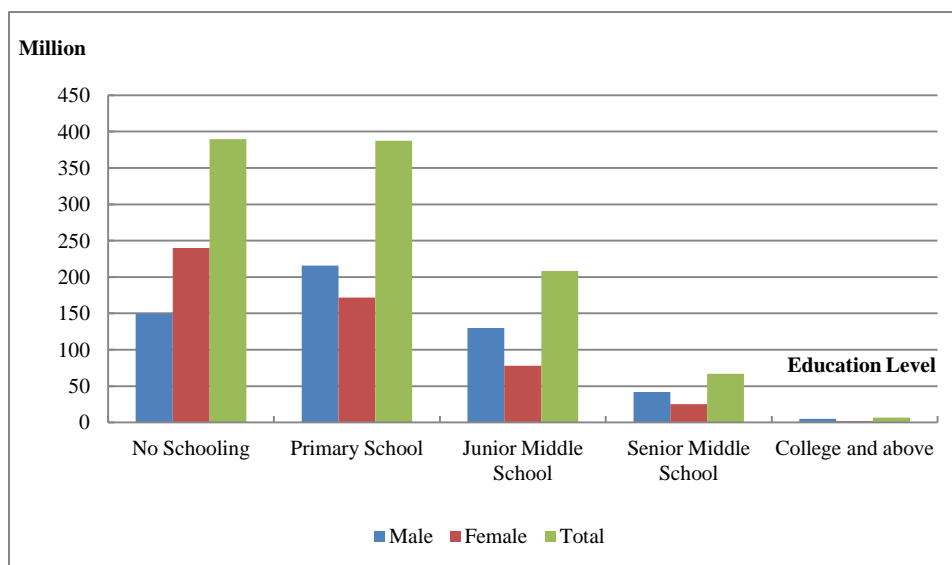
Figure 4.2.5 Population of Different Educational Levels by Gender, 1985
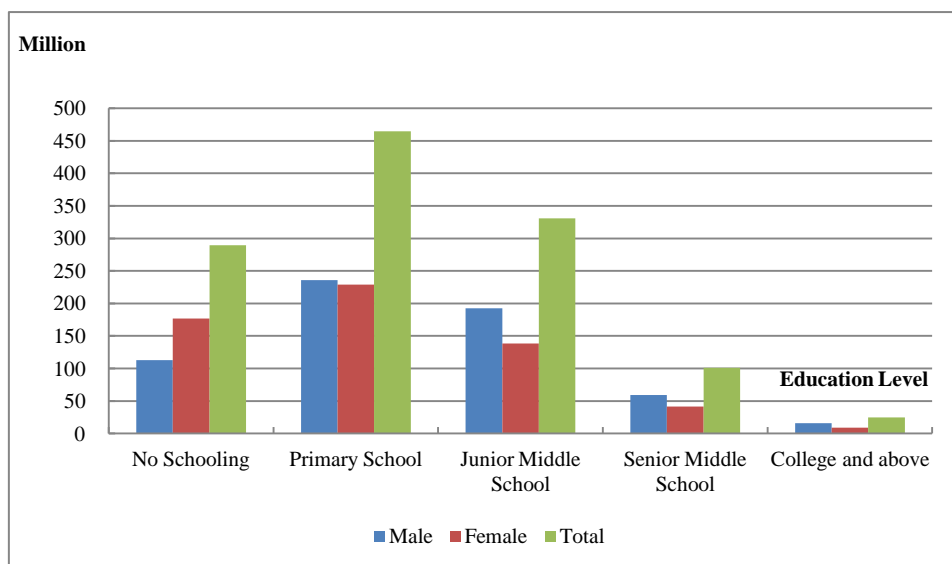
Figure 4.2.6 Population of Different Educational Levels by Gender, 1995
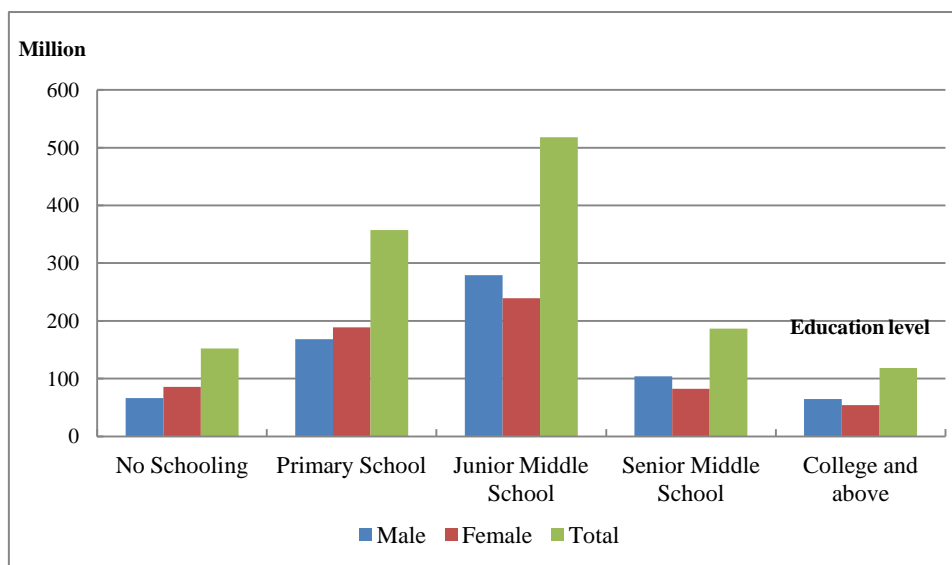
Figure 4.2.7 Population of Different Educational Levels by Gender, 2010

Chapter 5　Age and Education of Labor Force

We calculate provincial average age of labor population, average years of schooling and population proportions of high school educational attainment and above, in order to understand the degree of population aging, education status and higher education penetration of labor force more clearly at provincial level in China.

The cross-province comparison of these indicators, to some extent, can explain cross-province comparison of human capital. Moreover, the further analysis of the urban-rural comparison can help explain the human capital gap between urban and rural area within a province.

Meanwhile, according to the changes in these indicators over time, it can be clear to understand the growth of the human capital in China.

5.1 Definition of Labor Force and Education Level

Definition of Labor Force:

Male: the population in the range of 16-59 years old

Female: the population in the range of 16-54 years old

Definitions of educational attainment levels are shown in Table 5.1.1 and Table 5.1.2.

Table 5.1.1 Levels of Educational Attainment before 2000

Level	Illiterate	Primary School	Junior Middle	Senior Middle	College and Above
Years of Schooling	0	6	9	12	15

Table 5.1.2 Levels of Educational Attainment since 2000

Level	Illiterate	Primary School	Junior Middle	Senior Middle	College	University and Above
Years of Schooling	0	6	9	12	15	16

5.2 Average Age of National Labor Force
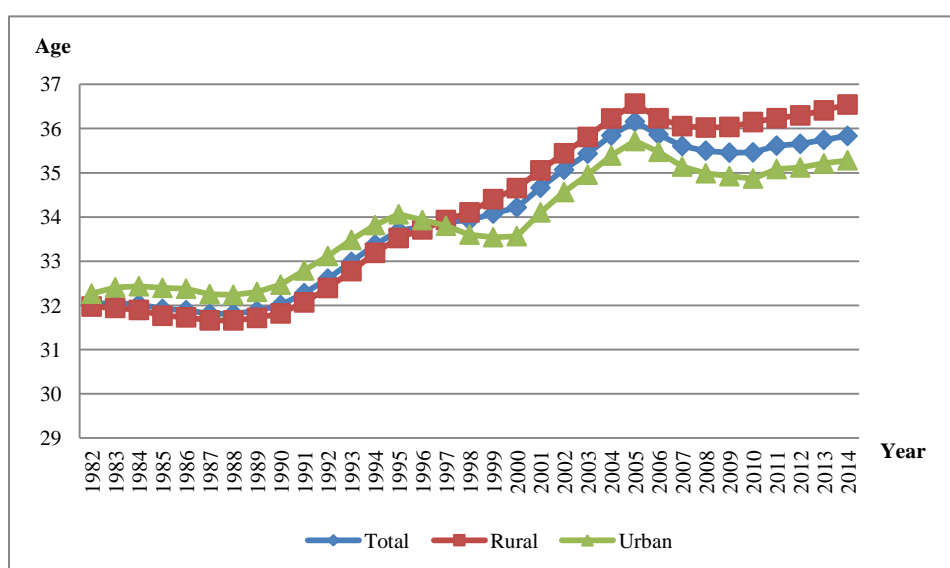
Figure 5.2.1 Average Age of National Labor Force(By census data and 1% sample data)

Figure5.2.1 shows the average age of labor force, we use 1982, 1990, 2000, 2010 census data and 1987, 1995, 2005 1%-sample data to obtain this result, but the age structures and education levels of those 1%-sample data are unreasonable. Take the 2005 1%-sample data as an example, the

population with high school level in 2000 is 138.3 million while that in 2005 is 149.1 million, it indicates a population increase of 10.8 million. The number of high school enrollment from 2001 to 2005 is 55.92 million, in other word, the number of death is 45.12 million, which accounts for 32.64% of the population with high school level in 2000. Also, from the 1%-sample data of 2005, the population of men at the age between 20 to 24 is 37.7 million while that in 2010 is 50.8 million, which suggests a population increase of 13.1 million. There should be a population decrease in 2010 when the death factor is taken into consideration; However, out of inevitable statistical error, it's likely to see an increase with one at 34.75% being too large though. It seems that there exist unreasonable data about age structures and education levels in 2005.

Therefore, we use only census data to generate the new result.
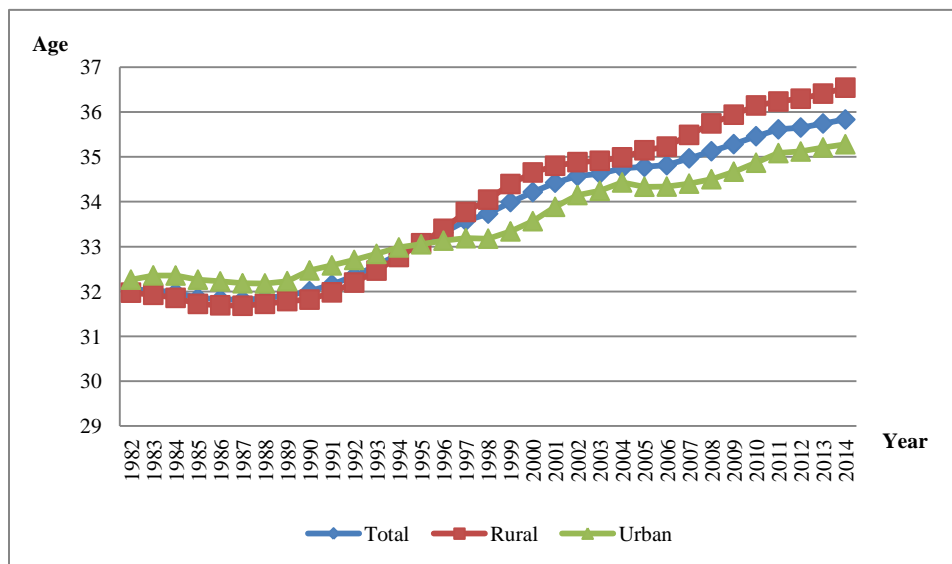
Figure 5.2.2 Average Age of National Labor Force(By census data)

Figure 5.2.2 shows the upward trend in average age of labor force from

1982 to 2014 in Mainland China. The average age increases not only in rural area but also in urban area. The national average age increases from 32 years old in 1982 to 36 years old in 2014 and the rural average age increases from 32 years old in 1982 to 37 years old in 2014, while the urban average age increases from 32 years old in 1982 to 35 in 2014. Since 1995, urban labor force average age became lower than rural because of the labor force immigration from rural area to urban area.

Table 5.2.1 Average Age of National Labor Force（1982-2014）

Unit：Year (of age)

Year	Average Age of Labor Force		
	Total	**Urban**	**Rural**
1982	32.04	32.26	31.97
1983	32.03	32.36	31.93
1984	31.98	32.36	31.86
1985	31.86	32.26	31.72
1986	31.83	32.22	31.69
1987	31.81	32.18	31.68
1988	31.85	32.18	31.72
1989	31.91	32.23	31.79
1990	32.01	32.47	31.82
1991	32.15	32.58	31.98
1992	32.35	32.70	32.20
1993	32.57	32.84	32.47
1994	32.83	32.98	32.77
1995	33.07	33.05	33.07
1996	33.31	33.13	33.40
1997	33.58	33.19	33.77
1998	33.74	33.18	34.05
1999	33.99	33.34	34.40
2000	34.22	33.57	34.65
2001	34.42	33.89	34.80
2002	34.57	34.15	34.88

Year	Average Age of Labor Force		
	Total	**Urban**	**Rural**
2003	34.63	34.24	34.91
2004	34.74	34.43	34.99
2005	34.78	34.33	35.15
2006	34.81	34.34	35.23
2007	34.97	34.40	35.49
2008	35.13	34.50	35.75
2009	35.28	34.67	35.94
2010	35.46	34.87	36.15
2011	35.61	35.08	36.23
2012	35.65	35.12	36.30
2013	35.74	35.21	36.41
2014	35.83	35.28	36.54
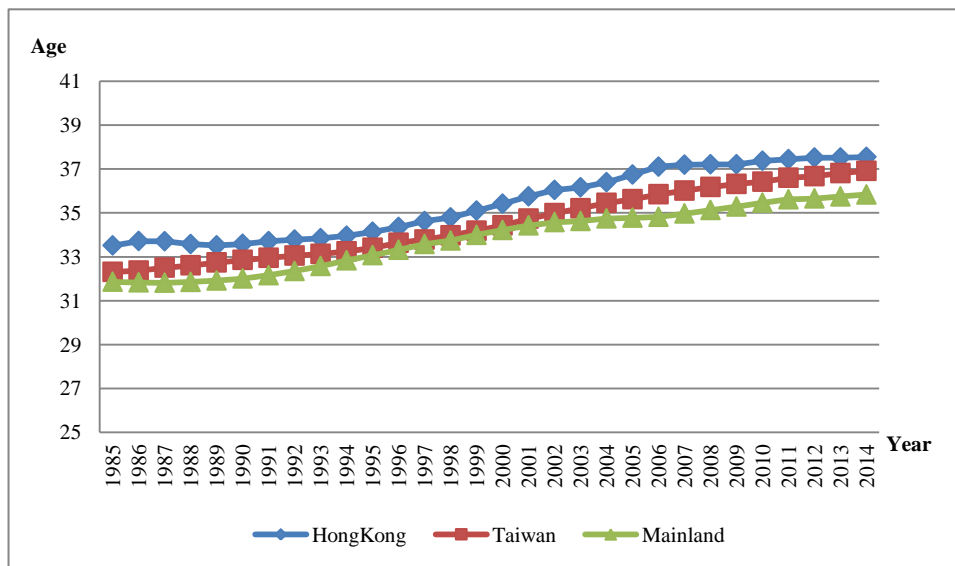
Figure 5.2.3 Average Age of Labor Force in Mainland, Hong Kong and Taiwan

Figure 5.2.3 and Table 5.2.2 show the trends of labor force average age in Mainland, Hong Kong and Taiwan. The average age of labor force in Hong Kong increases from 34 in 1985 to 38 in 2014, while that of Taiwan

increases from 32 in 1985 to 37 in 2014. The labor force average age of Taiwan is always between that of Hong Kong and Mainland China.

Table 5.2.2 Average Age of Labor Force in Mainland, Hong Kong and Taiwan

Unit：Year (of age)

Year	Average Age of Labor Force		
	Hong Kong	**Taiwan**	**Mainland**
1985	33.51	32.30	31.86
1986	33.71	32.36	31.83
1987	33.70	32.50	31.81
1988	33.57	32.61	31.85
1989	33.51	32.74	31.91
1990	33.58	32.85	32.01
1991	33.71	32.95	32.15
1992	33.78	33.05	32.35
1993	33.84	33.12	32.57
1994	33.95	33.24	32.83
1995	34.14	33.40	33.07
1996	34.35	33.63	33.31
1997	34.62	33.78	33.58
1998	34.79	33.97	33.74
1999	35.10	34.18	33.99
2000	35.41	34.43	34.22
2001	35.75	34.73	34.42
2002	36.04	34.98	34.57
2003	36.16	35.20	34.63
2004	36.39	35.45	34.74
2005	36.74	35.62	34.78
2006	37.10	35.84	34.81
2007	37.19	36.01	34.97
2008	37.21	36.18	35.13
2009	37.21	36.31	35.28
2010	37.37	36.42	35.46
2011	37.44	36.60	35.61
2012	37.52	36.67	35.65

Year	Average Age of Labor Force		
	Hong Kong	**Taiwan**	**Mainland**
2013	37.52	36.81	35.74
2014	37.54	36.91	35.83

5.3 Average Years of Schooling of National Labor Force
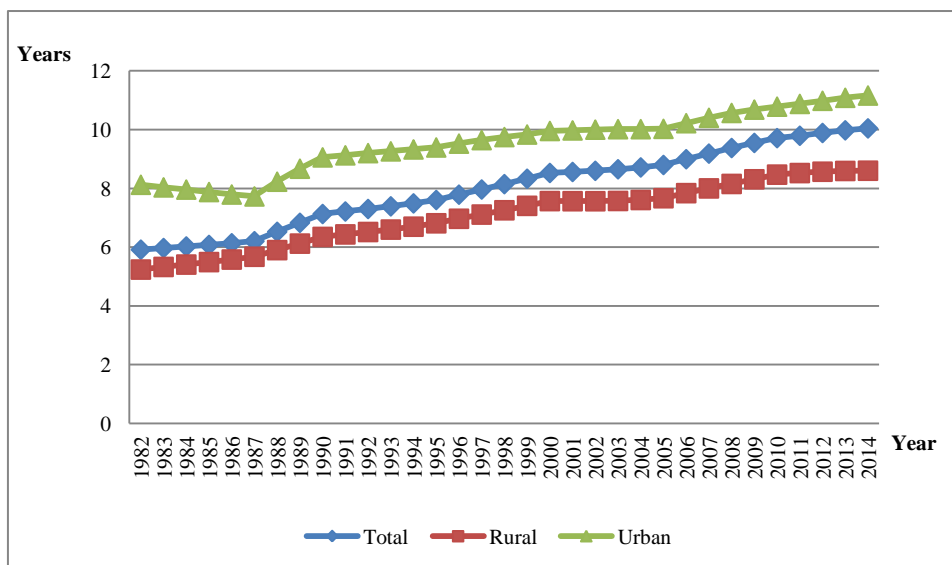
Figure 5.3.1 Average Years of Schooling of National Labor Force(by census data and 1%-sample data)
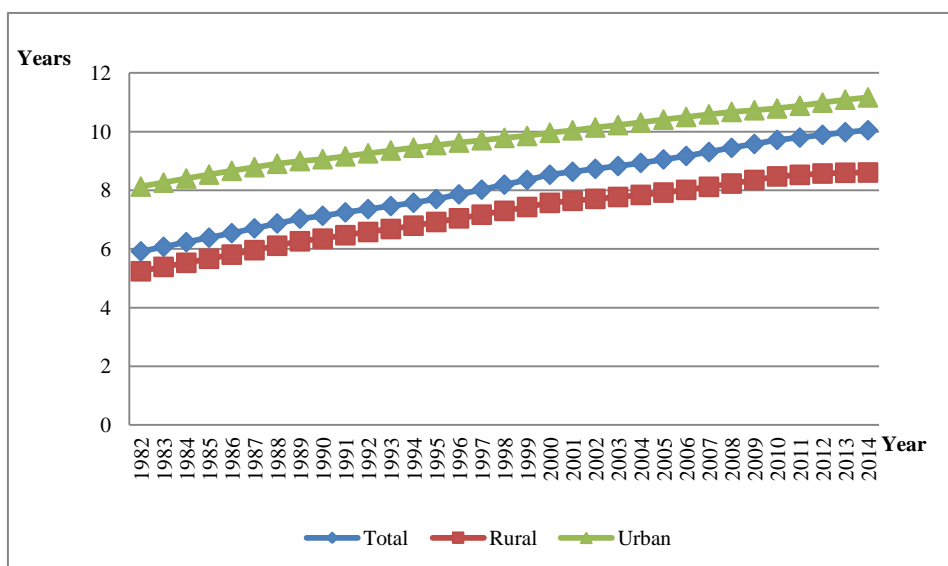
Figure 5.3.2 Average Years of Schooling of National Labor Force(by census data)

Figure 5.3.1 shows average schooling years of national labor force, we use census data and 1%-sample data to obtain this result, but there exist unreasonable data of age structures and education levels in 1987, 1995 and 2005.We use only census data to obtain the new result(Figure 5.3.2). Figure 5.3.2 shows the upward trend in average schooling years of national labor force from 1982 to 2014. The national average years of schooling increase from 5.92 years in 1982 to 10.05 in 2014, and the rural average years of schooling increase from 5.24 in 1982 to 8.61 in 2014 while the urban average years increase from 8.13 to 11.17 during the same period.

Table 5.3.1 Average Years of Schooling of National Labor Force(1982-2014)

Unit: Year

Year	Average Years of Schooling		
	Total	**Urban**	**Rural**
1982	5.92	8.13	5.24
1983	6.07	8.26	5.39
1984	6.23	8.40	5.53
1985	6.38	8.53	5.67
1986	6.54	8.66	5.81
1987	6.70	8.79	5.96
1988	6.87	8.90	6.11
1989	7.03	9.00	6.26
1990	7.13	9.06	6.35
1991	7.25	9.16	6.47
1992	7.36	9.26	6.58
1993	7.46	9.36	6.68
1994	7.57	9.45	6.79
1995	7.70	9.54	6.92
1996	7.86	9.63	7.04
1997	8.02	9.71	7.17
1998	8.19	9.79	7.30
1999	8.35	9.85	7.43
2000	8.53	9.96	7.57
2001	8.63	10.04	7.64
2002	8.73	10.14	7.71
2003	8.83	10.22	7.77
2004	8.93	10.31	7.84
2005	9.05	10.41	7.92
2006	9.17	10.50	8.01
2007	9.31	10.59	8.12
2008	9.45	10.67	8.23
2009	9.58	10.73	8.35
2010	9.72	10.79	8.47
2011	9.80	10.88	8.53
2012	9.89	10.99	8.57
2013	9.98	11.09	8.60
2014	10.05	11.17	8.61
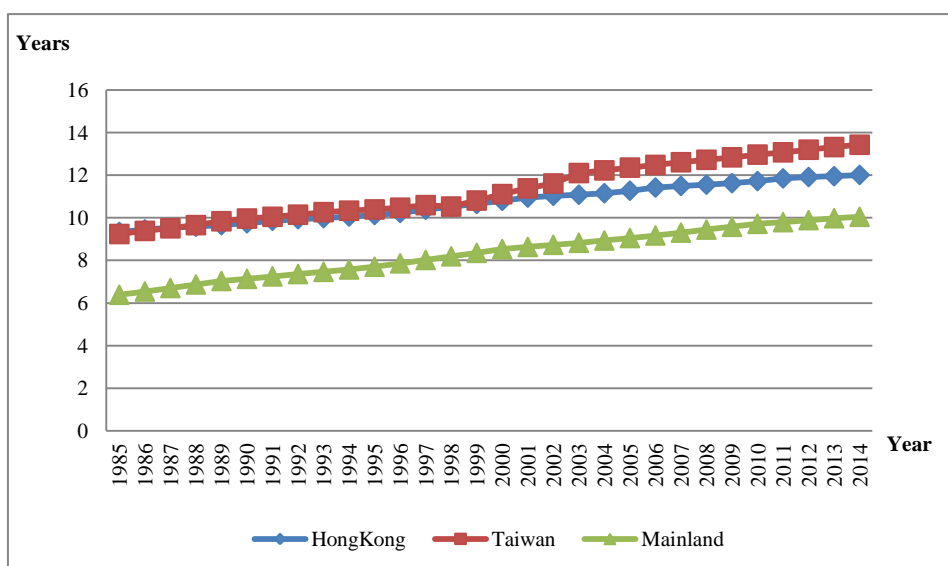
Figure 5.3.3Average Years of Schooling of Labor Force in Mainland, Hong Kong and Taiwan

Figure 5.3.3and Table 5.3.2 show the trends of average years of schooling of labor force in Mainland, Hong Kong and Taiwan. The labor force average years of schooling of Hong Kong increased from 9.34 in 1985 to 12.01 in 2014 while that of Taiwan increased from 9.24 in 1982 to 13.43 in 2014. The labor force years of schooling of Hong Kong and Taiwan are similar in 1985-2014, and both of them are significantly higher than Mainland counterpart.

Table 5.3.2 Average Years of Schooling of Labor Force in Mainland, Hong Kong and Taiwan

Unit: Year

Year	Average Years of Schooling		
	Hong Kong	**Taiwan**	**Mainland**
1985	9.34	9.24	6.38
1986	9.45	9.38	6.54
1987	9.53	9.51	6.70

Year	Average Years of Schooling		
	Hong Kong	**Taiwan**	**Mainland**
1988	9.58	9.65	6.87
1989	9.66	9.84	7.03
1990	9.74	9.96	7.13
1991	9.86	10.05	7.25
1992	9.94	10.14	7.36
1993	9.99	10.26	7.46
1994	10.06	10.33	7.57
1995	10.13	10.39	7.70
1996	10.23	10.47	7.86
1997	10.38	10.59	8.02
1998	10.51	10.53	8.19
1999	10.65	10.81	8.35
2000	10.80	11.11	8.53
2001	10.95	11.38	8.63
2002	11.03	11.61	8.73
2003	11.08	12.10	8.83
2004	11.15	12.23	8.93
2005	11.27	12.36	9.05
2006	11.42	12.48	9.17
2007	11.50	12.61	9.31
2008	11.56	12.72	9.45
2009	11.63	12.84	9.58
2010	11.72	12.97	9.72
2011	11.85	13.07	9.80
2012	11.91	13.20	9.89
2013	11.95	13.32	9.98
2014	12.01	13.43	10.05
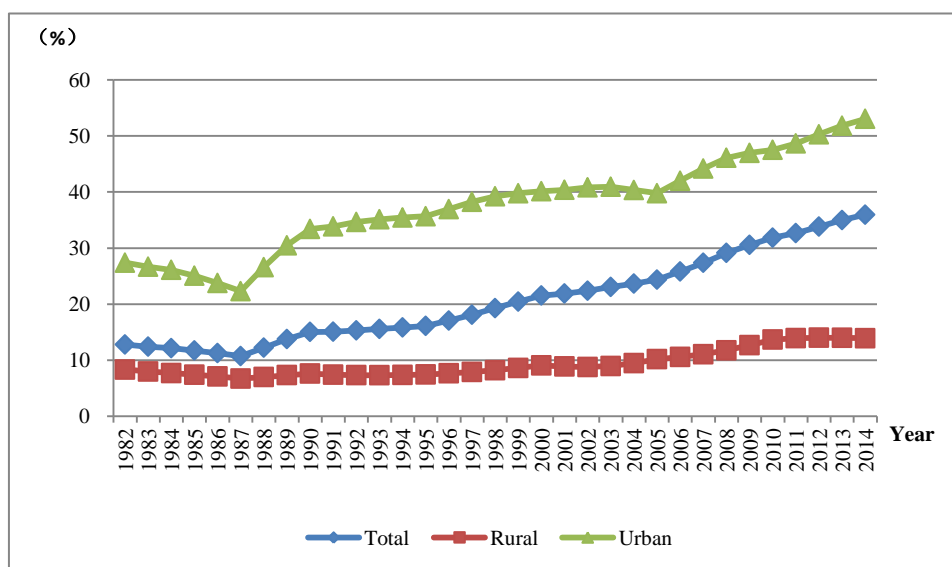
F**igure 5.3.4 Proportions of High School and Above in Labor Force(By census data and 1%-sample data)**

Figure 5.3.4shows the proportions of high school and above in labor force. We use census data and 1%-sample data to obtain this result, but there exist unreasonable data of age structures and education levels in 1987, 1995 and 2005.We use only census data to obtain the new result(Figure 5.3.5).
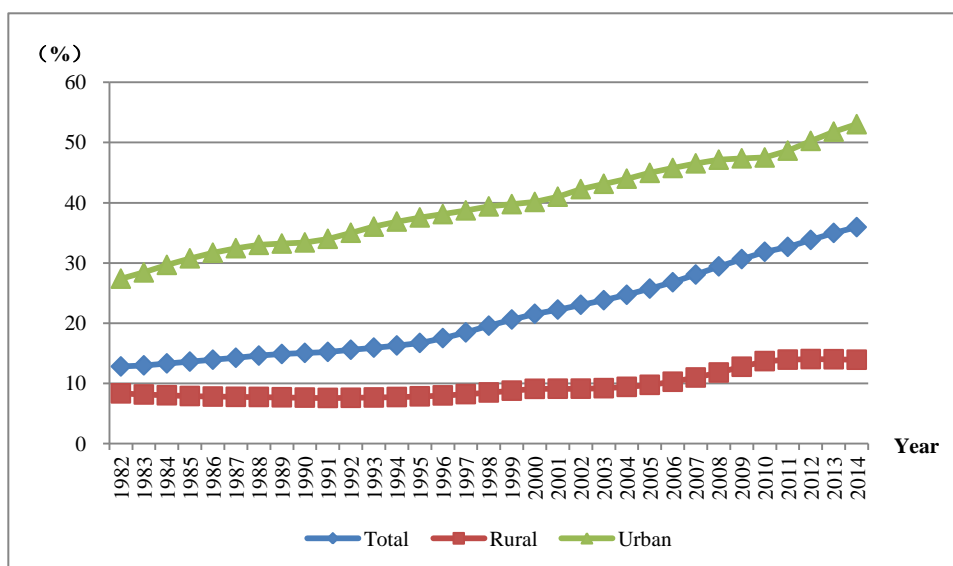
F**igure 5.3.5 Proportions of High School and Above in Labor Force(By census data)**

Figure 5.3.5shows the upward trend in the proportions of high school and above in labor force. National proportion of high school and above in labor force increases from 12% in 1982 to 36% in 2014, and rural proportion increases from 8% in 1982 to 14% in 2014 while urban proportion increases from 27% to 53%.

Table 5.3.3 National Proportions of High School and Above of National Labor Force(1982-2014)

Unit:%

Year	Proportions of High School and Above		
	Total	**Urban**	**Rural**
1982	12.80	27.38	8.33
1983	12.98	28.42	8.14
1984	13.31	29.67	8.02
1985	13.61	30.75	7.89
1986	13.92	31.69	7.80

Year	Proportions of High School and Above		
	Total	Urban	Rural
1987	14.24	32.44	7.75
1988	14.60	32.99	7.73
1989	14.87	33.21	7.68
1990	15.05	33.39	7.63
1991	15.22	34.00	7.57
1992	15.57	35.00	7.59
1993	15.93	36.02	7.64
1994	16.29	36.86	7.72
1995	16.71	37.55	7.84
1996	17.51	38.10	7.99
1997	18.45	38.72	8.21
1998	19.57	39.38	8.48
1999	20.59	39.76	8.78
2000	21.54	40.12	9.08
2001	22.25	40.99	9.10
2002	23.04	42.25	9.11
2003	23.80	43.13	9.19
2004	24.70	43.99	9.41
2005	25.73	44.95	9.74
2006	26.78	45.76	10.26
2007	28.06	46.53	10.96
2008	29.42	47.14	11.79
2009	30.62	47.36	12.75
2010	31.84	47.50	13.69
2011	32.66	48.64	13.93
2012	33.82	50.26	14.02
2013	34.98	51.79	14.00
2014	35.94	53.03	13.92
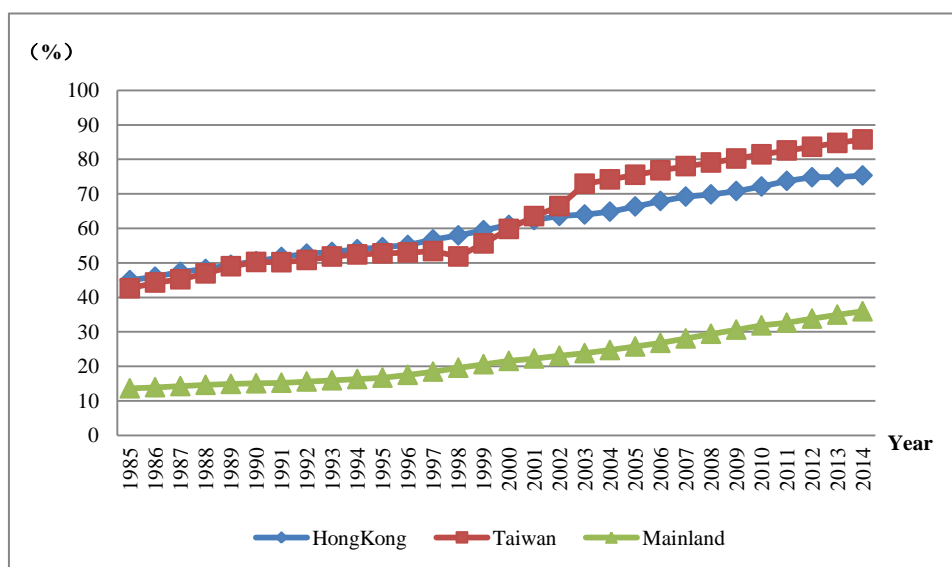
Figure 5.3.6Proportions of High School Education and Above in Labor Force of Mainland, Hong Kong and Taiwan

Figure 5.3.6 and Table 5.3.4 show the trends in proportions of population with high school educational attainment and above in labor force of Mainland, Hong Kong and Taiwan. The proportion of Hong Kong increases from 44.96% in 1985 to 75.32% in 2014 while that of Taiwan increases from 42.60% in 1985 to 85.75% in 2014. The proportion of Hong Kong is greater than that of Taiwan before 2001, but smaller since 2001; meanwhile the proportions in these two areas are always much greater than that in Mainland China.

Table 5.3.4 Proportions of High School Education and Above in Labor Force of Mainland, Hong Kong and Taiwan

Unit: %

Year	Proportions of High School Education and Above		
	Hong Kong	Taiwan	Mainland
1985	44.96	42.60	13.61
1986	45.95	44.27	13.92

Year	Proportions of High School Education and Above		
	Hong Kong	**Taiwan**	**Mainland**
1987	47.36	45.21	14.24
1988	48.20	46.92	14.60
1989	49.42	48.99	14.87
1990	50.44	50.23	15.05
1991	51.69	50.16	15.22
1992	52.65	50.81	15.57
1993	53.13	51.81	15.93
1994	53.93	52.41	16.29
1995	54.52	52.73	16.71
1996	55.15	52.96	17.51
1997	56.77	53.38	18.45
1998	57.94	51.82	19.57
1999	59.43	55.60	20.59
2000	60.97	59.80	21.54
2001	62.38	63.52	22.25
2002	63.58	66.42	23.04
2003	63.99	72.91	23.80
2004	64.82	74.17	24.70
2005	66.33	75.51	25.73
2006	67.92	76.81	26.78
2007	69.19	78.02	28.06
2008	69.83	79.06	29.42
2009	70.80	80.22	30.62
2010	72.12	81.44	31.84
2011	73.74	82.56	32.66
2012	74.80	83.62	33.82
2013	74.82	84.74	34.98
2014	75.32	85.75	35.94
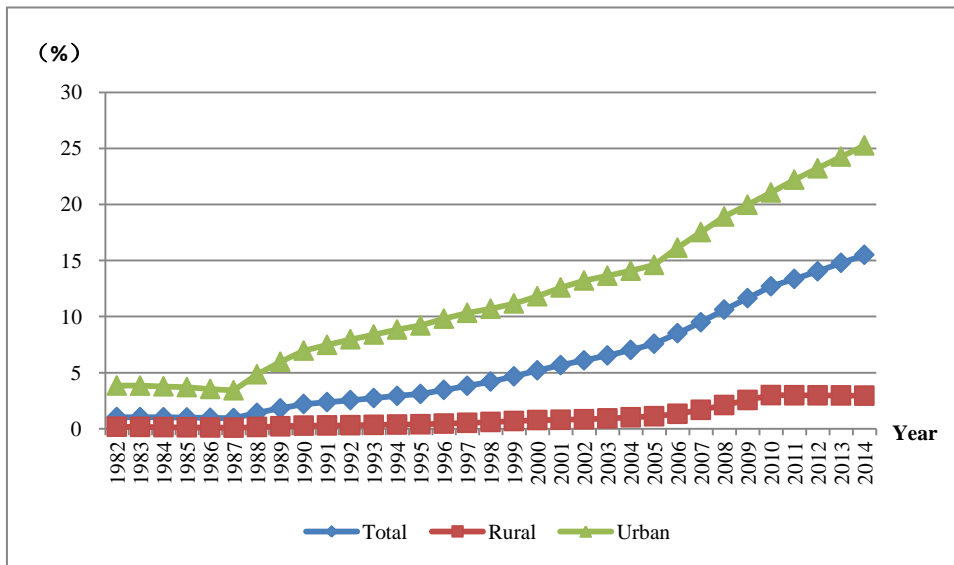
Figure 5.3.7 National Proportions of College Education and Above of National Labor Force(By census data and 1%-sample data)
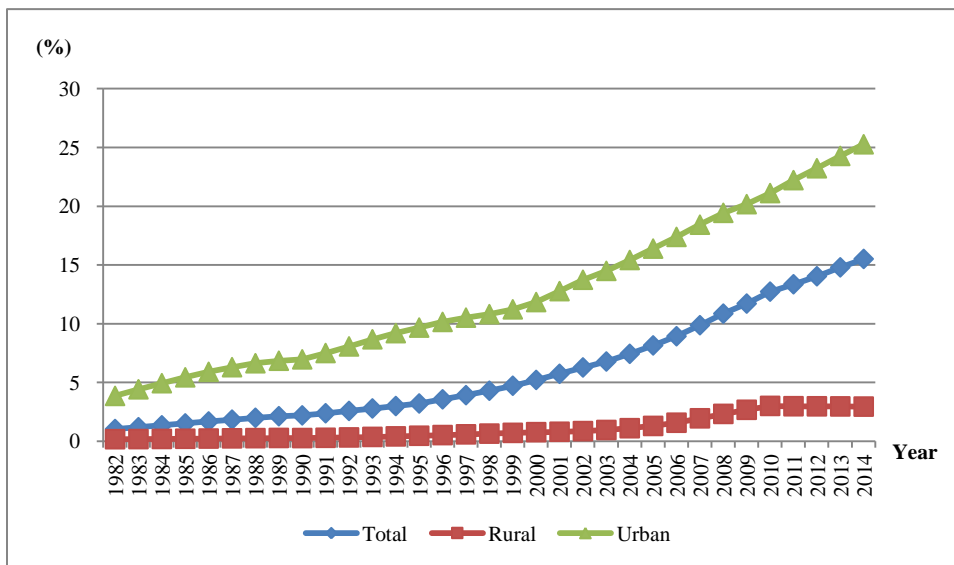
Figure 5.3.8 National Proportions of College Education and Above of National Labor Force(By census data)

Figure 5.3.7 shows proportions of college and above in labor force. We use census data and 1%-sample data to obtain this result, but there exist unreasonable data of age structures and education levels in 1987, 1995 and 2005.We use only census data to obtain the new result(Figure 5.3.8). Figure 5.3.8 shows national proportion of college and above in labor force increased from 1% in 1982 to 16% in 2014, and rural proportion increased from 0.2% in 1982 to 3% in 2014while urban proportion increased from 4% to 25%. The trend is consistent with the reality, which implies the improvement and expansion of higher education in China.

Table 5.3.5 National Proportions of College and Above of National Labor Force(1982-2014)

Unit:%

Year	Proportions of College and Above		
	Total	Urban	Rural
1982	1.04	3.86	0.17
1983	1.19	4.42	0.18
1984	1.35	4.94	0.19
1985	1.52	5.44	0.21
1986	1.68	5.90	0.23
1987	1.84	6.30	0.24
1988	2.00	6.64	0.26
1989	2.13	6.85	0.28
1990	2.20	6.97	0.27
1991	2.38	7.50	0.29
1992	2.58	8.07	0.32
1993	2.79	8.67	0.37
1994	2.99	9.20	0.41
1995	3.21	9.67	0.47
1996	3.56	10.15	0.52
1997	3.92	10.51	0.59

Year	Proportions of College and Above		
	Total	**Urban**	**Rural**
1998	4.30	10.81	0.65
1999	4.72	11.22	0.71
2000	5.21	11.84	0.77
2001	5.74	12.77	0.80
2002	6.28	13.74	0.86
2003	6.78	14.49	0.96
2004	7.44	15.42	1.11
2005	8.15	16.39	1.30
2006	8.93	17.38	1.57
2007	9.87	18.42	1.95
2008	10.85	19.43	2.32
2009	11.71	20.17	2.67
2010	12.73	21.11	3.00
2011	13.35	22.21	2.98
2012	14.03	23.22	2.97
2013	14.79	24.27	2.96
2014	15.51	25.26	2.94

Figure 5.3.9 and Table 5.3.6 show the trends in proportions of population with college educational attainment and above in labor force of Mainland, Hong Kong and Taiwan. The proportion of Hong Kong increases from 10.09% in 1985 to 34.78% in 2014 while that of Taiwan increases from 13.18% in 1985 to 51.76% in 2014. The proportion of Hong Kong is greater than that of Taiwan in general, and the proportions in these two areas are always much greater than that in Mainland China.
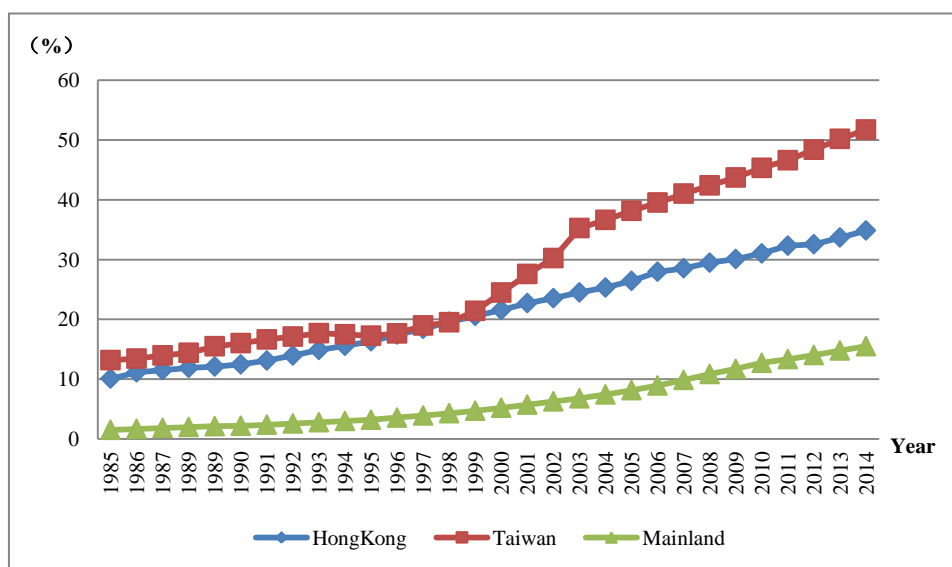
Figure 5.3.9 Proportions of College Education and Above in Labor Force of Mainland, Hong Kong and Taiwan

Table 5.3.6 Proportions of College Education and Above in Labor Force of Mainland, Hong Kong and Taiwan

Unit: %

Year	Proportions of College Education and Above		
	Hong Kong	Taiwan	Mainland
1985	10.09	13.18	1.52
1986	11.14	13.43	1.68
1987	11.52	13.97	1.84
1988	11.89	14.40	2.00
1989	12.11	15.50	2.13
1990	12.46	16.02	2.20
1991	13.11	16.64	2.38
1992	13.95	17.12	2.58
1993	14.88	17.68	2.79
1994	15.57	17.50	2.99
1995	16.33	17.26	3.21
1996	17.47	17.65	3.56

Year	Proportions of College Education and Above		
	Hong Kong	**Taiwan**	**Mainland**
1997	18.43	18.97	3.92
1998	19.61	19.51	4.30
1999	20.59	21.42	4.72
2000	21.57	24.49	5.21
2001	22.72	27.59	5.74
2002	23.55	30.25	6.28
2003	24.50	35.27	6.78
2004	25.32	36.64	7.44
2005	26.44	38.16	8.15
2006	27.97	39.54	8.93
2007	28.55	41.04	9.87
2008	29.49	42.41	10.85
2009	30.09	43.74	11.71
2010	31.03	45.34	12.73
2011	32.33	46.62	13.35
2012	32.56	48.39	14.03
2013	33.70	50.20	14.79
2014	34.87	51.76	15.51

5.4 Average Age of Labor Force at Provincial Level

Table 5.4.1 shows the comparison of average age of labor force in 2014 among all provinces in China in descending order. In general, the average age of labor force is distributed between 33 and 39 years old in 2014, and the three northeast provinces of China (Liaoning, Heilongjiang and Jilin) ranked the top while Tibet is at the bottom. Moreover, the average age of urban labor force is slightly lower than that of rural labor force within each province, except for Xinjiang and Qinghai.

Table 5.4.1 Average Age of Labor Force at Provincial Level(2014)

Unit: Year (of age)

Rank	Province	Average Age		
		Sub-Total	**Urban**	**Rural**
1	Liaoning	37.88	37.52	38.53
2	Heilongjiang	37.56	37.29	37.93
3	Jilin	37.19	36.50	38.04
4	InnerMongolia	36.94	36.24	37.99
5	Shanghai	36.78	36.78	-
6	Zhejiang	36.74	35.90	38.54
7	Jiangsu	36.51	35.86	37.77
8	Shandong	36.48	35.23	37.92
9	Beijing	36.21	36.04	37.49
10	Hunan	36.12	35.18	37.08
11	Hubei	35.99	35.11	37.09
12	Nation	35.83	35.28	36.54
13	Chongqing	35.82	35.21	36.84
14	Tianjin	35.77	35.46	37.20
15	Hebei	35.77	34.80	36.80
16	Fujian	35.69	35.03	36.88
17	Sichuan	35.65	34.72	36.58
18	Anhui	35.65	34.90	36.40
19	Xinjiang	35.35	36.05	34.69
20	Shanxi	35.30	34.60	36.09
21	Qinghai	35.25	35.47	35.01
22	Shaanxi	35.15	33.99	36.39
23	Yunnan	35.05	34.29	35.55
24	Jiangxi	35.00	34.10	35.85
25	Gansu	34.90	33.75	35.74
26	Hainan	34.74	34.26	35.28
27	Henan	34.71	33.34	35.85
28	Guangxi	34.59	33.26	35.78
29	Ningxia	34.52	34.24	34.85
30	Guangdong	34.13	34.08	34.25
31	Guizhou	34.01	32.80	34.87
32	Tibet	33.43	32.98	33.57

5.5 Education Indicators at Provincial Level

Table 5.5.1 shows the provincial rankings of average years of schooling of labor force in 2014.In general, the provinces with better economic development have longer average years of schooling accordingly, such as Beijing, Shanghai and Tianjin; in contrast, those underdeveloped provinces, such as Yunnan, Qinghai and Tibet, rank at the bottom. Average schooling years of urban labor force are longer than that of rural labor force in each province, and the urban-rural gap is greater in underdeveloped provinces. For example, the urban-rural differential in Tibet is 4.94 years while the gap in Beijing is only 2.48.

Table 5.5.1 Average Years of Schooling of Labor Force at Provincial Level(2014)

Unit: Year

Rank	Province	Average Years of Schooling		
		Sub-total	Urban	Rural
1	Beijing	12.35	12.65	10.17
2	Shanghai	11.53	11.53	-
3	Tianjin	11.21	11.67	9.07
4	Jiangsu	10.55	11.26	9.18
5	Liaoning	10.48	11.46	8.66
6	Hubei	10.44	11.60	8.99
7	Shaanxi	10.41	11.80	8.94
8	Shanxi	10.36	11.49	9.08
9	Jilin	10.31	11.72	8.55
10	Hunan	10.27	11.42	9.10
11	Guangdong	10.24	10.79	8.86
12	Shandong	10.20	11.38	8.84
13	InnerMongolia	10.16	11.18	8.62
14	Chongqing	10.12	11.16	8.39
15	Heilongjiang	10.12	11.34	8.46
16	Hubei	10.09	11.21	8.90

Rank	Province	Average Years of Schooling		
		Sub-total	Urban	Rural
17	Nation	10.05	11.17	8.61
18	Henan	10.04	11.39	8.93
19	Zhejiang	10.01	10.61	8.74
20	Hainan	9.98	11.11	8.71
21	Fujian	9.94	10.62	8.72
22	Xinjiang	9.94	11.43	8.51
23	Jiangxi	9.84	11.10	8.62
24	Ningxia	9.76	11.25	8.05
25	Guangxi	9.71	11.10	8.47
26	Anhui	9.70	10.89	8.49
27	Sichuan	9.64	11.07	8.20
28	Gansu	9.33	11.41	7.83
29	Guizhou	8.89	10.72	7.59
30	Qinghai	8.70	10.65	6.71
31	Yunnan	8.70	10.54	7.51
32	Tibet	6.01	9.75	4.81

Table 5.5.2 shows the provincial rankings for proportion of high school education and above in total, rural and urban labor force in 2014. Beijing, Shanghai and Tianjin are top 3 in accordance with their rankings of average years of schooling. National proportion ranks the 17th, Meanwhile Yunnan and Tibet are at the bottom, the same as their rankings of average years of schooling.

Table 5.5.2 The Proportion of High School Education and Above of Labor Force at Provincial Level (2014)

Unit：%

Rank	Province	The proportion of high school education and above		
		Sub-total	Urban	Rural
1	Beijing	64.85	68.97	35.38
2	Shanghai	54.51	54.51	0.00

Rank	Province	The proportion of high school education and above		
		Sub-total	Urban	Rural
3	Tianjin	51.35	58.70	17.34
4	Jiangsu	41.84	52.49	21.13
5	Shaanxi	41.12	61.67	19.19
6	Hubei	40.40	58.64	17.67
7	Chongqing	38.49	54.00	12.71
8	Shanxi	38.23	57.19	16.85
9	Hunan	38.19	56.85	19.20
10	Jilin	38.19	60.39	10.70
11	Guangdong	38.18	47.13	15.81
12	Liaoning	38.16	53.60	9.61
13	InnerMongolia	37.95	53.03	15.32
14	Shandong	36.27	55.22	14.37
15	Ningxia	36.14	55.47	13.89
16	Nation	35.94	53.03	13.92
17	Zhejiang	35.70	44.00	17.95
18	Xinjiang	35.09	58.69	12.57
19	Fujian	34.60	44.65	16.61
20	Heilongjiang	34.49	53.63	8.44
21	Hainan	34.43	52.86	13.50
22	Henan	33.74	57.17	14.41
23	Hebei	33.05	51.73	13.29
24	Gansu	32.84	59.80	13.30
25	Jiangxi	32.48	52.57	13.28
26	Sichuan	32.45	53.67	11.11
27	Anhui	31.39	49.64	13.01
28	Qinghai	31.01	52.83	8.66
29	Guangxi	30.33	52.68	10.44
30	Guizhou	25.49	50.39	7.86
31	Yunnan	23.96	47.07	8.97
32	Tibet	17.04	47.39	7.28

Table 5.5.3 shows the provincial rankings for proportion of college education and above of labor force in 2014. The rankings are consistent with the rankings of proportion of high school education in general. But

considering the facts that quantity and quality of colleges in different provinces vary a lot and that most college students from other provinces are counted as part of the population in the provinces where they are studying, hence there are some inconsistencies between these two rankings for a few provinces. For example, Liaoning Province has lower rank in this ranking list than its rank in the proportion of high school education.

Table 5.5.3 The Proportion of College Education and Above of Labor Force at Provincial Level (2014)

Unit: %

Rank	Province	The proportion of college education and above		
		Sub-total	Urban	Rural
1	Beijing	42.00	46.30	11.20
2	Shanghai	32.19	32.19	0.00
3	Tianjin	27.27	32.33	3.89
4	Jiangsu	19.90	27.64	4.85
5	Liaoning	19.43	28.51	2.65
6	Shaanxi	19.27	33.89	3.65
7	Hubei	18.84	30.66	4.12
8	Jilin	17.84	30.33	2.37
9	InnerMongolia	17.43	25.95	4.65
10	Zhejiang	16.99	23.03	4.06
11	Chongqing	16.96	25.82	2.25
12	Xinjiang	16.83	30.47	3.81
13	Ningxia	16.45	27.94	3.23
14	Shandong	16.08	27.74	2.62
15	Shanxi	15.91	27.52	2.82
16	Heilongjiang	15.83	26.17	1.75
17	Nation	15.51	25.26	2.94
18	Fujian	15.35	21.75	3.88
19	Hunan	15.19	26.93	3.25
20	Hebei	14.64	26.17	2.45
21	Guangdong	14.50	19.29	2.53
22	Qinghai	14.12	25.84	2.12

Rank	Province	The proportion of college education and above		
		Sub-total	Urban	Rural
23	Hainan	13.95	23.80	2.76
24	Jiangxi	13.87	25.22	3.02
25	Sichuan	13.07	23.86	2.22
26	Henan	13.05	25.73	2.60
27	Gansu	13.05	27.96	2.24
28	Anhui	12.99	23.34	2.56
29	Guangxi	12.25	23.61	2.14
30	Yunnan	10.89	23.76	2.55
31	Guizhou	10.45	22.30	2.06
32	Tibet	8.87	27.37	2.92

Chapter 6   National human capital

6.1 Trends in human capital

It is more meaningful to discuss the trends of the real value of the human capital stock than the nominal value. We use CPI as deflator to calculate the real values. Other published deflators are not available for recent years while CPI is updated year by year. Moreover, as can be seen in preceding chapters, results based on CPI provide more conservative estimates than those based on capital deflators reported in the studies by Zhang(2004) and Holz(2006).

The discussions of human capital categorized by gender and by region are important in our report. Table 6.1.1 shows real human capital for the country as a whole based on 5-education categories, by gender, and by region. From 1985 to 2014, human capital increased 6.80 times from 40.74 trillion Yuan to 318.06 trillion Yuan, an average annual growth rate of 7.08%, lower than the growth rate of the economy.[1] Based on the 6-education categories, the human capital increased from 40.79 trillion Yuan in 1985 to 325.97 trillion Yuan in 2014, an average annual growth rate of 7.16%. This measure reflects the exit of the aging low-educated population from the labor market and the entrance of younger individuals with higher expected education and higher income.

Both urban real capital and rural real capital increased in 1985-2014. Rural real human capital increased from 23.93 trillion Yuan to 61.26 trillion Yuan; urban real human capital grew from 16.81 trillion Yuan to 256.8 trillion Yuan. The corresponding annual growth rates are 3.24% for rural

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[1] The average annual growth rate is the average of annual logarithmic growth rate, and the same as follows.

areas and 9.40% for urban areas. Until 1991, urban real human capital is smaller than rural real human capital, while after 1991 urban human capital exceeds that in rural areas.

Table 6.1.1 National Real Human Capital by Gender and Region[2]

				Billions of 1985 Yuan	
Year	**National**	**Male**	Female	**Urban**	**Rural**
1985	40740	24380	16358	16810	23930
1986	44280	26760	17508	18990	25290
1987	47860	29150	18712	21060	26800
1988	47000	28820	18185	21180	25820
1989	46210	28520	17694	21820	24390
1990	52060	32350	19719	25760	26300
1991	57290	35760	21530	28630	28660
1992	61260	38490	22760	30820	30440
1993	60840	38500	22340	30950	29890
1994	55270	35230	20040	28430	26840
1995	52900	33840	19062	27630	25270
1996	55950	36020	19925	30940	25010
1997	62140	40190	21945	36130	26010
1998	71170	46280	24892	43260	27910
1999	82010	53440	28580	51990	30020
2000	91790	59970	31820	59850	31940
2001	103330	67380	35940	69310	34020
2002	117200	76560	40630	80820	36380
2003	129740	84860	44880	91680	38060
2004	139050	90670	48340	100400	38650
2005	150200	97610	52600	110100	40100
2006	169380	110780	58580	125900	43480
2007	183670	119970	63660	138700	44970
2008	195090	127350	67750	149200	45890
2009	220670	144400	76240	170400	50270

[2] Some discrepancy may exist when summing up male and female, urban and rural to get the national amount. This is mainly caused by rounding errors.

Year	National	Male	Female	Urban	Rural
2010	237510	155400	82100	184800	52710
2011	252780	164620	88160	199200	53580
2012	272890	177750	95160	216900	55990
2013	297400	193730	103650	239200	58200
2014	318060	207580	110490	256800	61260

Figure 6.1.1 shows the trend of urban and rural real human capital. Rural real human capital had little difference with urban real human capital before 1998, even higher than urban before 1991. However, since 1997, rural real human capital has shown a relatively lower growth rate compared to the accelerating growth rate of urban real human capital, and the gap between urban and rural also increased. There are several reasons for the more rapid growth of the urban than of the rural human-capital stock. Although the rural population which was 807 million was more than three times the size of the urban population which was 237 million in 1985 and thus had larger amount of human capital in the earlier years, by 2014, the population in rural China had fallen to 627 million, lower than the urban population of 746 million. This change was, to a large extent, a result of the rapid urbanization during the course of economic transition as well as the large scale rural-urban migration. These changes are magnified by the education gap between the urban and rural populations. Urban areas usually have a higher proportion of educated population than rural areas. As shown in the figure, the trend of national human capital most depends on the trend of urban human capital.
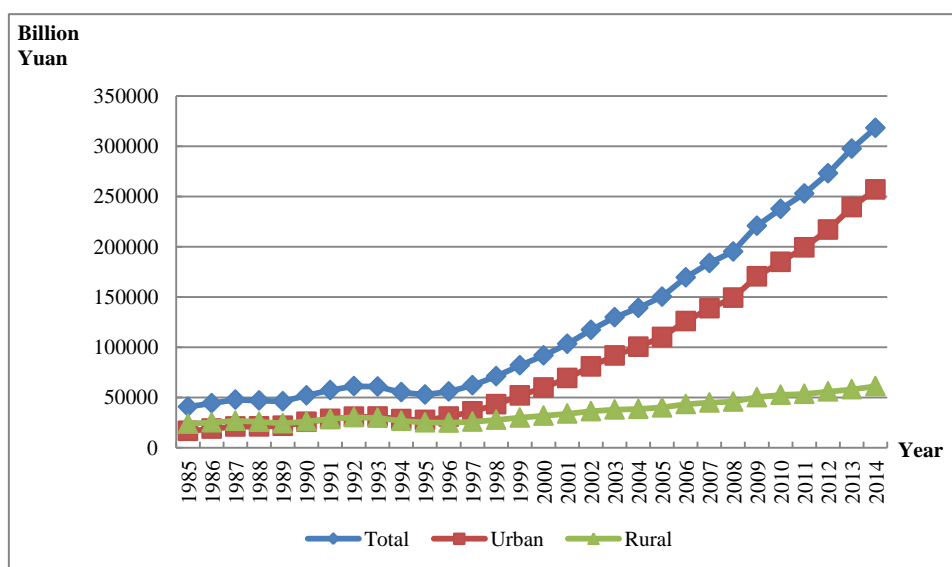
Figure 6.1.1 National Real Human Capital by Region,1985-2014

We report human capital indices (1985 = 100) by gender and region in table 6.1.2.

Table 6.1.2 National Real Human Capital Index (1985=100)

Year	National	Male	Female	Urban	Rural
1985	100	100	100	100	100
1986	108.69	109.76	107.03	112.97	105.68
1987	117.48	119.57	114.39	125.28	111.99
1988	115.37	118.21	111.17	126.00	107.90
1989	113.43	116.98	108.17	129.80	101.92
1990	127.79	132.69	120.55	153.24	109.90
1991	140.62	146.68	131.62	170.32	119.77
1992	150.37	157.88	139.14	183.34	127.20
1993	149.34	157.92	136.57	184.12	124.91
1994	135.67	144.50	122.51	169.13	112.16
1995	129.85	138.80	116.53	164.37	105.60
1996	137.33	147.74	121.81	184.06	104.51
1997	152.53	164.85	134.15	214.93	108.69

Year	National	Male	Female	Urban	Rural
1998	174.69	189.83	152.17	257.35	116.63
1999	201.30	219.20	174.72	309.28	125.45
2000	225.31	245.98	194.52	356.04	133.47
2001	253.63	276.37	219.71	412.31	142.16
2002	287.68	314.03	248.38	480.79	152.03
2003	318.46	348.07	274.36	545.39	159.05
2004	341.31	371.90	295.51	597.26	161.51
2005	368.68	400.37	321.56	654.97	167.57
2006	415.76	454.39	358.11	748.96	181.70
2007	450.83	492.08	389.17	825.10	187.92
2008	478.87	522.35	414.17	887.57	191.77
2009	541.65	592.29	466.07	1013.68	210.07
2010	582.99	637.41	501.90	1099.35	220.27
2011	620.47	675.23	538.94	1185.01	223.90
2012	669.83	729.08	581.73	1290.30	233.97
2013	730.00	794.63	633.63	1422.96	243.21
2014	780.71	851.44	675.45	1527.66	256.00

6.2 Human capital per capita

An increase in real human capital can be caused by a number of factors, such as population growth, demographic changes (e.g., the size of retirement group), region migration or urbanization (e.g., an individual can achieve higher value of human capital by moving from rural to urban area), higher educational attainment, higher rates of return to education, and higher rates of return to on-the-job training. To further understand the underlying factors contributing to human-capital dynamics, we first calculate real human capital per capita, i.e., the ratio of real human capital to the non-retired population.

Table 6.2.1 shows the real human capital for the nation, and by gender

and region based on 5-education group categories. The national real human capital per capita grew 5.50 times, from 43.20 thousand Yuan in 1985 to 280.71 thousand Yuan in 2014, with an average annual growth rate of 6.45%. The fast growth rate was caused by the rapid growth of economy, the expansion of education and the improvement of market economy. Moreover, real human capital per capita for the urban population kept higher than that for the rural population in 1985-2014.

Table 6.2.1 National Real Human Capital Per Capita by Gender and Region
Thousands of 1985 Yuan

Year	National	Male	Female	Urban	Rural
1985	43.20	49.00	36.72	78.31	32.86
1986	46.52	53.33	38.90	85.16	34.70
1987	49.80	57.62	41.10	91.17	36.74
1988	48.04	55.81	39.36	87.11	35.10
1989	46.38	54.11	37.71	85.54	32.89
1990	51.31	60.14	41.37	96.62	35.18
1991	55.84	65.93	44.52	104.42	38.15
1992	59.18	70.37	46.63	109.48	40.36
1993	58.25	69.98	45.20	107.46	39.53
1994	52.51	63.66	40.15	96.59	35.40
1995	49.88	60.77	37.85	91.96	33.26
1996	52.40	64.15	39.35	95.97	33.59
1997	57.89	71.23	43.10	104.98	35.65
1998	65.89	81.32	48.71	118.43	39.09
1999	75.53	93.22	55.77	134.67	42.95
2000	84.16	103.84	62.01	147.13	46.69
2001	94.58	116.88	69.65	162.69	51.01
2002	107.28	133.15	78.51	181.82	56.08
2003	118.88	147.96	86.68	198.65	60.42
2004	127.76	158.83	93.40	210.34	63.29
2005	138.86	172.35	102.07	223.99	67.86
2006	155.17	192.87	113.26	247.07	74.75
2007	167.13	207.23	122.42	262.98	78.72

Year	National	Male	Female	Urban	Rural
2008	176.59	217.96	130.16	274.52	81.73
2009	198.82	244.80	146.60	305.18	91.19
2010	212.60	261.04	157.32	321.97	97.20
2011	225.11	274.93	168.20	337.41	100.78
2012	242.58	295.96	181.49	358.57	107.69
2013	263.76	321.81	197.23	386.54	114.30
2014	280.71	343.45	209.00	405.10	122.68

Figure 6.2.1 shows the trend of urban and rural real human capital per capita. The urban real human capital per capita was considerably higher than rural human capital per capita with a widening gap. Based on Fleisher, Li and Zhao (2009), human capital is a significant contributing factor to economic growth, and the higher growth rate of per-capita human capital in urban areas is closely related to rural-urban and to regional growth in income gaps. It is worth noting that, although after 1997 rural human capital became less than the urban stock, the rural per capita stock has also been accelerating.
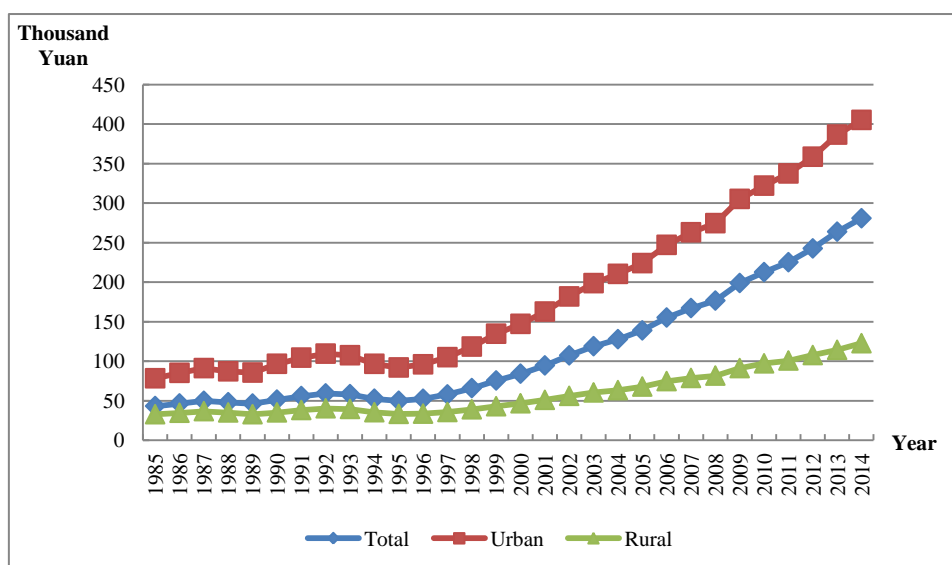
Figure 6.2.1 National Real Human Capital Per Capita by Region, 1985-2014
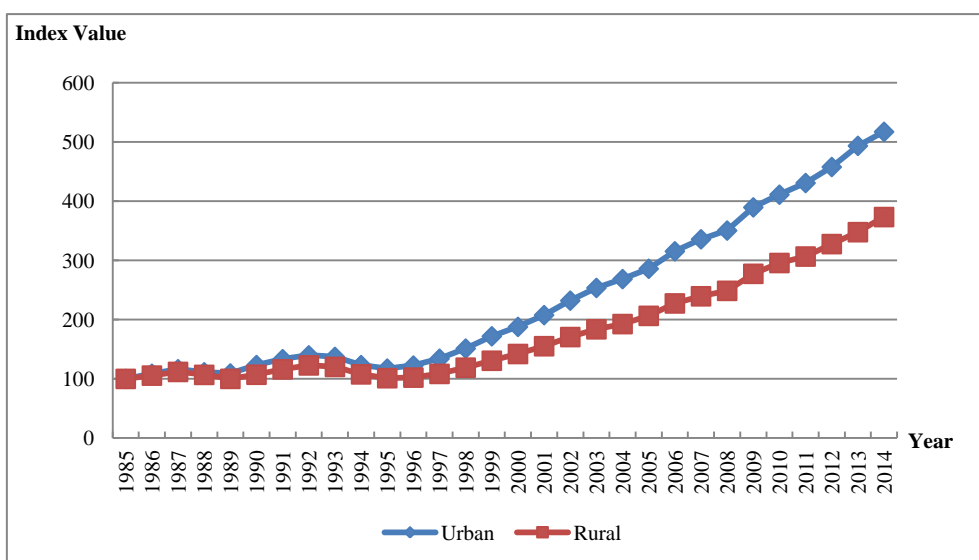
Figure 6.2.2 National Real Human Capital Per Capita Index by Region, 1985-2014

6.3 Labor force human capital

We also use the J-F method to estimate labor force human capital. Labor force human capital represents the human capital of the population that is over 15 years old, non-retired and out-of-school. Labor force human capital is estimated in the same way as national human capital.

6.3.1 National labor force human capital

The national labor force human capital is reported in table 6.3.1. It applies the national income parameters, national population and the 4.58% discount rate discussed in preceding chapters. The first two columns show the nominal labor force human capital based on 5-education and 6-education categories. The third and the forth columns show the real values. The real values in this table are calculated by deflating the nominal values with the CPI using 1985 as

the base year. The fifth column shows the nominal GDP and the ratio of labor

force human capital to GDP is showed in the last column.

Table 6.3.1 National Nominal and Real Labor Force Human Capital and Nominal GDP

Year	Nominal labor force human capital (Billions of Yuan)		Real labor force human capital (Billions of 1985 Yuan)		Nominal GDP (Billions of Yuan)	Ratio of labor force human capital to GDP
	By 5-education categories	By 6-education categories	By 5-education categories	By 6-education categories		
1985	16319	16311	16319	16311	904	18.05
1986	19051	19037	17891	17878	1031	18.48
1987	22356	22339	19573	19558	1210	18.47
1988	26910	26890	19813	19799	1510	17.82
1989	32010	31990	19959	19944	1709	18.73
1990	37950	37900	22960	22930	1877	20.21
1991	43380	43340	25330	25310	2190	19.81
1992	48790	48770	26750	26730	2707	18.02
1993	54820	54790	26180	26160	3552	15.43
1994	61270	61240	23560	23550	4846	12.64
1995	68540	68530	22480	22470	6113	11.21
1996	77330	77330	23350	23350	7157	10.80
1997	87850	87910	25740	25760	7943	11.06
1998	100670	100730	29640	29660	8488	11.86
1999	115150	115270	34270	34310	9019	12.77
2000	132200	131160	39040	38750	9978	13.25
2001	143910	143230	42130	41940	11027	13.05
2002	156980	156690	46280	46200	12100	12.97
2003	172640	172660	50250	50250	13656	12.64
2004	189890	191320	53150	53520	16071	11.82
2005	210840	212470	57880	58320	18590	11.34
2006	239620	241670	64800	65350	21766	11.01
2007	271190	273860	69970	70640	26802	10.12
2008	308210	311620	75050	75860	31675	9.73
2009	360100	364500	88170	89250	34563	10.42

Year	Nominal labor force human capital (Billions of Yuan)		Real labor force human capital (Billions of 1985 Yuan)		Nominal GDP (Billions of Yuan)	Ratio of labor force human capital to GDP
	By 5-education categories	By 6-education categories	By 5-education categories	By 6-education categories		
2010	415700	421400	98430	99760	40890	10.17
2011	447900	454400	100590	102020	48412	9.25
2012	482500	490000	105580	107200	53412	9.03
2013	518900	527200	112740	114540	58802	8.82
2014	569100	578400	120760	122710	63614	8.95

The ratio of nominal labor force human capital to nominal GDP shows the efficiency of the use of human capital. The decline in the ratio over time can reflect growing productivity of human capital, but the decrease of the ratio may reflect that the future growth of the GDP will diminish over time. Figure 6.3.1 shows the trend for the ratio. The level of nominal labor force human capital is much higher than that of nominal GDP, but it shows a decreasing trend. The ratio remained between 8 and 13 in 1994-2014. It indicates that although national human capital level still remains much lower than physical capital, the efficiency of human capital has improved. However, the decreasing trend may also indicate possible constraints on the future GDP growth in China.
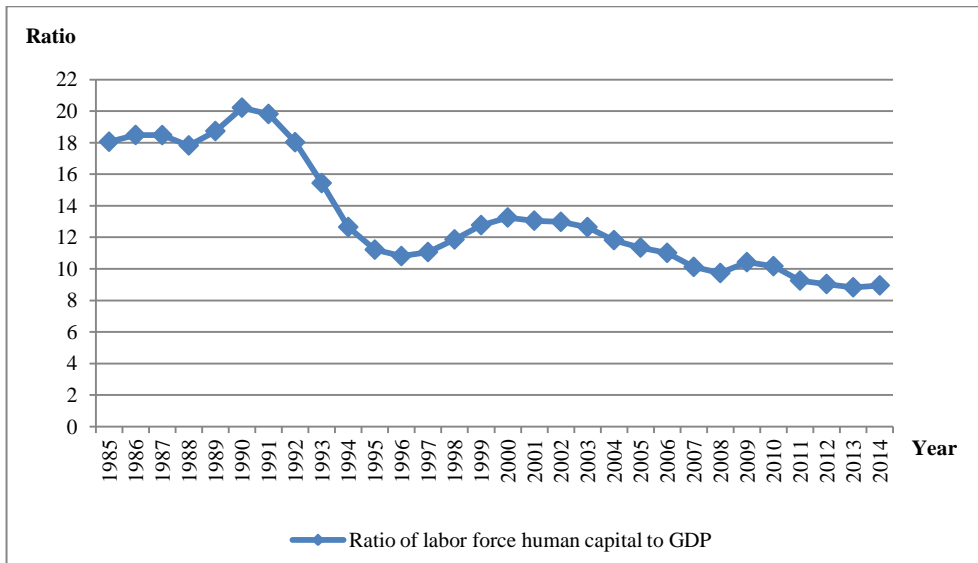
Figure 6.3.1 National Ratio of Labor Force Human Capital to GDP,1985-2014

Tables 6.3.2 and 6.3.3 show the labor force human capital by gender and region based on the 5-education categories, respectively. The first 3 columns are the nominal values and the last 3 columns are the real values.

Table 6.3.2 National Nominal and Real Labor Force Human Capital by Gender[3]

Year	Nominal labor force human capital (Billions of Yuan)			Real labor force human capital (Billions of 1985 Yuan)		
	National	**Male**	**Female**	**National**	**Male**	**Female**
1985	16319	9901	6419	16319	9901	6419
1986	19051	11664	7385	17891	10955	6939
1987	22356	13821	8532	19573	12095	7478
1988	26910	16764	10148	19813	12332	7485
1989	32010	20056	11952	19959	12503	7459
1991	43380	27470	15916	25330	16033	9300
1992	48790	30960	17825	26750	16967	9787
1993	54820	34930	19888	26180	16672	9509

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[3] Some discrepancy may exist when summing up male and female, urban and rural to get the national amount. This is mainly caused by rounding errors.

Year	Nominal labor force human capital (Billions of Yuan)			Real labor force human capital (Billions of 1985 Yuan)		
	National	Male	Female	National	Male	Female
1994	61270	39210	22070	23560	15066	8495
1995	68540	44000	24540	22480	14422	8055
1996	77330	50110	27230	23350	15124	8230
1997	87850	57350	30510	25740	16796	8944
1998	100670	66240	34430	29640	19497	10144
1999	115150	76340	38810	34270	22713	11555
2000	132200	88490	43720	39040	26130	12915
2001	143910	96100	47820	42130	28130	14002
2002	156980	104840	52190	46280	30900	15385
2003	172640	114900	57740	50250	33440	16803
2004	189890	126370	63540	53150	35370	17783
2005	210840	140150	70720	57880	38470	19415
2006	239620	160650	78990	64800	43430	21368
2007	271190	181590	89570	69970	46860	23112
2008	308210	206980	101290	75050	50390	24669
2009	360100	243440	116640	88170	59610	28574
2010	415700	281370	134310	98430	66620	31809
2011	447900	301630	146270	100590	67740	32853
2012	482500	325190	157450	105580	71140	34450
2013	518900	350160	168760	112740	76060	36680
2014	569100	384600	184630	120760	81580	39180

Table 6.3.3 shows the nominal and real labor force human capital for urban and rural regions respectively. The national nominal and real labor force human capital both were increasing during 1985-2014. Although the national real labor force human capital for urban and rural areas both exhibit positive trends, the urban real labor force human capital surpassed its rural counterpart for the first time in 1997. The regional gap increased from 0.68 trillion Yuan in

1997 to 53.46 trillion Yuan in 2014. In 2014, the national real labor force human capital was 2.59 times that that of the rural stock.

Table 6.3.3 National Nominal and Real Labor Force Human Capital by Region

Year	Nominal labor force human capital			Real labor force human capital (Billions of 1985 Yuan)		
	National	Urban	Rural	National	Urban	Rural
1985	16319	6331	9988	16319	6331	9988
1986	19051	7641	11410	17891	7141	10750
1987	22356	9316	13040	19573	8003	11570
1988	26910	11680	15230	19813	8313	11500
1989	32010	14440	17570	19959	8839	11120
1990	37950	17880	20070	22960	10800	12160
1991	43380	20600	22780	25330	11840	13490
1992	48790	23180	25610	26750	12270	14480
1993	54820	26230	28590	26180	11960	14220
1994	61270	29690	31580	23560	10830	12730
1995	68540	33690	34850	22480	10520	11960
1996	77330	39900	37430	23350	11450	11900
1997	87850	47470	40380	25740	13210	12530
1998	100670	57080	43590	29640	15980	13660
1999	115150	68710	46440	34270	19500	14770
2000	132200	82800	49400	39040	23310	15730
2001	143910	91600	52310	42130	25600	16530
2002	156980	101100	55880	46280	28560	17720
2003	172640	112600	60040	50250	31510	18740
2004	189890	126500	63390	53150	34270	18880
2005	210840	144000	66840	57880	38400	19480
2006	239620	163600	76020	64800	42970	21830
2007	271190	185700	85490	69970	46680	23290
2008	308210	213500	94710	75050	50820	24230
2009	360100	255500	104600	88170	61330	26840
2010	415700	301500	114200	98430	70140	28290
2011	447900	324400	123500	100590	71670	28920
2012	482500	349200	133300	105580	75120	30460
2013	518900	375300	143600	112740	80820	31920
2014	569100	415000	154100	120760	87110	33650

Figure 6.3.3 shows the trends of real labor force human capital for urban and rural areas, respectively. Before 1997, the real labor force human capital for the rural regions was higher than that for urban areas. After 1997, the real labor force human capital for urban areas increased more rapidly than that for rural areas, resulting in an increasing rural-urban gap. The reasons, as discussed previously include urbanization, migration and the education gap between the urban and rural populations.
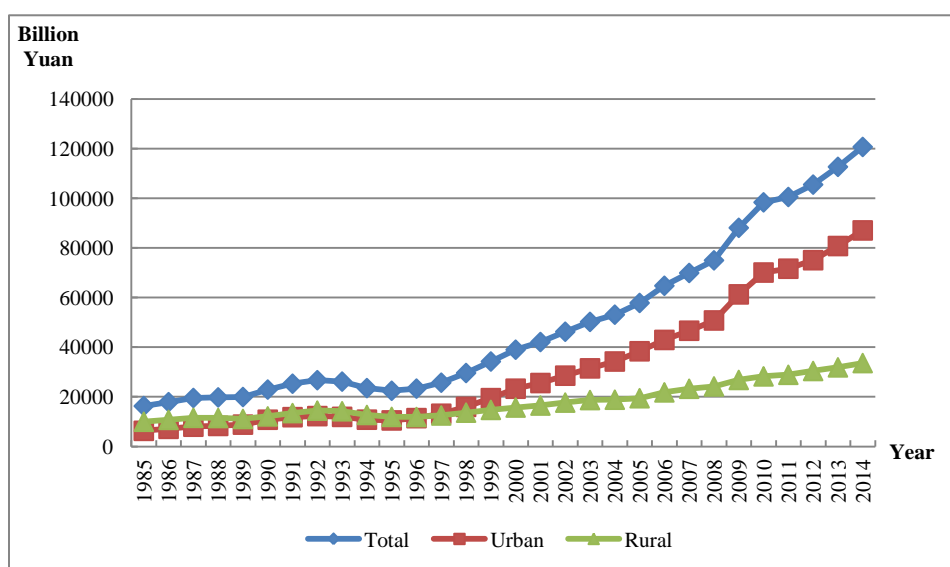
Figure 6.3.3 National Real Labor Force Human Capital by Region, 1985-2014

Figure 6.3.4 shows the national ratio of labor force human capital to total human capital by five education categories. The ratio reflects age structures as human capital for the young and often highly-educated population will be higher than that for the older and less-educated population. As is seen from the graph, before 1991, the ratio grew steadily, but it dropped dramatically after that, rebounding somewhat in 1997. The decreasing trend may indicate that the proportion of young generation in total population is getting smaller, and the aging population phenomenon becomes dominant. This may reflect the constraints on future productivity growth in China.
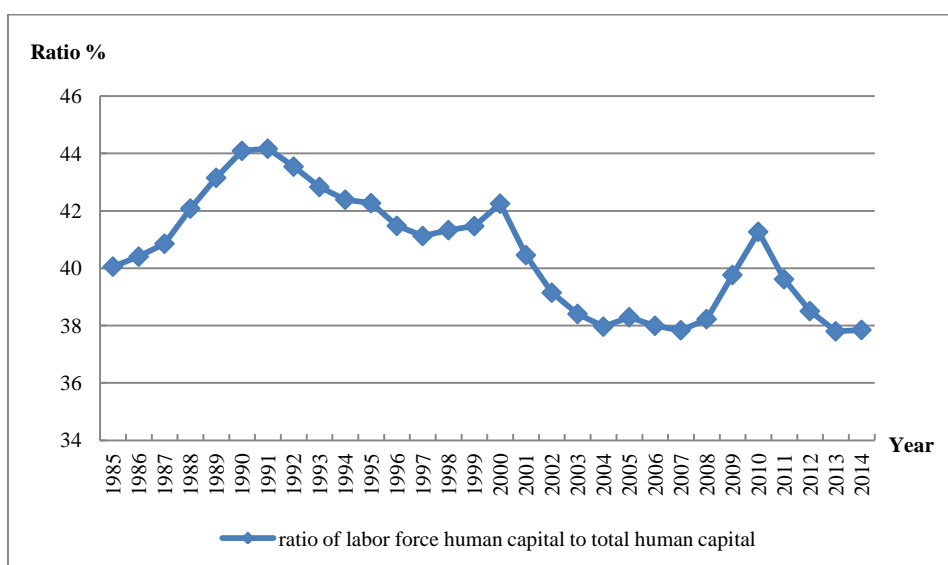
Figure 6.3.4 National Ratio of Labor Force Human Capital to Total Human Capital, 1985-2014

6.3.2 Average labor force human capital

To analyze the dynamic trends of the national labor force human capital more precisely, we calculate the average labor force human capital, in which the average labor force human capital is national labor force human capital divided by the number of the population that are over 15 years old, non-retired and out of school.

Table 6.3.4 shows that the average labor force human capital in nominal and real terms. The first two columns show the nominal terms based on 5-education and 6-education categories, while the last two columns show the real values. The real values in this table are calculated by deflating the nominal values with the CPI using 1985 as the base year. The results based on the two education categories are both increasing year by year.

Table 6.3.4 National Nominal and Real Average Labor Force Human Capital

Year	Nominal average labor force human capital （Thousands of Yuan）		Nominal average labor force human capital （Thousands of 1985 Yuan）	
	By 5-education Categories	By 6-education Categories	By 5-education Categories	By 6-education Categories
1985	29.64	29.63	29.64	29.63
1986	33.89	33.87	31.82	31.81
1987	38.89	38.88	34.05	34.04
1988	44.80	44.78	32.98	32.97
1989	51.29	51.28	31.98	31.97
1990	58.88	58.83	35.62	35.59
1991	65.59	65.56	38.30	38.28
1992	72.51	72.49	39.75	39.73
1993	80.33	80.30	38.36	38.34
1994	88.91	88.88	34.19	34.18
1995	98.46	98.46	32.29	32.28
1996	110.16	110.16	33.26	33.26
1997	123.91	123.99	36.30	36.33
1998	139.43	139.71	41.05	41.14
1999	156.67	157.26	46.63	46.81
2000	176.97	175.82	52.26	51.94
2001	193.43	192.77	56.63	56.45
2002	210.43	210.32	62.04	62.01
2003	230.19	230.21	67.00	67.00
2004	252.85	254.75	70.77	71.26
2005	280.75	282.92	77.07	77.66
2006	316.12	318.83	85.49	86.21
2007	354.50	357.99	91.46	92.34
2008	398.72	403.13	97.09	98.14
2009	458.14	463.74	112.18	113.55
2010	519.63	526.75	123.04	124.70

2011	564.11	572.29	126.69	128.49		
2012	611.53	621.04	133.81	135.87		
2013	659.34	669.89	143.25	145.54		
2014	720.38	732.15	152.86	155.33		

Tables 6.3.5 and 6.3.6 report the average labor force human capital by gender and by region separately. The first three columns show the nominal average labor force human capital, while the last three columns of Table 6.3.5 show the real terms. From 1985-2014, the nominal and real average labor force human capital exhibit increasing trends.

Table 6.3.5 National Nominal and Real Average Labor Force Human Capital by Gender

Year	Nominal average labor force human capital (Thousands of Yuan)			Real average labor force human capital (Thousands of 1985 Yuan)		
	National	**Male**	**Female**	**National**	**Male**	**Female**
1985	29.64	34.09	24.67	29.64	34.09	24.67
1986	33.89	39.42	27.73	31.82	37.02	26.06
1987	38.89	45.76	31.28	34.05	40.05	27.41
1988	44.80	52.88	35.77	32.98	38.90	26.38
1989	51.29	60.63	40.75	31.98	37.80	25.43
1990	58.88	69.95	46.30	35.62	42.32	28.01
1991	65.59	78.49	51.11	38.30	45.81	29.87
1992	72.51	87.21	56.07	39.75	47.79	30.79
1993	80.33	97.57	61.31	38.36	46.57	29.31
1994	88.91	108.92	67.06	34.19	41.85	25.81
1995	98.46	121.21	73.67	32.29	39.73	24.18
1996	110.16	136.54	81.28	33.26	41.21	24.57
1997	123.91	154.58	90.27	36.30	45.27	26.46
1998	139.43	174.78	100.38	41.05	51.44	29.57
1999	156.67	197.26	111.52	46.63	58.69	33.20
2000	176.97	224.03	124.20	52.26	66.15	36.69
2001	193.43	245.78	135.47	56.63	71.94	39.67

Year	Nominal average labor force human capital (Thousands of Yuan)			Real average labor force human capital (Thousands of 1985 Yuan)		
	National	Male	Female	National	Male	Female
2002	210.43	268.82	146.60	62.04	79.23	43.22
2003	230.19	293.86	160.84	67.00	85.52	46.81
2004	252.85	324.03	176.01	70.77	90.69	49.26
2005	280.75	360.28	195.36	77.07	98.89	53.63
2006	316.12	405.68	218.20	85.49	109.67	59.03
2007	354.50	452.84	246.07	91.46	116.86	63.49
2008	398.72	507.30	277.51	97.09	123.50	67.59
2009	458.14	582.39	316.96	112.18	142.61	77.65
2010	519.63	658.95	360.08	123.04	156.02	85.28
2011	564.11	711.39	395.32	126.69	159.76	88.79
2012	611.53	770.59	429.02	133.81	168.58	93.87
2013	659.34	831.73	461.09	143.25	180.67	100.22
2014	720.38	911.37	501.71	152.86	193.32	106.47

Table 6.3.6 reports the real average labor force human capital by region. The growth for urban region is much higher than that for rural and the urban-rural gap widens significantly. The average labor force human capital for urban areas was always higher than that for rural areas during 1985-2014.

Table 6.3.6 National Nominal and Real Average Labor Force Human Capital by Region

Year	Nominal average labor force human capital (Thousands of Yuan)			Real average labor force human capital (Thousands of 1985 Yuan)		
	National	Urban	Rural	National	Urban	Rural
1985	29.64	47.03	24.02	29.64	47.03	24.02
1986	33.89	54.52	27.04	31.82	50.95	25.48
1987	38.89	63.46	30.51	34.05	54.51	27.08
1988	44.80	73.60	34.46	32.98	52.38	26.03
1989	51.29	84.93	38.68	31.98	51.97	24.49

Year	Nominal average labor force human capital (Thousands of Yuan)			Real average labor force human capital (Thousands of 1985 Yuan)		
	National	Urban	Rural	National	Urban	Rural
1990	58.88	98.48	43.38	35.62	59.49	26.28
1991	65.59	109.94	48.12	38.30	63.19	28.50
1992	72.51	121.52	53.05	39.75	64.32	30.01
1993	80.33	135.14	58.61	38.36	61.60	29.16
1994	88.91	149.93	64.34	34.19	54.68	25.94
1995	98.46	165.97	70.72	32.29	51.82	24.27
1996	110.16	185.13	77.09	33.26	53.13	24.51
1997	123.91	207.01	84.11	36.30	57.62	26.09
1998	139.43	232.56	91.63	41.05	65.12	28.71
1999	156.67	259.22	98.95	46.63	73.54	31.48
2000	176.97	289.46	107.13	52.26	81.47	34.12
2001	193.43	310.38	116.47	56.63	86.75	36.80
2002	210.43	331.78	126.50	62.04	93.67	40.12
2003	230.19	358.17	137.74	67.00	100.22	43.00
2004	252.85	388.16	149.34	70.77	105.14	44.49
2005	280.75	422.83	162.54	77.07	112.73	47.38
2006	316.12	469.93	185.59	85.49	123.43	53.30
2007	354.50	520.87	209.42	91.46	130.92	57.06
2008	398.72	579.65	233.94	97.09	137.97	59.85
2009	458.14	662.65	261.34	112.18	159.09	67.07
2010	519.63	745.05	289.32	123.04	173.32	71.67
2011	564.11	800.32	318.32	126.69	176.81	74.54
2012	611.53	855.61	350.20	133.81	184.05	80.01
2013	659.34	908.73	383.63	143.25	195.69	85.27
2014	720.38	983.81	418.19	152.86	206.49	91.31

6.4 International comparison

The Jorgenson-Fraumeni lifetime earnings approach has been used to estimate human capital for many countries, for example for Canada (Gu and

Ambrose, 2008), New Zealand (Le, Gibson and Oxley, 2005), Norway (Greaker and Liu, 2008), Sweden (Alroth, 1997) and the United States (Jorgenson and Fraumeni, 1989, 1992a, 1992b and Christian, 2009). A summary of human capital estimates for 18 countries in 2006 is reported in table 6.4.1.[4] The working age population is defined as males aged 16-59 and females age 16-54 in China, population aged 15-59 in India and population aged 15-64 in other countries. Figure 6.4.1 shows the ratio of human capital to GDP for the 16 countries in 2006.

China's human capital is quite large, second only to that of the United States. In 2006, the human capital in China was around 69.6 times of that in New Zealand, 47.6 times of that in Norway, 13.2 times of that in Australia, 7 times of that in Canada, and 1.9 times of that in Japan. However, China's human capital per capita is still very small. In 2006, human capital per working age population in China is less than 20% of that for Canada, Japan, Norway, South Korea, the United Kingdom, and the United States.

Table 6.4.1 International Comparison of Human Capital Estimates

Currency unit: US Dollars

Countries	Human capital per working age population (10 thousands)	Human capital (Billions)	Human capital to GDP ratio
India	9.42	55.61	3.2
Rumania	12.65	1.9	7.91
Netherlands	45.7	5.04	8.3
Italy	37.45	14.59	8.38
Israel	38.2	1.61	9.24
Norway	53.71	1.65	9.29
Canada	49.78	11.29	9.39
France	45.94	18.38	9.41
US	64.1	128.24	9.62
Denmark	45.75	1.63	9.87

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[4] The estimates for Australia are for 2001 and for Denmark 2002.

Japan	48.97	41	10.08
New Zealand	40.69	1.13	10.39
UK	55.78	21.48	10.4
Australia	45.74	5.94	10.43
Spain	45.62	13.83	10.59
Poland	22.25	5.99	10.68
South Korea	48.99	17.01	14.28
China	9.72	78.6	14.5

Note: The PPPs for private consumption, which are applied to human capital in national currencies, are from the World Bank, International Comparison Program database, accessed December 2013. The website link is http://data.worldbank.org/indicator/PA.NUS.PRVT.PP.   The PPPs for GDP applied to GDP in national currencies are from the World Bank, International Comparison Program database, accessed January 2014. The website link is http://data.worldbank.org/indicator/PA.NUS.PPP.
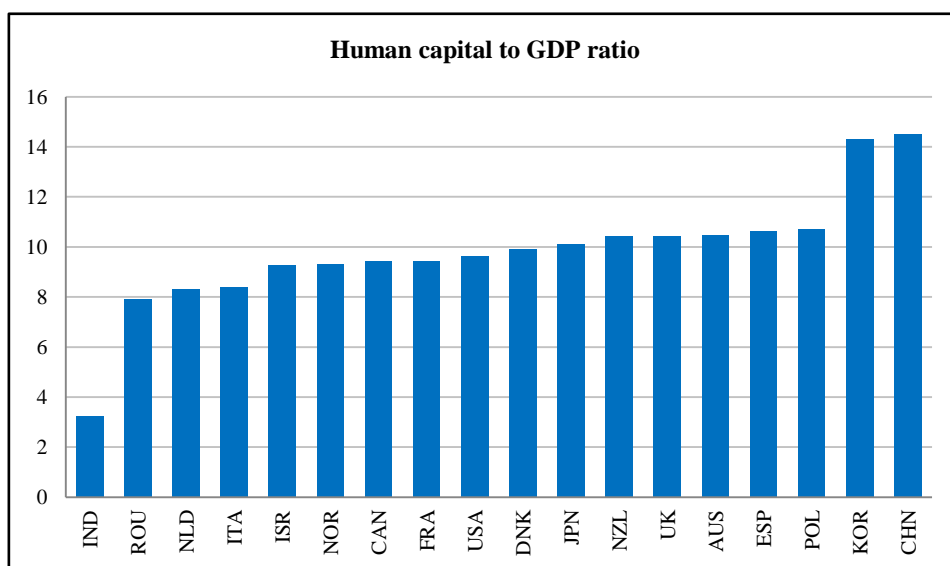
Figure 6.4.1 International Comparison of Human capital to GDP Ratio in 2006

6.5 Human capital, GDP, and physical capital

Human capital estimates are based on the Mincer equation parameter estimates and the population imputation data, with 4.58% as the discount rate using J-F method, as described in preceding chapters. Before 2000, five-education categories were reported by the National Bureau of Statistics of China. They are: no school, elementary school, junior middle school, senior middle school, and college and above. Starting from 2000, college and above was further divided into two categories: three-year college, and four-year university and above.[5]With this more detailed information on educational attainment, we create a separate human capital series starting from 2000.

As shown in Figure 6.5.1 and Figure 6.5.2, China's human capital stock is much larger than its physical capital stock, about 7 to 26 times the amount of physical capital. This is not surprising, given that in most other countries human capital accounts for over 60% of national wealth.[6]The ratio of the human capital to the physical capital as measured by Holz, the ratio keeps decreasing, but the rate of decrease slows down after 1996. Whether the more rapid growth of the physical capital stock than of the human capital indicates "overinvestment" in physical capital is beyond the scope of our study.[7]

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[5] When we estimate the Mincer equation to generate annual earnings, we assign 15 years of schooling for the category three-year college; and assign 16 years of schooling for the category four-year university and above. Because we use the lower bound of schooling for this education category, the amount of human capital is underestimated.

[6] World Bank (1997). The World Bank wealth estimates include physical capital, natural resources, and other forms of intangible capital besides human capital.

[7] Hechman（2005）and Liu（2007）also find that China invested too much on physical capital relative to human capital during the economy reform period.
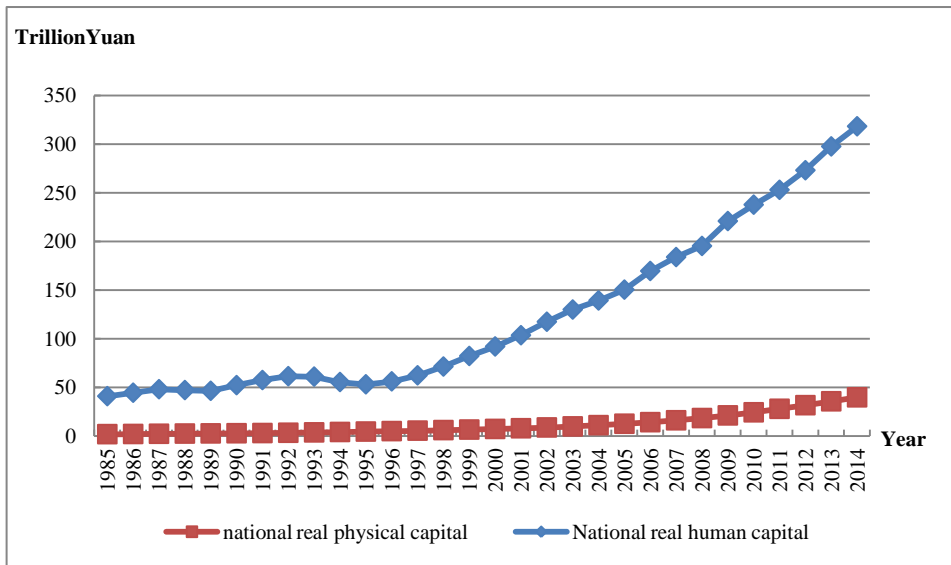
Figure 6.5.1 Human Capital and Physical Capital , 1985-2014
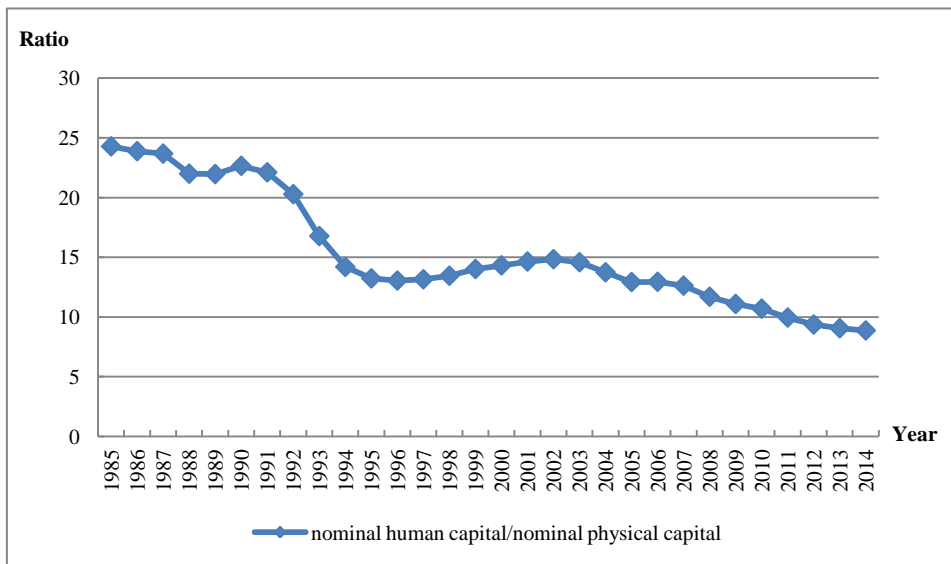
Figure 6.5.2 Human Capital and Physical Capital Ratio, 1985-2014

Chapter 7   Cross-province Comparison

By comparing the stocks of human capital across provinces and over time, we gain some understanding of the cross-section paths of economic progress and hope to gain further understanding of their causes. Our comparison is based on calculation of total provincial human capital and provincial labor force capital constructed using J-F method (see Appendix results C). We also construct two additional indicators: the provincial real human capital per capita and provincial real labor force human capital per capita. The definitions of these real stocks are as follows:

Real human capital per capita=real human capital/ population

Real labor force human capital per capita= real labor force human capital / labor force population

Where the real human capital stocks are the nominal stocks deflated by a cost of living index.

7.1 Cross-province human capital comparison

Graphical representation of current year (2014) provincial human capital stocks is shown in figure 7.1.1. Current year human capital is the nominal human capital adjusted by living cost and expressed in current-year prices for each province. The provinces are shown in descending order of their 2014 human capital indicators that are based on underlying schooling divided into five education categories. Shandong is the highest ranking province in terms of total real human capital, followed by Guangdong, and Tibet ranks the lowest. Notable features of the differences across provinces are: (1) Population plays a dominant role in influencing total human capital, in spite

of other provincial differences in educational attainment, age structure, and income level. Provinces with larger populations such as Shandong, Guangdong, Jiangsu, and Henan rank relatively higher. (2) Provinces at the top rank of human capital per capita (figure 7.1.3), such as Zhejiang, Beijing and Shanghai, also rank high in terms of total stock but their total human wealth is magnified by differences in their education levels and age structure.

Billion (RMB)
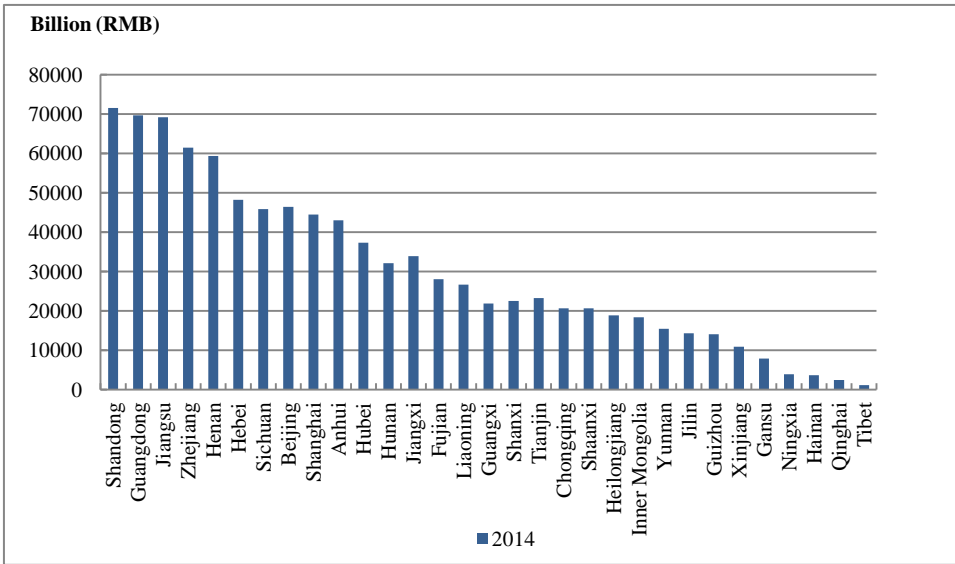
Figure 7.1.1 Provincial Current Year Human Capital in 2014

Figure 7.1.2 presents the provincial comparison of real human capital in 1985 prices. Real human capital is created by deflating nominal human capital by a living cost index based on Brandt and Holz (2006).[1,2]We use their living cost index and update it over time using provincial CPI's to construct a deflator that is comparable across provinces and over time. The ranking of real human capital is similar to the nominal ranking: Guangdong has the

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[1] Brandt Loren, Holz Carsten, 2006. Spatial price differences in China: estimates and implications. Economic Development and Cultural Change 55, 43–86.

[2] Specifically, the living cost index we use here is based on a package of commodities of 1985 in Beijing, other provinces and years are adjusted correspondingly.

largest real human capital, followed by Shandong, and Tibet ranks the lowest.
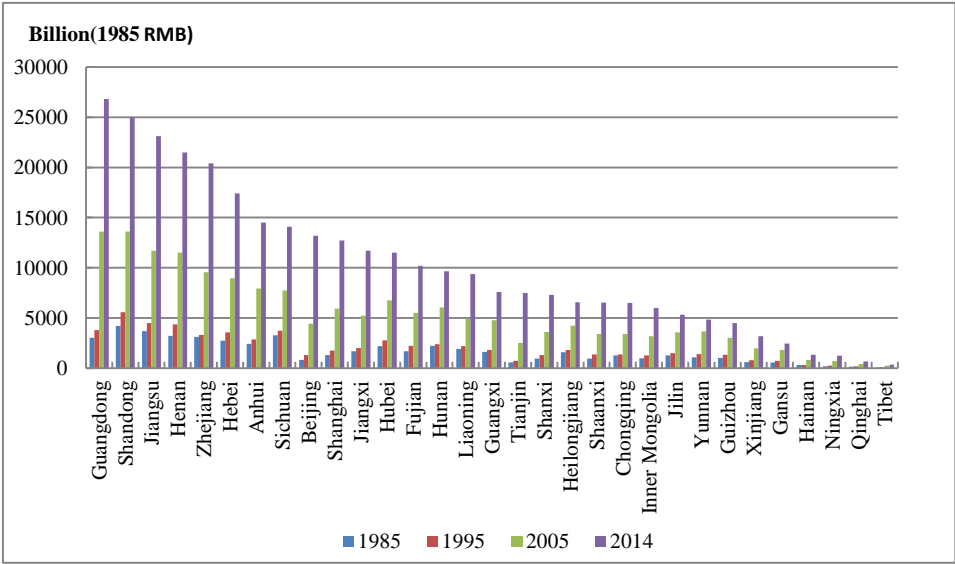
Figure 7.1.2 Provincial Real Human Capital

Figure 7.1.3 shows the provincial comparison of real human capital per capita. The provincial ranking of real human capital per capita is obviously different from that of total provincial real human capital, with Beijing, Tianjin and Shanghai ranking as the top three and Gansu at the bottom. The per-capita human capital ranking presents a good picture of the inequality of the development stage of the provinces. Not only is the ranking influenced by
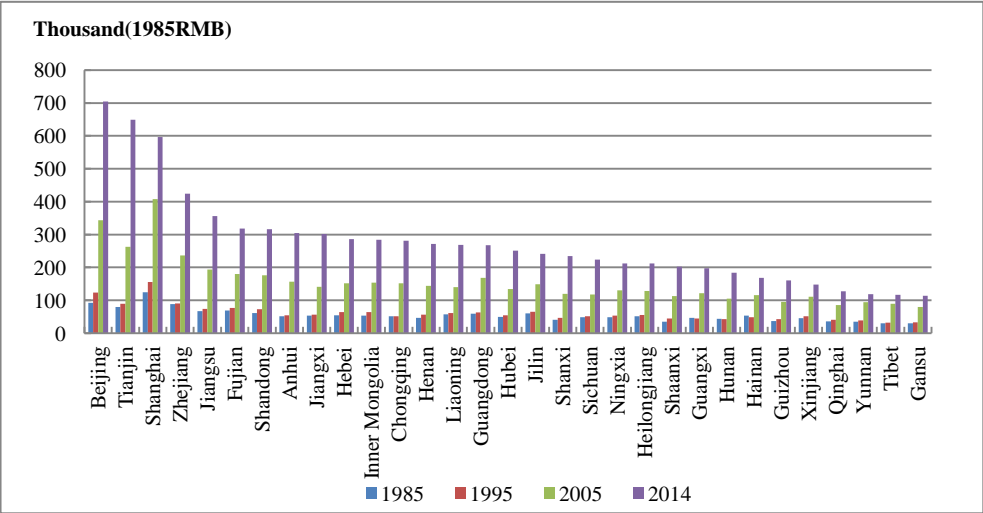
Figure 7.1.3 Provincial Real Human Capital Per Capita

education level and population structure, but perhaps more important at this stage of China's economic development, regional inequality in potential earnings has led to a clustering of educated workers in the provinces where their earnings potential is highest.

7.2 Cross-province labor force human capital comparison

Provincial real labor force human capital is displayed in figure 7.2.1. Overall, Guangdong has the largest real labor force human capital, followed by Jiangsu and Shandong; Tibet has the least. The provincial rankings by real labor force human capital ranking can differ from their ranking based on total human capital because of the different sizes of the provincial labor forces relative to their populations.
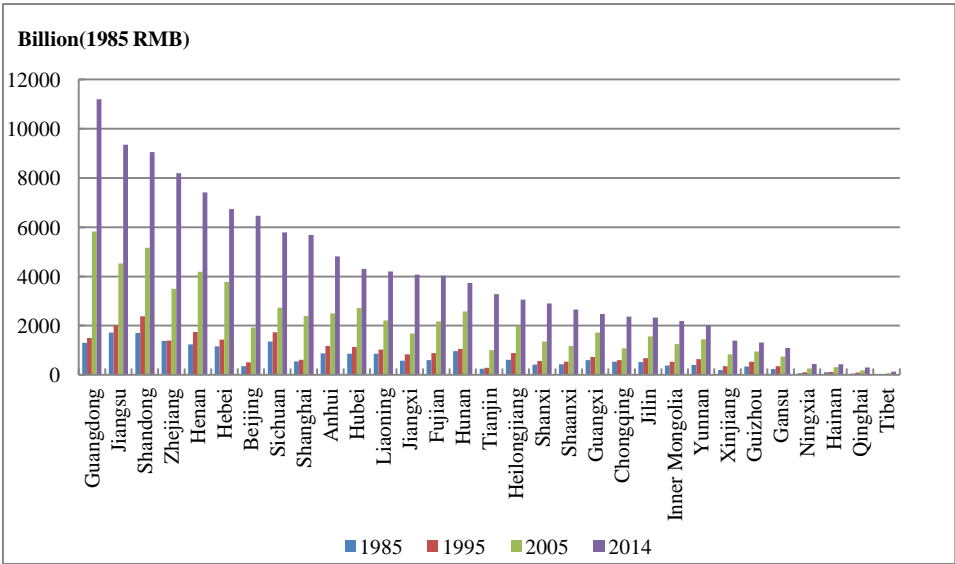
Figure 7.2.1 Provincial Real Labor Force Human Capital

Figure 7.2.2 shows the provincial comparison for real labor force human capital per member of the labor force. Average labor force human capital

rankings are almost the same as those for real human capital per capita: Beijing remains at the top, Tianjin and Shanghai follow, and Tibet stays in the last place.
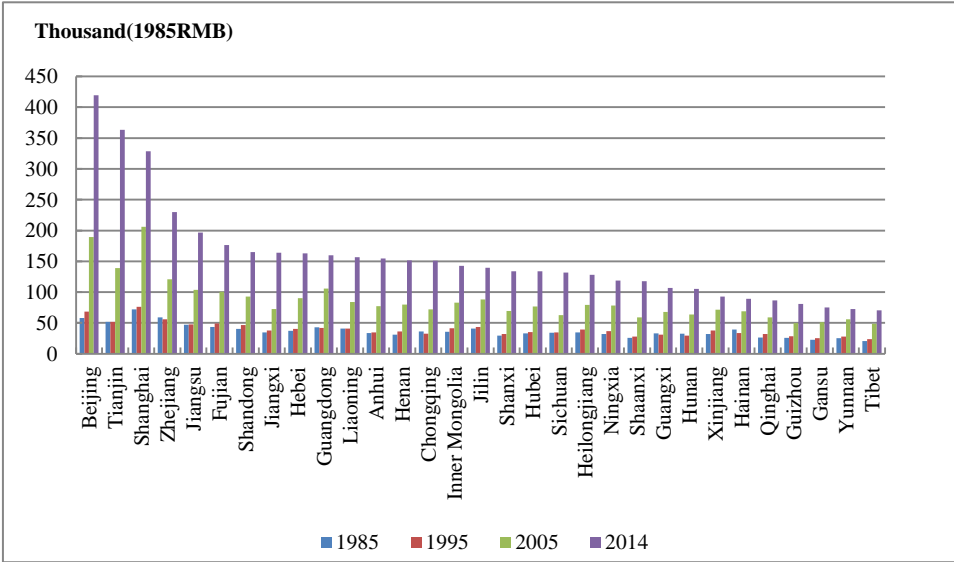
Figure 7.2.2 Provincial Real Average Labor Force Human Capital

7.3 Comparison of the human-capital measures across provinces.

Figure 7.3.1 presents the ratios of nominal labor force human capital to total nominal human capital by province. The ratios reflect age structures, as human capital of the young and more-educated population will be higher than that of the old and less-educated population. In general, for provinces with low ratios and relatively small young populations, future development of the province might require inflows of working-age population from other provinces. The labor forces of more developed provinces tend to be more educated, tending raise their ratios of labor-force to total human capital In

2014 Shanghai ranks highest, followed by Heilongjiang and Jiangsu.
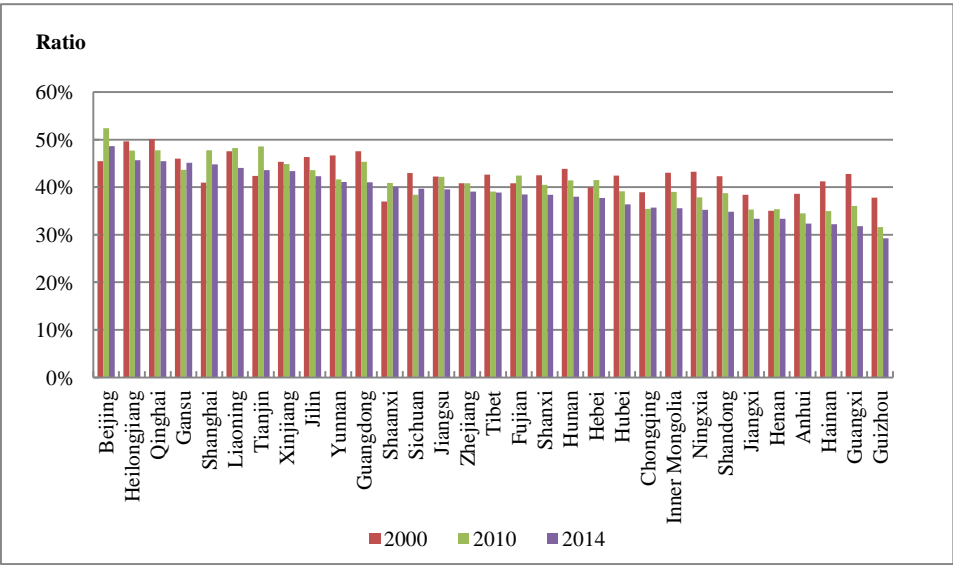
Figure 7.3.1 Ratio of Nominal Labor Force Human Capital to Total Nominal Human Capital

Figure 7.3.2 shows ratios of provincial nominal GDP to nominal labor force human capital. Inner Mongolia ranks at the top in 2014, followed by Liaoning Qinghai and Shandong; Beijing and Shanghai rank the last. These ratios reflect their persistent dispersion, and the continuing geographical disequilibrium in the allocation of labor and human capital in the Chinese economy.
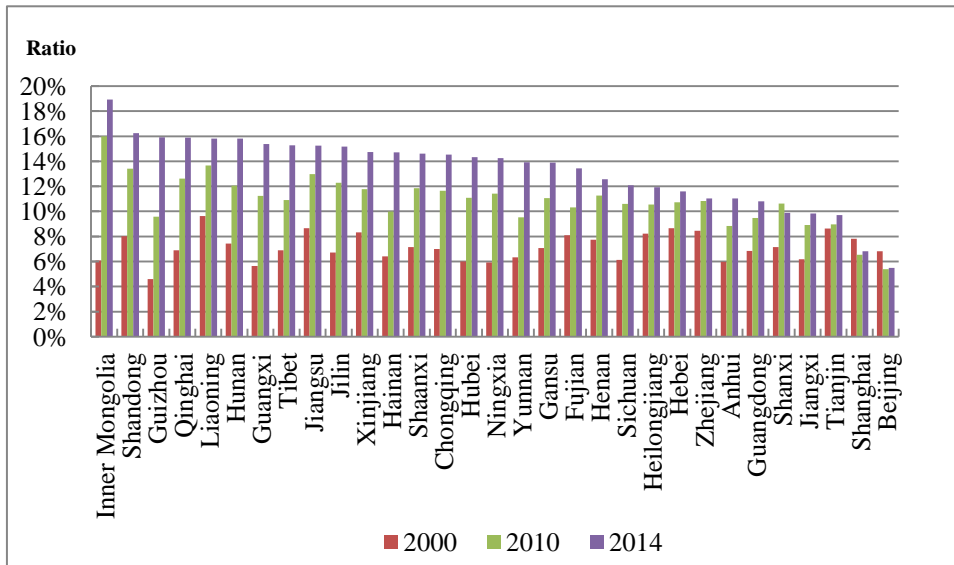
Figure 7.3.2 Ratio of Nominal GDP to Nominal Labor Force Human Capital

Chapter 8   Human Capital for Beijing

8.1 Total human capital

Table BJ-1.1 presents the results of nominal and real total human capital and real physical capital for Beijing. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Beijing.

Table BJ-1.1 Real Physical Capital, Nominal and Real Human Capital for Beijing

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	749	753	749	753	43
1986	917	918	859	860	51
1987	1117	1120	963	965	62
1988	1344	1348	963	966	75
1989	1615	1621	986	990	85
1990	1906	2011	1105	1166	99
1991	2231	2335	1156	1210	112
1992	2654	2783	1251	1311	131
1993	3172	3281	1256	1300	146
1994	3707	3767	1176	1195	169
1995	4297	4368	1162	1181	204
1996	5132	5226	1243	1267	235
1997	6018	6144	1384	1414	266
1998	7065	7404	1587	1664	302
1999	8170	9080	1825	2028	338

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	9366	11162	2021	2409	379
2001	10879	12502	2277	2616	425
2002	12647	14430	2696	3076	485
2003	14593	16156	3105	3436	561
2004	16780	18793	3533	3958	648
2005	19015	21278	3945	4416	743
2006	23152	26964	4760	5544	845
2007	27914	32448	5606	6517	960
2008	33142	38827	6334	7421	1067
2009	39148	45895	7595	8902	1178
2010	45042	52371	8534	9920	1327
2011	50004	57364	8971	10290	1469
2012	56845	65286	9872	11336	1638
2013	63995	73617	10758	12380	1806
2014	71716	82550	11866	13658	1976

8.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table BJ-2.1 presents human capital per capita for Beijing by region. From 1985 to 2014, the nominal human capital per capita increases from 85,850 Yuan to 3,816,950 Yuan, an increase of more than 43 times; and the real human capital per capita increases from 85,850 Yuan to 631,550 Yuan, an increase of approximately 6 times.

Figure BJ-2.1 illustrates the trends of human capital per capita by

gender for Beijing.[1] The real human capital per capita of male is similar to that of female for Beijing. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
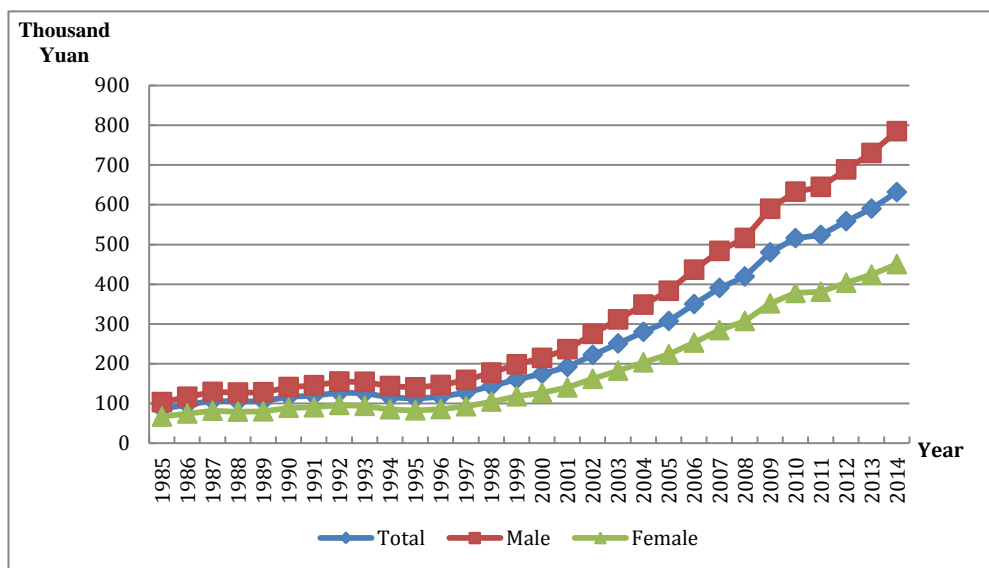
Figure BJ-2.1 Human Capital Per Capita by Gender for Beijing，1985-2014

Table BJ-2.1 Nominal and Real Human Capital Per Capita by Region for Beijing

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	85.85	107.94	41.36	85.85	107.94	41.36
1986	103.28	128.94	47.85	96.72	120.73	44.80
1987	123.60	153.16	55.29	106.56	132.05	47.67
1988	146.18	179.74	63.67	104.70	128.71	45.59
1989	172.74	210.92	72.92	105.52	128.87	44.56

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[1]All the discussion below is based on 5-education category.

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	201.33	244.39	82.53	116.69	141.67	47.84
1991	230.83	279.81	92.89	119.57	144.96	48.12
1992	269.40	326.93	104.11	126.98	154.11	49.08
1993	316.70	384.84	116.93	125.40	152.45	46.32
1994	364.21	442.50	130.44	115.50	140.34	41.37
1995	415.63	504.75	144.64	112.40	136.47	39.11
1996	483.66	587.76	158.98	117.18	142.40	38.52
1997	554.40	673.23	174.82	127.52	154.90	40.22
1998	636.60	772.47	191.10	143.03	173.56	42.94
1999	719.20	871.26	208.03	160.66	194.59	46.46
2000	806.86	975.99	225.69	174.15	210.61	48.70
2001	915.36	1094.20	246.52	191.55	229.02	51.60
2002	1040.93	1231.47	268.87	221.89	262.48	57.31
2003	1177.10	1379.10	292.61	250.47	293.36	62.24
2004	1328.11	1539.95	318.81	279.67	324.33	67.15
2005	1480.47	1701.94	341.93	307.18	353.15	70.95
2006	1701.10	1945.71	377.09	349.73	400.13	77.55
2007	1943.70	2213.73	414.48	390.33	444.58	83.24
2008	2192.97	2488.07	452.95	419.09	475.42	86.55
2009	2473.20	2795.90	494.82	479.82	542.38	95.99
2010	2722.01	3066.67	534.26	515.72	580.96	101.21
2011	2919.95	3278.69	563.12	523.83	588.19	101.02
2012	3214.04	3599.88	592.59	558.14	625.18	102.91
2013	3509.35	3921.56	621.59	589.94	659.29	104.50
2014	3816.95	4255.14	650.76	631.55	704.11	107.68

Figure BJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area

remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
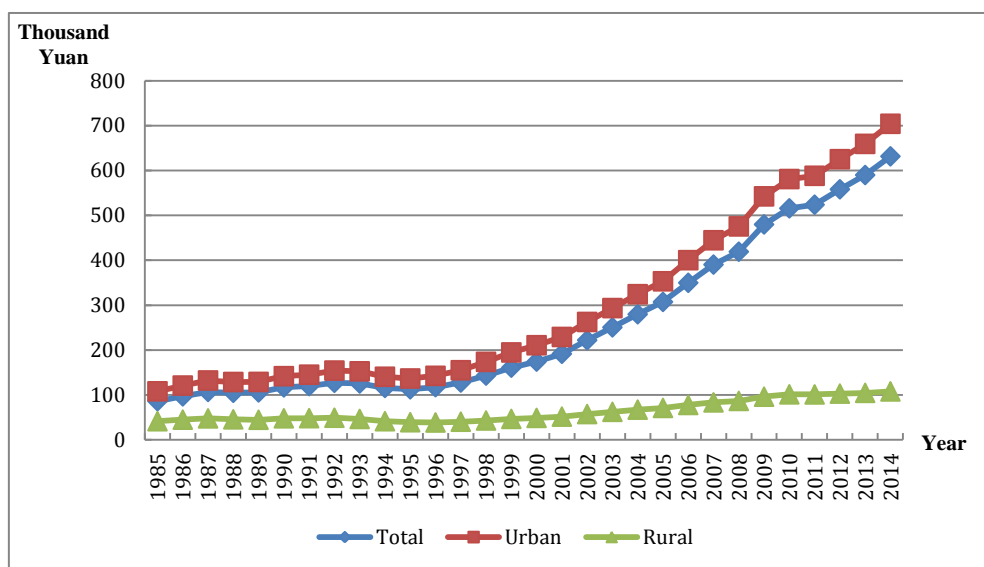
Figure BJ-2.2 Real Human Capital Per Capita by Region for Beijing，1985-2014

8.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

8.3.1 Total labor force human capital

The total labor force human capital for Beijing is reported in Table BJ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 341 billion Yuan to 40,107 billion Yuan, an increase of more than 116 times; and the real labor force human capital increases from 341 billion

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Yuan to 6,638 billion Yuan, an increase of approximately 18 times.

Table BJ-3.1 Nominal and Real Labor Force Human Capital for Beijing

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	341	339	341	339
1986	420	417	393	391
1987	521	518	449	447
1988	633	630	453	451
1989	757	753	462	460
1990	887	883	514	512
1991	1032	1028	535	533
1992	1193	1194	563	563
1993	1388	1392	550	551
1994	1607	1612	510	511
1995	1850	1860	500	503
1996	2177	2186	527	530
1997	2633	2642	606	608
1998	3241	3246	728	729
1999	3875	3880	865	867
2000	4683	4577	1011	988
2001	5312	5272	1112	1103
2002	6084	6130	1296	1307
2003	7126	7228	1515	1538
2004	8107	8402	1708	1770
2005	9372	9743	1945	2022
2006	11834	12356	2434	2542
2007	14931	15644	2999	3142
2008	18633	19587	3560	3743
2009	22670	23916	4398	4639

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2010	26928	28486	5101	5396
2011	29903	31722	5365	5690
2012	33195	35284	5765	6128
2013	36515	38905	6138	6540
2014	40107	42809	6638	7084

8.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables BJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 56,130 Yuan to 2,603,070 Yuan, an increase of more than 45 times; and the Real average labor force human capital from 56,130 Yuan to 430,790 Yuan, an increase of approximately 6 times.

Table BJ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Beijing

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	56.13	66.00	33.09	56.13	66.00	33.09
1986	67.83	79.52	38.72	63.50	74.46	36.25
1987	82.24	96.11	45.11	70.91	82.86	38.89
1988	97.94	113.84	51.98	70.14	81.52	37.22
1989	115.05	132.85	59.49	70.29	81.17	36.35
1990	132.12	151.73	67.68	76.58	87.96	39.23
1991	149.89	172.28	76.23	77.65	89.25	39.49
1992	169.79	195.69	85.16	80.05	92.25	40.14

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1993	194.13	224.69	95.14	76.92	89.01	37.69
1994	220.53	256.04	105.59	69.92	81.20	33.49
1995	248.80	289.80	116.85	67.26	78.36	31.59
1996	285.99	334.24	129.01	69.28	80.98	31.25
1997	333.54	390.75	143.24	76.75	89.90	32.96
1998	390.55	458.00	159.06	87.76	102.91	35.74
1999	446.51	523.58	174.62	99.71	116.94	39.00
2000	518.27	608.79	190.72	111.84	131.37	41.16
2001	576.07	671.53	208.56	120.60	140.56	43.65
2002	643.92	745.75	228.05	137.21	158.95	48.61
2003	731.70	842.28	249.49	155.60	179.17	53.07
2004	816.34	934.01	270.92	171.93	196.71	57.06
2005	920.95	1046.92	293.12	191.09	217.23	60.82
2006	1089.36	1236.87	331.07	224.07	254.36	68.08
2007	1288.00	1458.51	369.53	258.68	292.91	74.21
2008	1505.04	1698.89	409.17	287.53	324.63	78.18
2009	1728.97	1946.50	450.72	335.41	377.60	87.44
2010	1943.57	2181.70	490.54	368.14	413.31	92.93
2011	2095.98	2348.46	515.63	376.03	421.31	92.50
2012	2267.57	2536.55	540.09	393.80	440.52	93.80
2013	2430.28	2713.25	563.28	408.55	456.15	94.70
2014	2603.07	2901.31	584.03	430.79	480.09	96.64

Chapter 9　Human Capital for Tianjin

9.1 Total human capital

Table TJ-1.1 presents the results of nominal and real total human capital and real physical capital for Tianjin. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Tianjin.

Table TJ-1.1 Real Physical Capital, Nominal and Real Human Capital for Tianjin

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	534	534	534	534	47
1986	620	621	581	581	51
1987	717	718	628	629	55
1988	835	837	627	627	60
1989	965	967	631	632	63
1990	1117	1120	709	711	66
1991	1268	1272	731	733	71
1992	1455	1461	753	755	87
1993	1671	1678	735	738	104
1994	1901	1910	674	677	123
1995	2147	2160	660	664	144
1996	2454	2471	692	697	167
1997	2813	2837	770	776	192
1998	3201	3232	881	889	220
1999	3714	3760	1033	1046	247

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	4274	4729	1193	1320	276
2001	4936	5470	1361	1509	310
2002	5675	6368	1572	1764	350
2003	6572	7179	1802	1969	402
2004	7589	8312	2035	2228	467
2005	8687	9667	2294	2554	541
2006	10279	12113	2675	3153	630
2007	12129	14901	3030	3722	741
2008	14107	17631	3344	4178	895
2009	16427	20681	3932	4950	1115
2010	19094	24100	4415	5573	1386
2011	21808	27595	4808	6083	1705
2012	25051	31888	5377	6846	2031
2013	28654	36732	5967	7647	2395
2014	32903	42493	6724	8684	2809

9.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table TJ-2.1 presents human capital per capita for Tianjin by region. From 1985 to 2014, the nominal human capital per capita increases from 75,270 Yuan to 2,856,700 Yuan, an increase of more than 36 times; and the real human capital per capita increases from 75,270 Yuan to 583,770 Yuan, an increase of approximately 6 times.

Figure TJ-2.1 illustrates the trends of human capital per capita by

gender for Tianjin. The real human capital per capita of male is similar to that of female for Tianjin. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
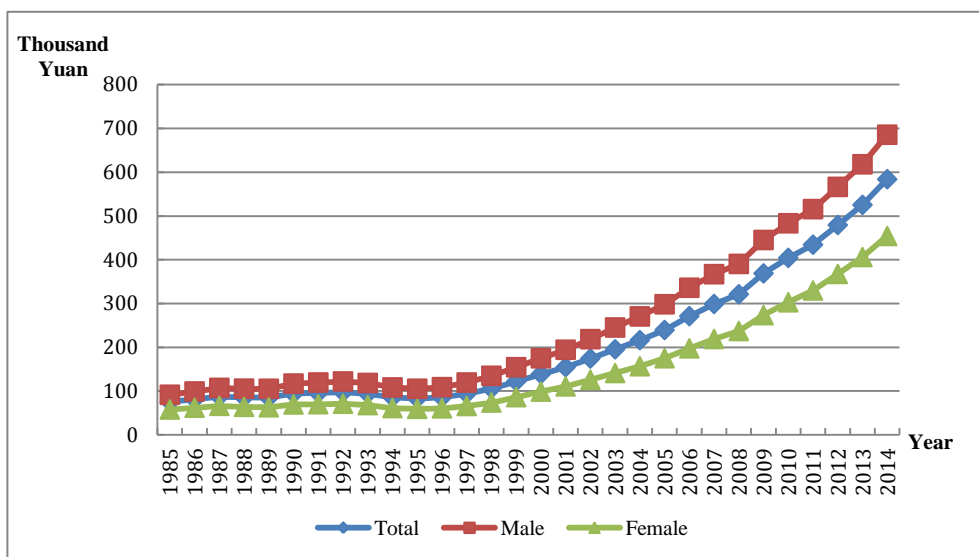
Figure TJ-2.1 Human Capital Per Capita by Gender for Tianjin，1985-2014

Table TJ-2.1 Nominal and Real Human Capital Per Capita by Region for Tianjin

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	75.27	86.32	49.92	75.27	86.32	49.92
1986	86.62	99.55	56.75	81.10	93.22	53.13
1987	99.70	115.02	64.38	87.41	100.84	56.44
1988	113.91	131.33	72.55	85.42	98.50	54.41
1989	129.72	149.75	81.09	84.81	97.92	53.02
1990	148.24	171.34	90.94	94.11	108.76	57.73
1991	165.98	190.99	102.55	95.64	110.02	59.07

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	188.13	216.11	115.54	97.31	111.75	59.75
1993	213.80	245.31	130.02	94.01	107.86	57.17
1994	240.85	275.73	145.93	85.40	97.78	51.75
1995	269.55	307.96	162.88	82.91	94.71	50.09
1996	302.73	346.09	179.25	85.41	97.65	50.58
1997	342.08	391.81	196.75	93.61	107.23	53.85
1998	383.41	439.61	215.28	105.46	120.91	59.21
1999	437.73	503.79	234.83	121.72	140.11	65.31
2000	496.83	573.24	256.54	138.66	160.06	71.63
2001	559.80	646.26	282.44	154.39	178.31	77.93
2002	628.82	725.91	311.25	174.22	201.09	86.22
2003	712.15	823.88	339.69	195.30	225.97	93.17
2004	806.07	933.24	373.89	216.12	250.21	100.24
2005	905.83	1049.64	408.73	239.25	277.26	107.97
2006	1041.02	1205.76	453.55	270.95	313.79	118.04
2007	1195.89	1384.82	502.18	298.74	345.87	125.42
2008	1354.35	1566.61	550.67	321.01	371.23	130.49
2009	1540.05	1778.32	609.66	368.58	425.65	145.92
2010	1747.79	2015.46	671.85	404.10	466.09	155.37
2011	1969.55	2271.47	737.58	434.19	500.76	162.61
2012	2232.34	2574.34	809.10	479.15	552.61	173.68
2013	2521.86	2909.55	885.11	525.13	605.79	184.29
2014	2856.70	3297.49	966.70	583.77	673.76	197.52

Figure TJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
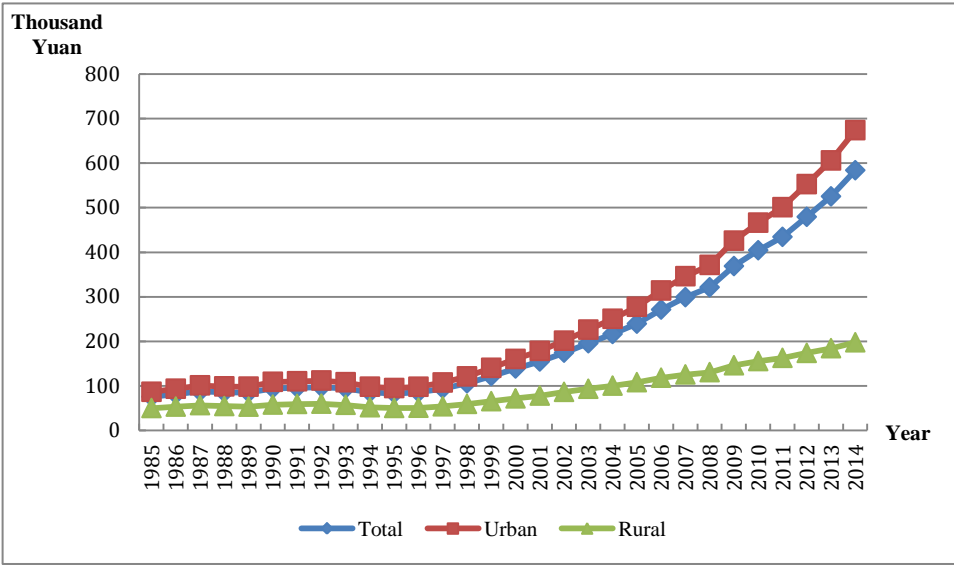
Figure TJ-2.2 Real Human Capital Per Capita by Region for Tianjin，1985-2014

9.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

9.3.1 Total labor force human capital

The total labor force human capital for Tianjin is reported in Table TJ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 247 billion Yuan to 16,170 billion Yuan, an increase of more than 64 times; and the real labor force human capital increases from 247 billion Yuan to 3,305 billion Yuan, an increase of approximately 12 times.

Table TJ-3.1 Nominal and Real Labor Force Human Capital for Tianjin

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	247	247	247	247
1986	289	289	271	270
1987	337	337	296	295
1988	392	391	294	294
1989	449	449	294	293
1990	515	513	327	326
1991	586	585	338	337
1992	661	660	342	341
1993	745	744	327	327
1994	837	835	297	296
1995	937	936	288	288
1996	1066	1065	301	300
1997	1242	1240	340	339
1998	1466	1464	403	402
1999	1702	1700	474	473
2000	1980	1955	553	546
2001	2246	2237	620	617
2002	2573	2574	713	713
2003	2968	2966	814	814
2004	3350	3394	898	910
2005	3853	3908	1018	1032
2006	4723	4801	1229	1249
2007	5815	5926	1453	1480
2008	7135	7289	1691	1728
2009	8625	8841	2065	2116
2010	10267	10561	2374	2442
2011	11480	11854	2532	2612

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2012	12800	13254	2748	2845
2013	14428	14983	3005	3119
2014	16170	16846	3305	3442

9.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables TJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 51,140 Yuan to 1,792,830 Yuan, an increase of more than 34 times; and the Real average labor force human capital from 51,140 Yuan to 366,420 Yuan, an increase of approximately 6 times.

Table TJ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Tianjin

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	51.14	56.80	35.15	51.14	56.80	35.15
1986	59.28	65.99	40.41	55.51	61.78	37.84
1987	68.72	76.79	46.43	60.25	67.32	40.71
1988	77.79	86.87	52.31	58.34	65.15	39.23
1989	87.60	97.91	58.58	57.27	64.02	38.30
1990	98.98	110.62	65.76	62.83	70.23	41.75
1991	110.51	123.03	73.69	63.65	70.87	42.45
1992	122.70	136.11	82.30	63.44	70.38	42.56

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1993	136.82	151.51	92.11	60.15	66.62	40.50
1994	152.05	168.03	102.51	53.92	59.59	36.35
1995	168.34	185.61	114.16	51.77	57.08	35.11
1996	187.98	207.48	125.40	53.04	58.54	35.38
1997	213.30	236.14	138.36	58.36	64.63	37.87
1998	243.60	270.47	152.79	67.01	74.39	42.02
1999	274.17	305.04	167.00	76.26	84.83	46.44
2000	310.12	345.82	182.14	86.59	96.56	50.86
2001	343.02	382.42	201.46	94.64	105.51	55.59
2002	381.44	425.90	223.11	105.66	117.98	61.81
2003	427.10	477.91	247.14	117.16	131.08	67.79
2004	472.80	529.39	272.87	126.78	141.94	73.16
2005	530.54	595.11	300.15	140.14	157.20	79.28
2006	626.20	704.36	342.28	162.94	183.31	89.08
2007	741.64	837.38	383.78	185.26	209.14	95.85
2008	873.23	988.08	428.42	206.98	234.14	101.52
2009	1019.29	1154.49	478.66	244.02	276.33	114.57
2010	1172.40	1327.94	529.81	271.09	307.10	122.52
2011	1298.44	1470.38	583.81	286.32	324.16	128.70
2012	1442.86	1635.03	645.00	309.80	350.98	138.46
2013	1608.04	1823.20	709.45	334.88	379.60	147.71
2014	1792.83	2036.72	771.60	366.42	416.15	157.66

Chapter 10 Human Capital for Hebei

10.1 Total human capital

Table HeB-1.1 presents the results of nominal and real total human capital and real physical capital for Hebei. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Hebei.

Table HeB-1.1 Real Physical Capital, Nominal and Real Human Capital for Hebei

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	2182	2183	2182	2183	76
1986	2531	2533	2398	2400	84
1987	2944	2947	2590	2593	92
1988	3413	3417	2546	2548	101
1989	3937	3943	2446	2449	110
1990	4503	4511	2788	2793	118
1991	5103	5114	3058	3064	130
1992	5769	5782	3274	3282	146
1993	6553	6570	3282	3292	163
1994	7330	7353	3012	3021	183
1995	8164	8193	2906	2916	208
1996	9213	9250	3051	3063	241
1997	10371	10420	3308	3321	278
1998	11649	11700	3763	3779	320
1999	13054	13120	4286	4307	365

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	14587	14700	4787	4822	408
2001	16740	16911	5434	5485	452
2002	18718	18927	6109	6172	496
2003	20846	21094	6637	6712	554
2004	23151	23459	7053	7143	630
2005	25250	25590	7553	7649	733
2006	28930	29360	8482	8600	851
2007	32890	33410	9184	9321	990
2008	36860	37480	9665	9819	1177
2009	41180	41910	10850	11034	1368
2010	45830	46680	11698	11910	1579
2011	51180	52190	12341	12577	1849
2012	56450	57580	13253	13511	2127
2013	61580	62790	14028	14300	2412
2014	67260	68570	15054	15339	2695

10.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table HeB-2.1 presents human capital per capita for Hebei by region. From 1985 to 2014, the nominal human capital per capita increases from 43,350 Yuan to 1,109,470 Yuan, an increase of more than 24 times; and the real human capital per capita increases from 43,350 Yuan to 248,320 Yuan, an increase of approximately 4.7 times.

Figure HeB-2.1 illustrates the trends of human capital per capita by

gender for Hebei. The real human capital per capita of male is similar to that of female for Hebei. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
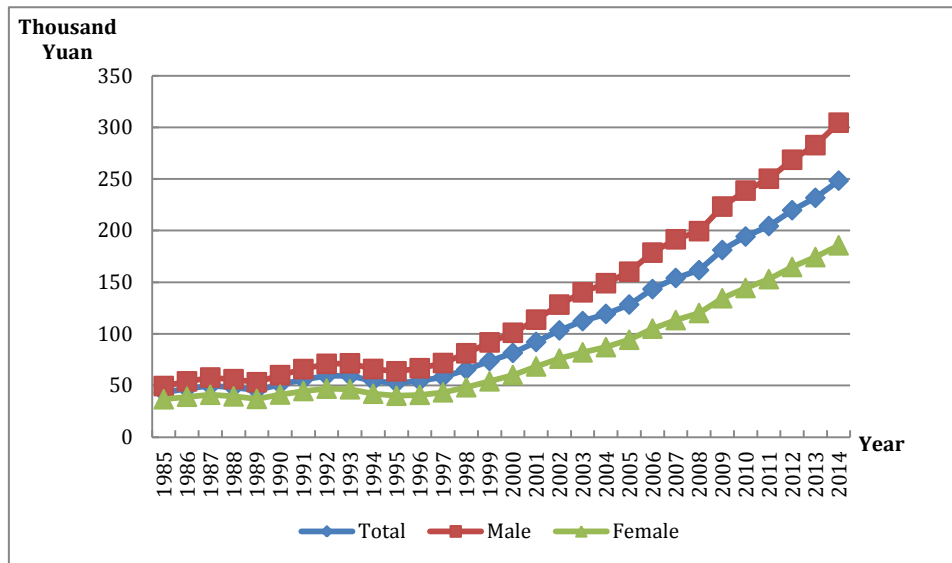
Figure HeB-2.1 Human Capital Per Capita by Gender for Hebei，1985-2014

Table HeB-2.1 Nominal and Real Human Capital Per Capita by Region for Hebei

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	43.35	71.79	37.79	43.35	71.79	37.79
1986	49.51	83.84	42.37	46.90	79.09	40.20
1987	56.51	98.38	47.55	49.72	85.78	42.01
1988	64.58	112.96	53.60	48.17	83.25	40.20
1989	73.18	129.19	60.07	45.46	82.16	36.87
1990	82.50	145.01	67.28	51.08	91.12	41.33
1991	93.11	165.76	74.84	55.79	97.71	45.25

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	104.82	189.91	82.81	59.49	103.17	48.19
1993	118.64	218.54	92.24	59.42	102.80	47.97
1994	132.60	245.80	101.78	54.49	92.57	44.11
1995	147.12	275.43	111.90	52.37	89.34	42.24
1996	164.11	308.97	121.43	54.35	93.14	42.92
1997	182.37	344.27	131.87	58.17	100.08	45.08
1998	202.46	383.67	142.74	65.40	113.01	49.74
1999	224.37	426.34	154.37	73.67	127.23	55.11
2000	248.44	471.40	167.18	81.53	139.98	60.23
2001	283.78	534.47	183.75	92.12	158.07	65.80
2002	316.50	583.94	200.27	103.30	175.15	72.08
2003	352.71	637.43	218.35	112.30	186.90	77.05
2004	391.53	693.26	239.65	119.28	196.02	80.69
2005	429.11	736.42	264.23	128.36	205.35	87.05
2006	488.73	815.80	296.04	143.29	223.68	95.90
2007	551.75	898.37	328.98	154.07	236.08	101.42
2008	616.50	976.08	365.31	161.65	243.82	104.18
2009	687.59	1054.68	409.90	181.16	266.59	116.51
2010	760.80	1137.64	456.28	194.19	279.66	125.17
2011	847.56	1240.81	504.37	204.37	289.67	129.93
2012	935.78	1337.83	555.58	219.70	304.21	139.68
2013	1017.18	1423.10	609.76	231.71	315.10	148.12
2014	1109.47	1515.96	669.06	248.32	330.05	159.65

Figure HeB-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
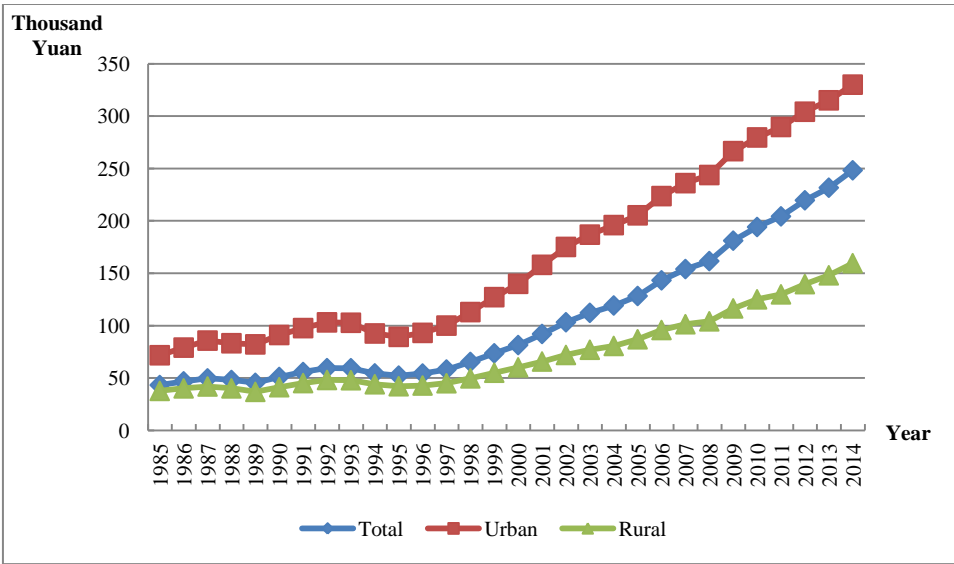
Figure HeB-2.2 Real Human Capital Per Capita by Region for Hebei，1985-2014

10.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

10.3.1 Total labor force human capital

The total labor force human capital for Hebei is reported in Table HeB-3.1 From 1985 to 2014, the nominal labor force human capital increases from 924 billion Yuan to 25,352 billion Yuan, an increase of more than 26 times; and the real labor force human capital increases from 924 billion Yuan to 5,726 billion Yuan, an increase of approximately 5 times.

Table HeB-3.1 Nominal and Real Labor Force Human Capital for Hebei

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	924	924	924	924
1986	1079	1078	1022	1021
1987	1264	1263	1112	1112
1988	1462	1461	1091	1090
1989	1675	1674	1039	1039
1990	1908	1906	1181	1180
1991	2127	2127	1276	1275
1992	2345	2344	1335	1335
1993	2592	2592	1306	1306
1994	2880	2880	1194	1194
1995	3208	3207	1153	1152
1996	3569	3570	1197	1197
1997	4001	4004	1294	1295
1998	4502	4507	1479	1481
1999	5087	5091	1700	1701
2000	5835	5816	1948	1942
2001	6475	6461	2145	2141
2002	7258	7250	2422	2420
2003	8112	8105	2649	2648
2004	9059	9099	2832	2843
2005	10154	10202	3106	3120
2006	11458	11519	3441	3458
2007	12971	13046	3709	3728
2008	14543	14634	3884	3907
2009	16651	16770	4450	4481
2010	19002	19160	4904	4942

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	20534	20713	5000	5042
2012	21863	22073	5188	5235
2013	23339	23568	5370	5421
2014	25352	25612	5726	5782

10.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables HEB-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 29,890 Yuan to 613,120 Yuan, an increase of more than 19 times; and the Real average labor force human capital from 29,890 Yuan to 138,480 Yuan, an increase of approximately 4 times.

Table HeB-3.2 Nominal and Real Average Labor Force Human Capital by Region for Hebei

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	29.89	45.20	26.78	29.89	45.20	26.78
1986	34.17	53.24	29.99	32.36	50.23	28.46
1987	38.96	62.63	33.66	34.28	54.61	29.73
1988	44.06	70.06	37.88	32.87	51.63	28.41
1989	49.23	77.98	42.36	30.56	49.59	25.99
1990	55.30	87.43	47.18	34.23	54.94	28.98

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	61.33	97.41	52.03	36.78	57.42	31.46
1992	67.46	107.68	57.18	38.42	58.50	33.28
1993	74.54	119.57	63.02	37.55	56.24	32.77
1994	82.47	133.07	69.09	34.18	50.12	29.94
1995	90.84	147.91	75.80	32.64	47.98	28.62
1996	99.75	162.70	82.51	33.45	49.05	29.16
1997	109.88	179.54	90.26	35.53	52.20	30.85
1998	121.02	197.67	98.75	39.76	58.22	34.41
1999	133.85	220.96	106.87	44.72	65.94	38.16
2000	149.70	249.21	116.34	49.97	74.00	41.91
2001	164.71	266.68	127.96	54.57	78.87	45.83
2002	181.28	287.49	140.86	60.49	86.23	50.70
2003	199.12	306.34	155.79	65.02	89.82	54.97
2004	218.72	329.20	172.07	68.38	93.08	57.94
2005	242.86	357.07	190.16	74.29	99.57	62.65
2006	273.53	391.33	215.00	82.15	107.29	69.65
2007	307.29	433.71	240.12	87.87	113.97	74.03
2008	343.32	474.07	266.32	91.69	118.42	75.95
2009	390.62	533.71	296.58	104.39	134.90	84.30
2010	440.31	597.12	326.75	113.63	146.79	89.64
2011	482.99	645.83	357.12	117.61	150.77	92.00
2012	522.62	682.09	389.78	124.02	155.10	97.99
2013	561.21	719.21	424.04	129.13	159.24	103.00
2014	613.12	775.40	459.95	138.48	168.82	109.75

Chapter 11   Human Capital for Shanxi

11.1 Total human capital

Table SX-1.1 presents the results of nominal and real total human capital and real physical capital for Shanxi. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Shanxi.

Table SX-1.1 Real Physical Capital, Nominal and Real Human Capital for Shanxi

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	797	798	797	798	43
1986	920	921	871	872	49
1987	1054	1055	929	930	55
1988	1251	1253	911	913	58
1989	1478	1480	901	902	61
1990	1737	1740	1036	1037	64
1991	1996	1999	1137	1139	68
1992	2301	2306	1225	1227	72
1993	2656	2662	1233	1236	77
1994	3037	3046	1125	1128	83
1995	3456	3467	1093	1097	87
1996	3917	3932	1147	1152	93
1997	4402	4423	1250	1256	100
1998	4911	4937	1413	1420	110
1999	5448	5482	1572	1581	121

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	6072	6125	1682	1697	132
2001	7260	7346	2007	2030	145
2002	8386	8496	2353	2382	162
2003	9660	9800	2654	2692	183
2004	10940	11112	2883	2927	212
2005	12272	12463	3158	3207	249
2006	13945	14180	3515	3572	294
2007	15620	15905	3763	3829	348
2008	17254	17580	3875	3948	408
2009	19170	19547	4325	4410	488
2010	21378	21826	4681	4779	582
2011	24419	24978	5082	5198	693
2012	27309	27958	5544	5676	798
2013	30249	30968	5962	6104	913
2014	33621	34421	6514	6670	1023

11.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table SX-2.1 presents human capital per capita for Shanxi by region. From 1985 to 2014, the nominal human capital per capita increases from 33,640 Yuan to 1,079,570 Yuan, an increase of more than 31 times; and the real human capital per capita increases from 33,640 Yuan to 209,160 Yuan, an increase of approximately 5 times.

Figure SX-2.1 illustrates the trends of human capital per capita by gender for Shanxi.The real human capital per capita of male is similar to

that of female for Shanxi. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
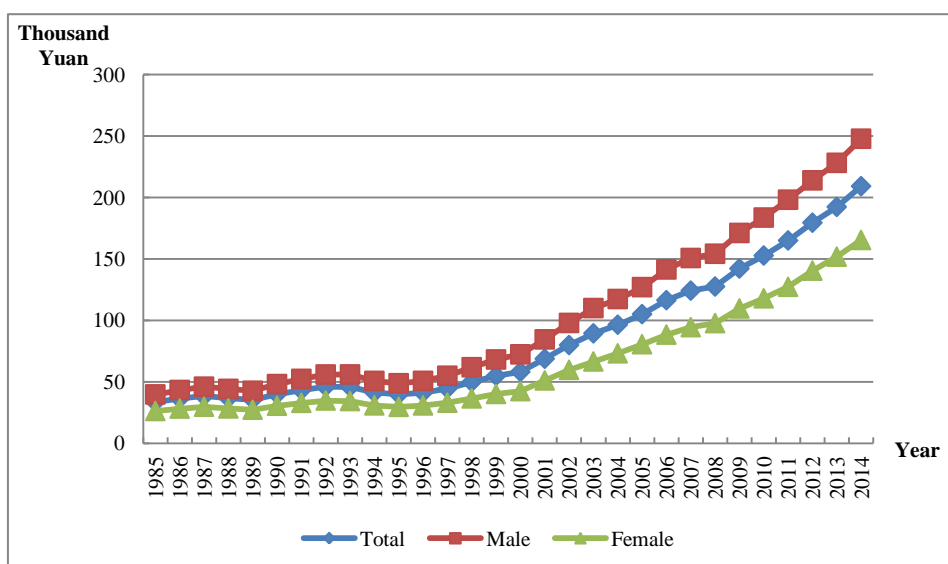
Figure SX-2.1 Human Capital Per Capita by Gender for Shanxi，1985-2014

Table SX-2.1 Nominal and Real Human Capital Per Capita by Region for Shanxi

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	33.64	62.59	24.32	33.64	62.59	24.32
1986	38.47	71.60	27.24	36.44	67.30	25.99
1987	43.73	81.25	30.34	38.52	70.38	27.16
1988	50.67	93.26	34.56	36.91	66.16	25.85
1989	58.45	106.73	39.18	35.61	65.10	23.84
1990	67.12	121.45	44.38	40.02	72.99	26.22
1991	76.09	137.12	49.72	43.35	77.60	28.54
1992	86.67	156.64	55.48	46.12	81.25	30.45
1993	98.91	178.62	62.22	45.90	79.80	30.30

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1994	111.84	201.76	69.27	41.41	71.60	27.12
1995	125.91	226.46	76.92	39.84	68.86	25.69
1996	141.20	254.88	84.29	41.36	71.56	26.24
1997	157.03	282.89	92.35	44.59	77.04	27.91
1998	173.44	311.45	100.72	49.89	85.94	30.90
1999	190.41	340.23	109.54	54.93	93.50	34.12
2000	210.09	374.20	119.40	58.20	98.22	36.11
2001	248.80	444.10	133.69	68.79	117.16	40.27
2002	284.92	501.45	148.63	79.93	135.26	45.09
2003	325.61	564.95	165.40	89.46	149.99	48.95
2004	366.13	622.38	184.38	96.49	159.49	51.77
2005	408.46	683.32	203.43	105.10	172.18	55.08
2006	462.00	760.12	227.07	116.45	188.15	59.99
2007	515.53	832.59	252.88	124.20	197.78	63.20
2008	568.01	898.12	280.03	127.57	199.39	64.98
2009	630.27	979.35	310.95	142.20	219.51	71.51
2010	697.73	1060.15	345.42	152.78	230.48	77.28
2011	792.98	1194.09	381.45	165.03	247.00	80.97
2012	884.06	1313.97	419.53	179.47	265.31	86.77
2013	975.79	1428.30	461.57	192.33	280.22	92.49
2014	1079.57	1557.79	508.20	209.16	300.21	100.42

Figure SX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
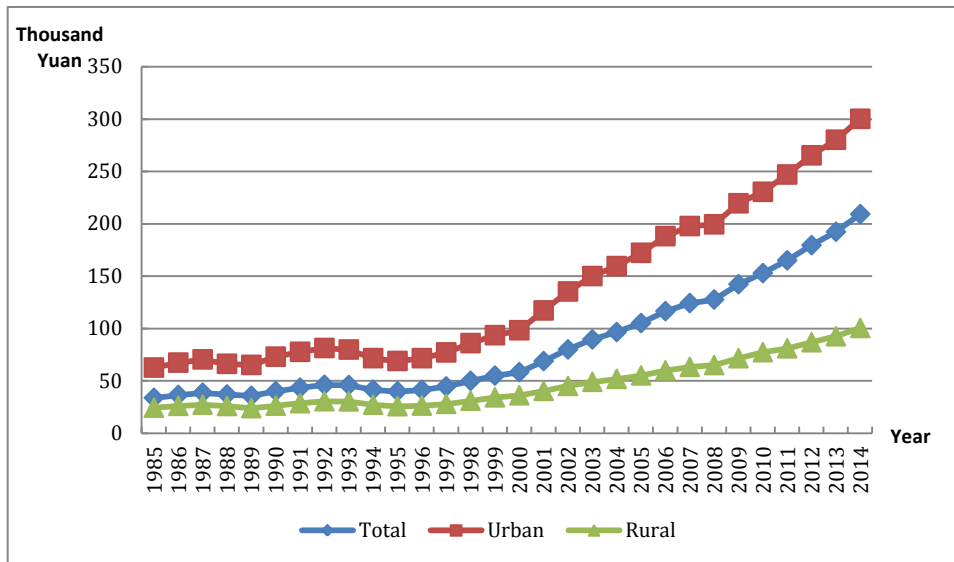
Figure SX-2.2 Real Human Capital Per Capita by Region for Shanxi，1985-2014

11.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

11.3.1 Total labor force human capital

The total labor force human capital for Shanxi is reported in Table SX-3.1 From 1985 to 2014, the nominal labor force human capital increases from 352 billion Yuan to 12,949 billion Yuan, an increase of more than 35 times; and the real labor force human capital increases from 352 billion Yuan to 2,518 billion Yuan, an increase of approximately 6 times.

Table SX-3.1 Nominal and Real Labor Force Human Capital for Shanxi

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	352	352	352	352
1986	420	420	398	398
1987	508	507	447	447
1988	594	594	433	432
1989	688	687	419	419
1990	798	798	476	476
1991	917	916	523	522
1992	1038	1038	553	553
1993	1175	1175	547	547
1994	1323	1322	492	491
1995	1491	1491	474	474
1996	1656	1656	487	487
1997	1842	1843	526	526
1998	2064	2066	597	597
1999	2302	2306	668	669
2000	2584	2569	721	717
2001	2848	2837	795	792
2002	3175	3169	901	899
2003	3561	3557	990	989
2004	3960	3981	1055	1060
2005	4485	4512	1164	1171
2006	5069	5103	1288	1297
2007	5689	5731	1379	1389
2008	6468	6521	1461	1472
2009	7487	7553	1694	1709
2010	8668	8753	1904	1922

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	9507	9607	1985	2006
2012	10428	10546	2124	2148
2013	11569	11704	2287	2313
2014	12949	13104	2518	2547

11.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables SX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 24,740 Yuan to 596,920 Yuan, an increase of more than 23 times; and the Real average labor force human capital from 24,740 Yuan to 116,070 Yuan, an increase of approximately 3 times.

Table SX-3.2 Nominal and Real Average Labor Force Human Capital by Region for Shanxi

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	24.74	42.52	18.42	24.74	42.52	18.42
1986	28.48	49.42	20.67	26.98	46.44	19.73
1987	32.91	57.40	23.25	28.99	49.73	20.81
1988	37.59	64.29	26.41	27.38	45.61	19.75
1989	42.72	71.90	29.88	26.02	43.86	18.18
1990	48.81	81.22	33.76	29.09	48.81	19.95

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	54.98	91.07	37.90	31.32	51.54	21.76
1992	61.21	101.19	42.29	32.61	52.49	23.21
1993	68.45	112.91	47.20	31.86	50.44	22.99
1994	76.35	125.85	52.27	28.38	44.66	20.46
1995	85.11	140.06	57.71	27.03	42.59	19.28
1996	93.49	153.59	62.83	27.52	43.12	19.56
1997	102.94	168.64	68.38	29.37	45.93	20.67
1998	113.08	184.55	74.49	32.69	50.92	22.86
1999	123.33	200.25	80.65	35.80	55.03	25.12
2000	135.58	219.17	87.77	37.81	57.53	26.54
2001	149.97	239.37	97.95	41.89	63.15	29.51
2002	166.58	263.72	109.38	47.26	71.13	33.18
2003	185.03	288.42	122.55	51.45	76.57	36.27
2004	204.56	313.57	136.46	54.48	80.36	38.32
2005	228.76	348.55	151.51	59.38	87.83	41.02
2006	255.75	383.38	170.00	64.99	94.90	44.91
2007	284.53	418.61	188.97	68.95	99.44	47.23
2008	317.40	459.13	210.40	71.67	101.93	48.82
2009	358.06	510.44	236.56	81.01	114.41	54.40
2010	403.74	564.17	265.51	88.69	122.65	59.40
2011	443.02	610.58	296.75	92.49	126.30	62.99
2012	486.05	659.45	330.82	99.02	133.15	68.42
2013	535.98	717.51	367.24	105.96	140.77	73.58
2014	596.92	794.38	406.43	116.07	153.09	80.31

Chapter 12   Human Capital for Inner Mongolia

12.1 Total human capital

Table NMG-1.1 presents the results of nominal and real total human capital and real physical capital for Inner Mongolia. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Inner Mongolia.

Table NMG-1.1 Real Physical Capital, Nominal and Real Human Capital for Inner Mongolia

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	849	850	849	850	25
1986	995	996	947	948	28
1987	1162	1163	1029	1031	31
1988	1354	1356	1032	1034	35
1989	1557	1559	1021	1023	38
1990	1792	1795	1148	1150	41
1991	2017	2020	1234	1236	46
1992	2269	2275	1299	1302	53
1993	2558	2565	1285	1289	63
1994	2871	2880	1170	1173	72
1995	3209	3220	1113	1116	81

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1996	3652	3665	1174	1178	89
1997	4181	4133	1283	1269	97
1998	4702	4725	1451	1458	107
1999	5281	5315	1627	1637	118
2000	5884	5958	1788	1810	130
2001	6874	6999	2069	2106	143
2002	7744	7887	2283	2325	166
2003	8657	8825	2502	2550	207
2004	9669	9873	2716	2773	269
2005	10566	10792	2901	2963	357
2006	12120	12393	3279	3352	461
2007	13645	13947	3535	3613	590
2008	15257	15620	3743	3831	746
2009	16814	17198	4136	4230	951
2010	18700	19176	4462	4575	1190
2011	20870	21436	4719	4846	1457
2012	22756	23373	4987	5120	1760
2013	24541	25179	5204	5339	2118
2014	26440	27099	5518	5654	2395

12.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table NMG-2.1 presents human capital per capita for Inner Mongolia by region. From 1985 to 2014, the nominal human capital per capita increases from 45,560 Yuan to 1,254,150 Yuan, an

increase of more than 26 times; and the real human capital per capita increases from 45,560 Yuan to 261,750 Yuan, an increase of approximately 4 times.

Figure NMG-2.1 illustrates the trends of human capital per capita by gender for Inner Mongolia. The real human capital per capita of male is similar to that of female for Inner Mongolia. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
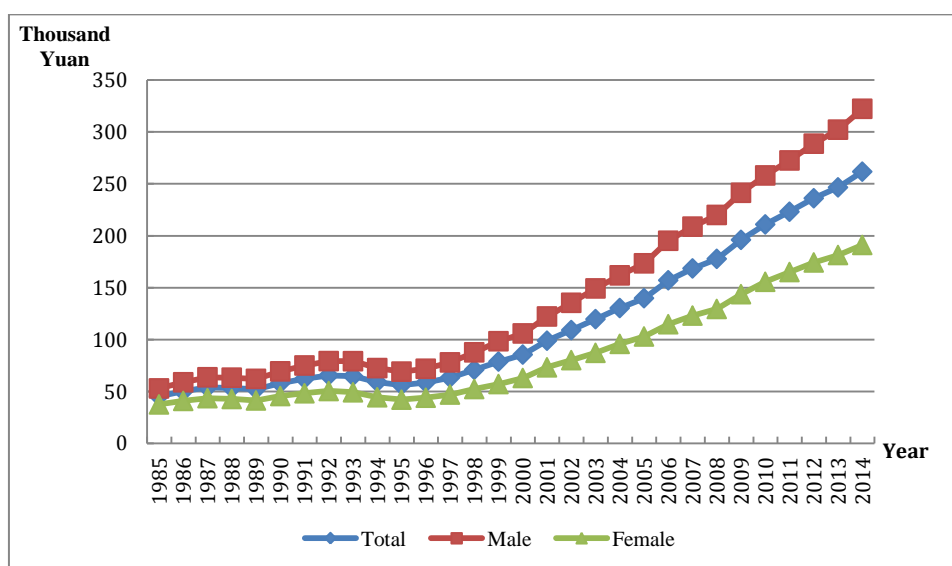
Figure NMG-2.1 Human Capital Per Capita by Gender for Inner Mongolia，1985-2014

Table NMG-2.1 Nominal and Real Human Capital Per Capita by Region for Inner Mongolia

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	45.56	73.09	32.51	45.56	73.09	32.51
1986	52.78	86.37	36.18	50.25	81.87	34.62

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1987	60.97	101.44	40.16	54.03	88.62	36.26
1988	70.10	117.58	44.70	53.46	87.79	35.09
1989	79.61	134.16	49.27	52.22	87.33	32.70
1990	90.66	153.20	54.62	58.07	97.97	35.06
1991	101.83	173.35	60.26	62.30	104.58	37.73
1992	114.48	196.89	66.24	65.54	109.27	39.91
1993	129.22	223.93	73.36	64.92	108.35	39.29
1994	145.17	253.84	80.55	59.15	98.81	35.57
1995	162.38	285.94	88.45	56.31	95.05	33.10
1996	182.54	320.74	95.72	58.68	99.18	33.26
1997	206.48	363.67	103.03	63.36	107.51	34.33
1998	230.01	403.57	110.64	70.98	120.15	37.16
1999	256.01	446.86	118.68	78.89	132.64	40.22
2000	281.82	488.39	127.02	85.62	143.11	42.53
2001	328.86	567.94	138.14	98.99	165.42	46.03
2002	370.37	630.53	149.70	109.21	182.20	47.32
2003	414.46	694.86	162.24	119.78	197.82	49.56
2004	464.36	766.77	176.16	130.44	212.97	51.79
2005	509.54	825.19	191.09	139.92	224.70	54.38
2006	580.94	928.66	210.80	157.19	249.63	58.82
2007	650.84	1023.43	232.44	168.59	263.76	61.65
2008	724.66	1122.20	255.45	177.80	274.40	63.73
2009	797.19	1212.28	282.82	196.10	297.32	70.70
2010	884.13	1323.87	312.17	210.98	315.23	75.40
2011	987.03	1458.81	341.58	223.18	329.25	78.06
2012	1077.50	1566.18	373.98	236.15	342.19	83.38
2013	1163.08	1660.77	408.85	246.64	350.92	88.67
2014	1254.15	1759.66	449.89	261.75	365.61	96.41

Figure NMG-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
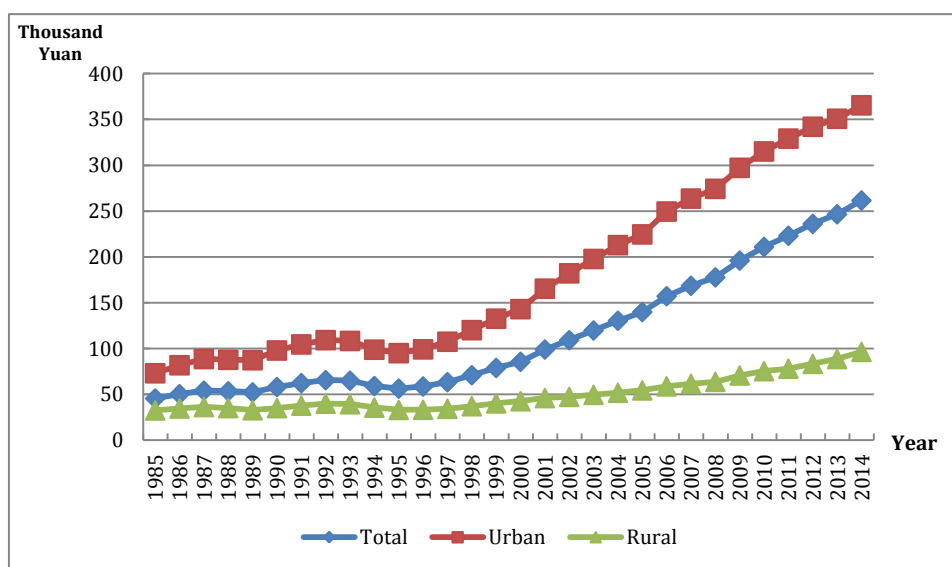
Figure NMG-2.2 Real Human Capital Per Capita by Region for Inner Mongolia，1985-2014

12.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

12.3.1 Total labor force human capital

The total labor force human capital for Inner Mongolia is reported in Table NMG-3.1 From 1985 to 2014, the nominal labor force human capital increases from 320 billion Yuan to 9,393 billion Yuan, an increase of more than 28 times; and the real labor force human capital increases from 320 billion Yuan to 1,967 billion Yuan, an increase of approximately 5 times.

Table NMG-3.1 Nominal and Real Labor Force Human Capital for Inner Mongolia

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	320	319	320	319
1986	377	376	359	358
1987	448	448	397	397
1988	532	532	407	406
1989	631	631	414	414
1990	745	744	477	477
1991	852	851	522	522
1992	957	957	550	550
1993	1076	1076	543	543
1994	1202	1202	493	493
1995	1342	1342	468	468
1996	1520	1521	492	493
1997	1729	1731	535	536
1998	1971	1972	614	614
1999	2240	2241	696	697
2000	2534	2550	777	781
2001	2792	2813	850	856

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2002	3048	3072	906	913
2003	3339	3371	972	981
2004	3675	3703	1038	1046
2005	4060	4096	1119	1129
2006	4529	4571	1231	1242
2007	5052	5100	1313	1325
2008	5659	5715	1392	1405
2009	6436	6503	1587	1602
2010	7303	7383	1745	1764
2011	7790	7878	1764	1784
2012	8258	8356	1814	1835
2013	8796	8903	1871	1894
2014	9393	9508	1967	1991

12.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables NMG-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 30,250 Yuan to 612,480 Yuan, an increase of more than 19 times; and the Real average labor force human capital from 30,250 Yuan to 128,250 Yuan, an increase of approximately 3 times.

Table NMG-3.2 Nominal and Real Average Labor Force Human Capital by Region for Inner Mongolia

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	30.25	42.44	23.88	30.25	42.44	23.88
1986	34.84	50.21	26.57	33.17	47.60	25.42
1987	40.39	59.70	29.56	35.84	52.15	26.69
1988	46.06	68.59	33.06	35.20	51.22	25.95
1989	52.51	78.97	36.82	34.48	51.40	24.43
1990	60.25	91.47	41.05	38.59	58.49	26.34
1991	67.40	103.40	45.29	41.30	62.38	28.35
1992	74.68	115.52	49.81	42.93	64.11	30.02
1993	83.31	129.76	54.93	42.07	62.79	29.42
1994	92.61	145.39	60.19	38.01	56.60	26.58
1995	102.68	162.06	66.00	35.84	53.87	24.70
1996	113.90	180.12	71.42	36.88	55.70	24.82
1997	126.42	200.83	77.33	39.14	59.37	25.76
1998	140.60	224.07	83.66	43.77	66.71	28.09
1999	155.92	248.16	89.74	48.47	73.66	30.41
2000	171.41	272.02	96.43	52.54	79.71	32.29
2001	188.22	297.04	104.77	57.30	86.52	34.91
2002	204.64	320.22	113.41	60.86	92.53	35.85
2003	222.94	345.27	122.88	64.87	98.29	37.53
2004	244.33	374.58	132.45	69.02	104.04	38.94
2005	268.17	405.43	142.94	73.94	110.40	40.68
2006	296.96	444.11	160.90	80.68	119.38	44.89
2007	329.53	486.90	179.37	85.62	125.48	47.57
2008	365.17	532.30	198.95	89.80	130.16	49.64
2009	411.10	592.20	220.84	101.34	145.24	55.21
2010	460.40	653.88	243.92	110.01	155.70	58.92

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2011	495.85	693.19	267.35	112.27	156.45	61.09
2012	530.68	727.44	293.41	116.54	158.94	65.41
2013	569.16	765.76	321.19	121.07	161.81	69.66
2014	612.48	810.20	351.48	128.25	168.34	75.32

Chapter 13   Human Capital for Liaoning

13.1 Total human capital

Table LN-1.1 presents the results of nominal and real total human capital and real physical capital for Liaoning. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six-education categories respectively. Column 5 is the real physical capital of Liaoning.

Table LN-1.1 Real Physical Capital, Nominal and Real Human Capital for Liaoning

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1688	1689	1688	1689	80
1986	1942	1944	1828	1830	89
1987	2246	2248	1952	1955	100
1988	2615	2619	1921	1924	113
1989	3021	3027	1875	1878	123
1990	3457	3464	2074	2078	133
1991	3839	3847	2185	2189	144
1992	4290	4300	2300	2306	155
1993	4829	4844	2257	2264	175
1994	5378	5397	2024	2031	192
1995	5957	5981	1930	1938	205
1996	6667	6707	2001	2012	217
1997	7391	7445	2142	2156	230
1998	8153	8226	2370	2389	243

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	9163	9268	2689	2718	257
2000	10185	10366	2983	3032	275
2001	11347	11581	3315	3379	295
2002	12417	12688	3662	3737	319
2003	13539	13868	3912	4000	353
2004	14885	15244	4136	4232	405
2005	16223	16632	4431	4538	485
2006	18122	18585	4885	5008	580
2007	20366	20940	5215	5359	686
2008	22517	23182	5506	5664	819
2009	25135	25932	6138	6328	953
2010	27969	28887	6622	6834	1121
2011	31128	32176	7000	7230	1313
2012	34278	35475	7488	7745	1518
2103	37539	38888	7953	8232	1725
2014	41086	42555	8549	8850	1918

13.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table LN-2.1 presents human capital per capita for Liaoning by region. From 1985 to 2014, the nominal human capital per capita increases from 50,790 Yuan to 1,179,810 Yuan, an increase of more than 22 times; and the real human capital per capita increases from 50,790 Yuan to 245,490 Yuan, an increase of approximately 3 times.

Figure LN-2.1 illustrates the trends of human capital per capita by gender for Liaoning. The real human capital per capita of male is similar to that of female for Liaoning. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
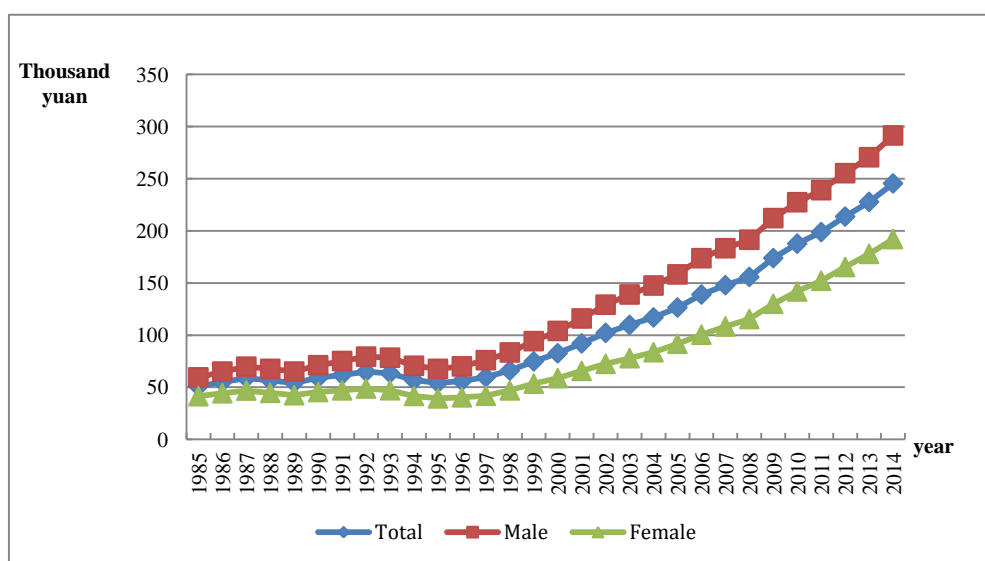
Figure LN-2.1 Human Capital Per Capita by Gender for Liaoning，1985-2014

Table LN-2.1 Nominal and Real Human Capital Per Capita by Region for Liaoning

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	50.79	67.75	36.22	50.79	67.75	36.22
1986	58.51	78.14	40.92	55.07	73.03	38.97
1987	67.69	90.49	46.41	58.83	77.03	41.85
1988	77.19	103.04	52.02	56.7	73.33	40.48
1989	87.41	116.42	57.99	54.24	70.69	37.57
1990	98.23	130	64.75	58.92	76.57	40.3

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	108.58	143.76	71.55	61.8	79.88	42.74
1992	120.86	160.66	79	64.8	82.58	46.13
1993	135.75	181.65	87.52	63.46	80.01	46.08
1994	150.91	202.71	96.52	56.78	70.8	42.03
1995	166.95	224.65	106.36	54.09	67.59	39.93
1996	186.14	251.67	115.48	55.85	69.98	40.59
1997	206	279.35	124.67	59.71	74.83	42.92
1998	227.04	308.13	134.21	65.99	82.7	46.81
1999	254.86	348.63	144.3	74.79	94.81	51.2
2000	281.9	386.94	155.11	82.56	105.23	55.21
2001	315.1	429.91	170.7	92.05	117.03	60.63
2002	346.26	468.36	185.97	102.12	128.91	66.93
2003	379.81	509.83	202.04	109.74	138.66	70.12
2004	420.96	561.39	220.15	116.97	148.53	71.87
2005	462.9	614.16	238.03	126.43	161.2	74.72
2006	515.29	681.16	262.67	138.9	176.84	81.16
2007	577.51	763.36	287.33	147.88	189.46	82.97
2008	637.02	839.53	312.99	155.77	199.59	85.67
2009	711.88	937.15	343.24	173.84	222.79	93.67
2010	792.73	1043.36	373	187.69	241.29	97.87
2011	884.03	1165.6	401.46	198.8	256.51	99.84
2012	978.23	1290.52	430.93	213.69	276	104.56
2013	1075.03	1417.32	462.62	227.76	294.61	108.04
2014	1179.81	1551.87	498.66	245.49	316.87	114.84

Figure LN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
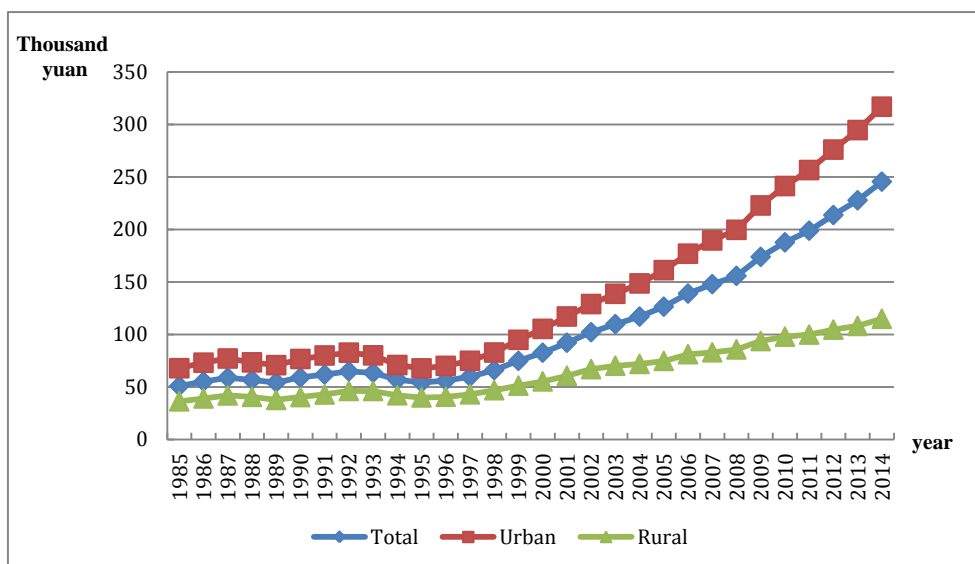
Figure LN-2.2 Real Human Capital Per Capita by Region for Liaoning，1985-2014

13.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

13.3.1 Total labor force human capital

The total labor force human capital for Liaoning is reported in Table LN-3.1 From 1985 to 2014, the nominal labor force human capital increases from 764 billion Yuan to 18,078 billion Yuan, an increase of more than 22 times; and the real labor force human capital increases from 764 billion Yuan to 3,794 billion Yuan, an increase of approximately 3 times.

Table LN-3.1 Nominal and Real Labor Force Human Capital for Liaoning

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	764	763	764	763
1986	888	887	836	835
1987	1038	1037	903	902
1988	1218	1217	895	894
1989	1413	1411	878	877
1990	1637	1635	982	981
1991	1845	1843	1051	1050
1992	2045	2044	1099	1099
1993	2270	2268	1066	1065
1994	2509	2508	950	950
1995	2786	2785	910	909
1996	3112	3110	941	941
1997	3488	3489	1020	1020
1998	3946	3949	1156	1157
1999	4367	4370	1293	1294
2000	4852	4811	1433	1422
2001	5261	5235	1550	1543
2002	5692	5675	1695	1690
2003	6187	6191	1806	1807
2004	6644	6700	1865	1880
2005	7216	7283	1987	2005
2006	8153	8241	2216	2239
2007	9106	9219	2351	2378
2008	10220	10367	2517	2551
2009	11750	11945	2887	2933
2010	13448	13703	3200	3259

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	14445	14751	3268	3335
2012	15535	15891	3420	3495
2013	16594	16991	3544	3626
2014	18078	18526	3794	3886

13.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables LN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 35,810 Yuan to 674,790 Yuan, an increase of more than 17 times; and the Real average labor force human capital from 35,810 Yuan to 141,610 Yuan, an increase of approximately 2 times.

Table LN-3.2 Nominal and Real Average Labor Force Human Capital by Region for Liaoning

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	35.81	44.6	27.47	35.81	44.6	27.47
1986	41.48	52.15	31.03	39.05	48.74	29.55
1987	48.22	61.12	35.03	41.93	52.02	31.59
1988	54.38	68.57	39.31	39.97	48.8	30.59
1989	60.99	76.55	43.92	37.88	46.48	28.46
1990	68.84	86.05	49.03	41.3	50.68	30.52

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	76.06	95.24	54.24	43.33	52.92	32.4
1992	83.33	104.4	59.65	44.8	53.66	34.83
1993	91.65	115.04	65.74	43.04	50.67	34.61
1994	100.7	126.59	72.23	38.14	44.22	31.45
1995	110.81	139.49	79.62	36.18	41.96	29.89
1996	122.26	154.49	86.18	36.98	42.96	30.29
1997	135.15	171.81	93.21	39.52	46.02	32.09
1998	150.31	192.15	100.64	44.04	51.57	35.1
1999	164.87	211.69	107.32	48.82	57.57	38.08
2000	181.11	233.97	114.02	53.47	63.63	40.58
2001	197.34	252.99	123.51	58.13	68.87	43.87
2002	213.33	271.62	134.17	63.53	74.76	48.28
2003	231.3	292.46	146.32	67.5	79.54	50.78
2004	250.27	314.54	158.43	70.26	83.22	51.72
2005	273.2	341.78	170.9	75.22	89.71	53.65
2006	305.92	381.98	190.56	83.16	99.17	58.88
2007	339.28	423.11	210.21	87.58	105.01	60.7
2008	377.51	470.98	230.31	92.96	111.97	63.04
2009	430.16	538.96	253.38	105.68	128.13	69.14
2010	487.17	612.16	277.49	115.92	141.57	72.81
2011	528.87	664.78	302.98	119.66	146.3	75.35
2012	572.79	718.43	331.17	126.1	153.65	80.35
2013	616.69	771.71	360.55	131.72	160.41	84.2
2014	674.79	845.41	389.31	141.61	172.62	89.66

Chapter 14   Human Capital for Jilin

14.1 Total human capital

Table JL-1.1 presents the results of nominal and real total human capital and real physical capital for Jilin. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Jilin.

Table JL-1.1 Real Physical Capital, Nominal and Real Human Capital for Jilin

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	1047	1048	1047	1048	32
1986	1194	1195	1131	1131	36
1987	1358	1359	1205	1205	40
1988	1559	1560	1157	1158	45
1989	1771	1773	1113	1114	48
1990	2019	2020	1199	1200	51
1991	2282	2284	1276	1277	56
1992	2588	2592	1351	1353	61
1993	2941	2947	1378	1380	69
1994	3316	3324	1285	1288	77
1995	3699	3706	1241	1244	85
1996	4112	4126	1288	1292	94
1997	4594	4621	1383	1391	100
1998	5026	5064	1523	1534	108
1999	5545	5598	1708	1723	117

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
2000	6008	6079	1872	1893	129
2001	6818	7285	2095	2230	141
2002	7635	7979	2352	2453	156
2003	8481	8895	2577	2697	175
2004	9397	9801	2741	2854	201
2005	10280	10672	2951	3059	239
2006	11216	11553	3173	3265	302
2007	12217	12672	3294	3413	392
2008	13184	13802	3379	3533	517
2009	14199	14753	3636	3772	647
2010	15348	16684	3792	4113	809
2011	16615	18791	3933	4431	959
2012	17883	20400	4129	4689	1117
2013	19124	21861	4289	4883	1271
2014	20482	23369	4505	5118	1431

14.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table JL-2.1 presents human capital per capita for Jilin by region. From 1985 to 2014, the nominal human capital per capita increases from 49,160 Yuan to 927,050 Yuan, an increase of more than 17 times; and the real human capital per capita increases from 49,160 Yuan to 203,900 Yuan, an increase of approximately 3 times.

Figure JL-2.1 illustrates the trends of human capital per capita by

gender for Jilin. The real human capital per capita of male is similar to that of female for Jilin. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
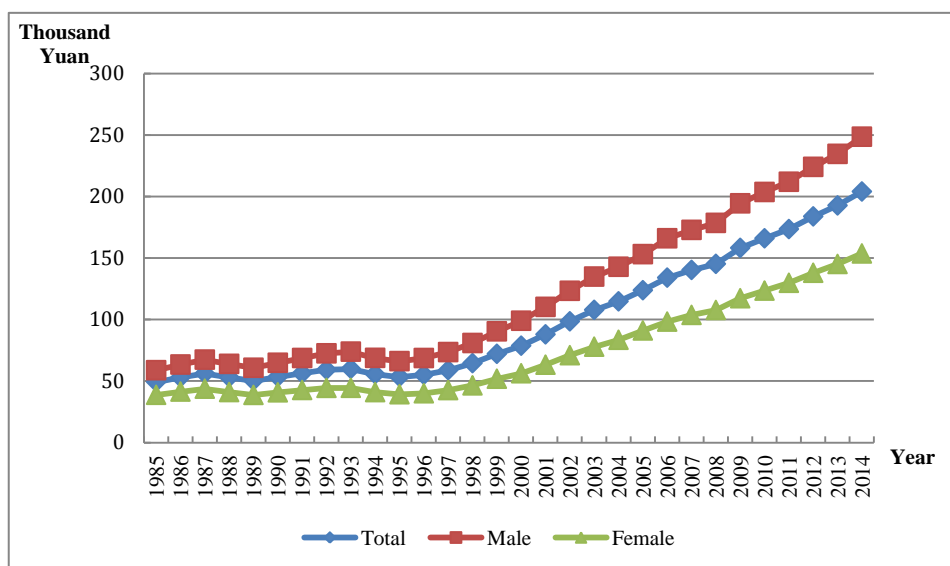
Figure JL-2.1 Human Capital Per Capita by Gender for Jilin，1985-2014

Table JL-2.1 Nominal and Real Human Capital Per Capita by Region for Jilin

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	49.16	62.82	39.60	49.16	62.82	39.60
1986	55.81	72.28	44.15	52.86	68.19	42.01
1987	63.24	82.97	49.11	56.10	72.48	44.37
1988	71.37	94.57	54.61	52.95	67.94	42.14
1989	79.84	106.53	60.44	50.19	65.46	39.09
1990	89.70	120.76	67.04	53.29	71.42	40.08
1991	100.63	136.02	73.97	56.24	75.12	42.03

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	113.19	154.08	81.39	59.09	77.85	44.51
1993	127.74	175.06	89.81	59.83	78.13	45.14
1994	143.19	196.83	98.87	55.51	71.31	42.44
1995	158.86	218.26	108.27	53.31	68.70	40.20
1996	175.65	242.83	116.77	55.00	70.97	40.99
1997	195.16	272.01	125.85	58.75	76.66	42.60
1998	212.64	296.17	135.22	64.42	84.06	46.23
1999	233.69	327.09	144.91	71.99	94.82	50.24
2000	252.27	351.42	155.56	78.60	103.64	54.15
2001	285.75	402.43	170.17	87.82	116.93	58.94
2002	319.44	452.52	185.17	98.40	132.54	63.95
2003	354.48	503.91	201.16	107.72	145.98	68.44
2004	393.03	559.52	219.38	114.65	156.46	71.02
2005	430.81	612.57	238.76	123.68	168.93	75.85
2006	473.37	670.91	261.68	133.92	182.83	81.51
2007	519.87	734.52	286.44	140.15	191.73	84.09
2008	566.17	796.83	312.07	145.11	197.90	87.00
2009	617.38	865.08	341.81	158.10	215.06	94.63
2010	671.38	933.20	373.82	165.88	224.37	99.42
2011	732.46	1013.33	406.29	173.38	231.61	105.73
2012	795.52	1094.92	440.72	183.68	244.13	111.98
2013	858.75	1175.30	476.40	192.59	254.67	117.63
2014	927.05	1261.17	514.76	203.90	267.65	125.23

Figure JL-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
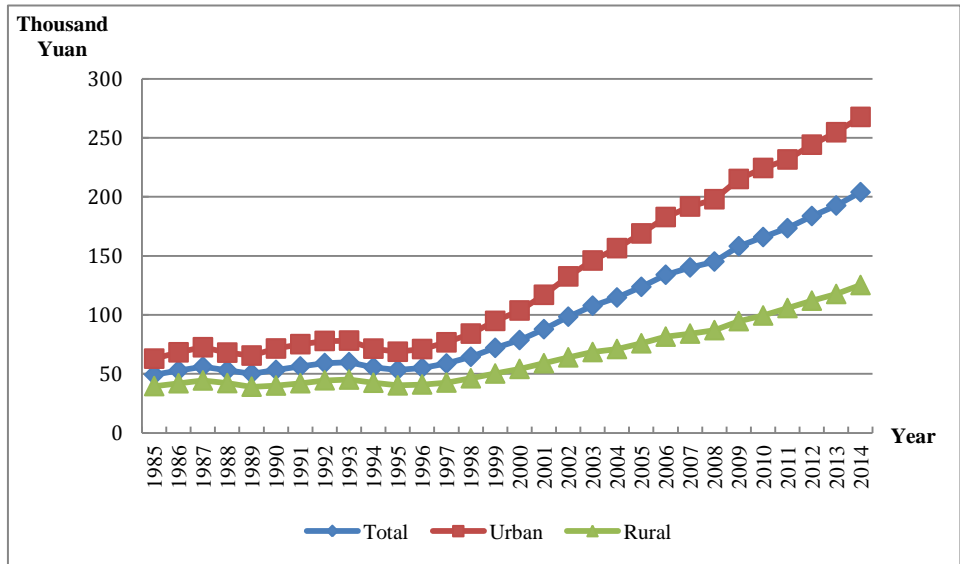
Figure JL-2.2 Real Human Capital Per Capita by Region for Jilin，1985-2014

14.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

14.3.1 Total labor force human capital

The total labor force human capital for Jilin is reported in Table JL-3.1 From 1985 to 2014, the nominal labor force human capital increases from 438 billion Yuan to 9,012 billion Yuan, an increase of more than 19 times; and the real labor force human capital increases from 438 billion Yuan to 2,012 billion Yuan, an increase of approximately 3 times.

Table JL-3.1 Nominal and Real Labor Force Human Capital for Jilin

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	438	438	438	438
1986	518	517	491	490
1987	621	620	551	550
1988	717	716	532	532
1989	815	814	513	512
1990	927	926	551	550
1991	1058	1057	592	591
1992	1200	1200	628	628
1993	1367	1366	643	642
1994	1535	1533	599	598
1995	1735	1733	586	586
1996	1927	1926	609	608
1997	2130	2130	647	647
1998	2376	2374	726	726
1999	2630	2628	817	816
2000	2912	2882	913	905
2001	3188	3171	989	984
2002	3484	3466	1086	1081
2003	3876	3861	1194	1190
2004	4208	4238	1246	1254
2005	4654	4692	1356	1366
2006	5112	5161	1467	1481
2007	5524	5580	1509	1523
2008	5951	6012	1545	1560
2009	6464	6534	1674	1692
2010	7034	7118	1756	1776

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	7421	7520	1781	1804
2012	7905	8023	1852	1878
2013	8456	8589	1924	1953
2014	9012	9164	2012	2045

14.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables JL-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 34,350 Yuan to 539,410 Yuan, an increase of more than 14 times; and the real average labor force human capital increases from 34,350 Yuan to 120,450 Yuan, an increase of approximately 2 times.

Table JL-3.2 Nominal and Real Average Labor Force Human Capital by Region for Jilin

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	34.35	41.68	29.25	34.35	41.68	29.25
1986	39.68	49.43	32.69	37.58	46.64	31.10
1987	46.04	58.64	36.63	40.85	51.23	33.10
1988	51.47	65.59	41.04	38.24	47.12	31.67
1989	57.19	73.00	45.58	36.00	44.86	29.48
1990	64.15	82.67	50.60	38.13	48.90	30.25

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	71.74	92.95	55.76	40.13	51.33	31.68
1992	79.95	104.37	61.20	41.83	52.73	33.47
1993	89.37	117.53	67.35	42.02	52.45	33.86
1994	98.86	130.18	73.96	38.58	47.16	31.75
1995	109.77	145.03	81.24	37.09	45.65	30.17
1996	119.99	159.38	87.62	37.89	46.58	30.75
1997	130.91	174.52	94.00	39.78	49.18	31.81
1998	142.94	190.55	100.99	43.68	54.08	34.53
1999	155.22	207.05	107.69	48.18	60.02	37.34
2000	169.00	225.54	115.52	53.00	66.51	40.22
2001	184.13	244.67	126.81	57.14	71.09	43.93
2002	199.86	264.17	139.54	62.31	77.37	48.19
2003	218.76	287.83	154.13	67.39	83.38	52.44
2004	237.28	310.60	169.57	70.24	86.86	54.90
2005	261.03	342.23	186.08	76.04	94.38	59.12
2006	286.62	374.25	205.63	82.27	101.99	64.05
2007	311.55	404.58	224.30	85.10	105.61	65.85
2008	337.29	435.26	243.81	87.56	108.10	67.97
2009	368.18	472.73	266.36	95.34	117.52	73.74
2010	400.68	511.51	288.93	100.01	122.98	76.84
2011	430.07	545.86	313.05	103.24	124.76	81.46
2012	463.42	584.90	339.16	108.55	130.41	86.18
2013	500.64	630.39	365.89	113.89	136.59	90.35
2014	539.41	677.87	393.65	120.45	143.86	95.76

Chapter 15   Human Capital for Heilongjiang

15.1 Total human capital

Table HLJ-1.1 presents the results of nominal and real total human capital and real physical capital for Heilongjiang. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Heilongjiang.

Table HLJ-1.1 Real Physical Capital, Nominal and Real Human Capital for Heilongjiang

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1350	1350	1350	1350	56
1986	1550	1551	1453	1454	63
1987	1781	1781	1541	1542	70
1988	2071	2072	1525	1526	77
1989	2392	2394	1536	1537	81
1990	2758	2761	1672	1674	86
1991	3093	3097	1751	1753	90
1992	3470	3475	1815	1818	96
1993	3905	3912	1782	1785	103
1994	4351	4361	1629	1633	111
1995	4839	4851	1560	1564	121
1996	5334	5355	1607	1613	132
1997	5840	5867	1687	1694	144

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1998	6385	6419	1834	1843	158
1999	7008	7058	2077	2092	172
2000	7716	7794	2326	2349	186
2001	8826	9505	2637	2830	202
2002	9972	10308	2993	3089	220
2003	10921	11246	3247	3339	240
2004	11989	12497	3426	3565	264
2005	13043	13671	3680	3850	291
2006	14402	14975	3982	4133	328
2007	15831	16285	4149	4265	375
2008	17272	17785	4282	4406	433
2009	18809	19423	4653	4801	502
2010	20640	21815	4908	5181	585
2011	22394	23690	5032	5320	676
2012	24096	25571	5244	5560	782
2013	25792	27378	5487	5820	908
2014	27548	29234	5775	6122	1021

15.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table HLJ-2.1 presents human capital per capita for Heilongjiang by region. From 1985 to 2014, the nominal human capital per capita increases from 43,710 Yuan to 892,710 Yuan, an increase of more than 19 times; and the real human capital per capita increases from 43,710

Yuan to 187,140 Yuan, an increase of approximately 3 times.

Figure HLJ-2.1 illustrates the trends of human capital per capita by gender for Heilongjiang. The real human capital per capita of male is similar to that of female for Heilongjiang. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
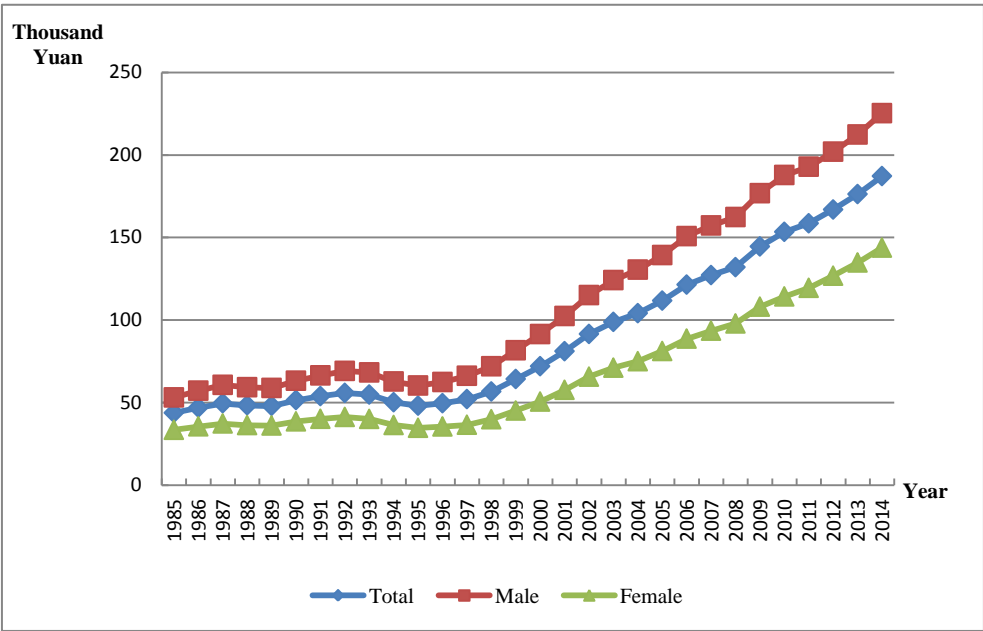
Figure HLJ-2.1 Human Capital Per Capita by Gender for Heilongjiang，1985-2014

Table HLJ-2.1 Nominal and Real Human Capital Per Capita by Region for Heilongjiang

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	43.71	52.98	36.60	43.71	52.98	36.60
1986	49.99	61.42	40.88	46.86	57.95	38.03
1987	57.21	71.07	45.74	49.51	61.12	39.91
1988	65.61	82.31	51.29	48.30	59.68	38.55
1989	74.68	94.35	57.25	47.95	59.70	37.55
1990	84.87	107.88	63.88	51.45	64.64	39.41
1991	95.11	121.65	70.58	53.85	67.36	41.36
1992	106.65	137.09	78.19	55.79	69.20	43.26
1993	120.06	155.42	86.55	54.77	68.11	42.12
1994	133.87	174.40	95.03	50.13	62.64	38.12
1995	149.05	194.94	104.45	48.06	60.41	36.06
1996	164.43	216.72	113.00	49.53	62.42	36.88
1997	180.13	238.20	122.22	52.03	65.65	38.42
1998	197.14	261.78	131.86	56.63	71.51	41.58
1999	216.60	290.02	141.56	64.21	81.67	46.35
2000	238.70	322.17	152.21	71.96	91.92	51.27
2001	271.22	370.51	167.17	81.04	104.87	56.09
2002	304.77	420.26	182.39	91.48	119.79	61.51
2003	332.35	456.78	199.14	98.81	129.17	66.36
2004	364.22	499.59	218.06	104.08	136.50	69.07
2005	395.84	541.06	237.78	111.68	146.65	73.62
2006	439.03	596.78	263.20	121.39	158.90	79.58
2007	485.19	657.58	287.89	127.16	166.11	82.59
2008	532.27	718.32	314.11	131.96	172.82	84.06
2009	584.12	783.14	345.14	144.50	188.79	91.27
2010	644.91	862.95	376.09	153.35	200.80	94.81
2011	705.52	941.69	406.44	158.53	207.69	96.31

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2012	766.75	1022.61	434.19	166.87	218.37	100.00
2013	828.36	1098.12	468.52	176.23	229.87	104.65
2014	892.71	1175.66	505.67	187.14	242.70	111.16

Figure HLJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
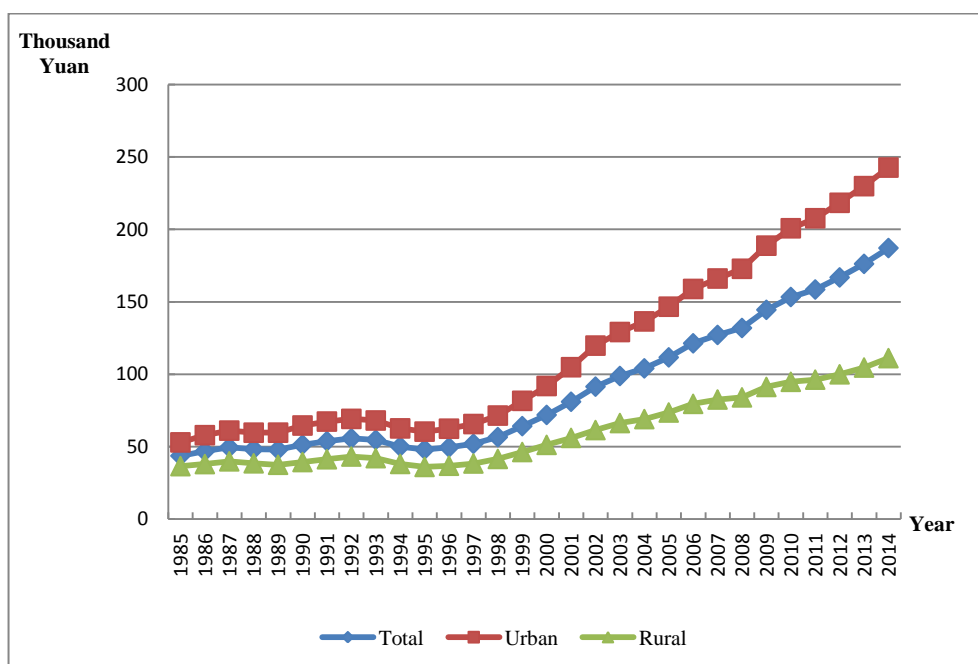
Figure HLJ-2.2 Real Human Capital Per Capita by Region for Heilongjiang，1985-2014

15.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

15.3.1 Total labor force human capital

The total labor force human capital for Heilongjiang is reported in Table HLJ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 524 billion Yuan to 12,590 billion Yuan, an increase of more than 23 times; and the real labor force human capital increases from 524 billion Yuan to 2,656 billion Yuan, an increase of approximately 4 times.

Table HLJ-3.1 Nominal and Real Labor Force Human Capital for Heilongjiang

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	524	523	524	523
1986	613	613	575	575
1987	719	719	622	622
1988	875	875	644	644
1989	1058	1058	679	679
1990	1273	1272	771	771
1991	1467	1466	830	830
1992	1663	1662	870	870
1993	1880	1879	858	858
1994	2111	2111	792	791
1995	2371	2371	766	766
1996	2617	2618	791	791

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1997	2877	2878	833	833
1998	3189	3191	919	919
1999	3493	3496	1039	1040
2000	3829	3804	1160	1153
2001	4212	4196	1268	1264
2002	4648	4639	1409	1406
2003	5137	5141	1543	1545
2004	5547	5576	1602	1610
2005	6042	6074	1722	1730
2006	6627	6667	1851	1862
2007	7240	7289	1919	1931
2008	7942	8003	1988	2003
2009	8818	8894	2198	2217
2010	9831	9934	2352	2377
2011	10442	10567	2362	2389
2012	11115	11263	2437	2468
2013	11745	11911	2515	2550
2014	12590	12778	2656	2695

15.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables HLJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 29,540

Yuan to 525,940 Yuan, an increase of more than 16 times; and the Real average labor force human capital from 29,540 Yuan to 110,940 Yuan, an increase of approximately 3 times.

Table HLJ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Heilongjiang

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	29.54	34.26	25.33	29.54	34.26	25.33
1986	33.89	39.85	28.46	31.77	37.59	26.47
1987	38.98	46.43	31.98	33.73	39.93	27.91
1988	45.33	54.51	36.54	33.36	39.53	27.46
1989	52.44	63.77	41.44	33.67	40.35	27.18
1990	60.75	74.81	46.79	36.82	44.82	28.87
1991	68.31	84.62	52.11	38.67	46.86	30.53
1992	76.07	94.60	57.65	39.79	47.75	31.90
1993	84.84	105.94	63.86	38.72	46.42	31.08
1994	94.29	118.32	70.40	35.35	42.50	28.24
1995	104.74	132.07	77.52	33.83	40.93	26.77
1996	114.57	145.33	83.97	34.62	41.86	27.40
1997	125.43	159.86	90.58	36.30	44.06	28.48
1998	137.25	175.75	97.87	39.53	48.01	30.86
1999	148.70	190.92	104.97	44.24	53.76	34.37
2000	161.41	207.70	112.82	48.88	59.26	38.01
2001	175.15	224.13	123.65	52.74	63.44	41.49
2002	189.59	241.05	135.34	57.48	68.71	45.64
2003	205.82	260.25	148.22	61.83	73.59	49.39
2004	221.36	278.12	161.69	63.92	75.99	51.22
2005	239.36	298.80	176.64	68.21	80.99	54.69
2006	263.17	325.54	196.65	73.52	86.68	59.46
2007	288.06	354.16	217.05	76.33	89.47	62.27
2008	316.30	388.27	237.66	79.17	93.41	63.60

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2009	351.44	432.09	261.11	87.61	104.16	69.05
2010	391.79	484.17	284.94	93.72	112.66	71.83
2011	422.33	519.51	309.47	95.52	114.58	73.33
2012	454.67	556.83	334.62	99.69	118.91	77.07
2013	486.32	589.92	363.50	104.14	123.49	81.19
2014	525.94	635.98	393.19	110.94	131.29	86.44

Chapter 16   Human Capital for Shanghai

16.1 Total human capital

Table SH-1.1 presents the results of nominal and real total human capital and real physical capital for Shanghai. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Shanghai.

Table SH-1.1 Real Physical Capital, Nominal and Real Human Capital for Shanghai

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1389	1388	1389	1388	59
1986	1682	1683	1582	1583	68
1987	2051	2054	1785	1787	79
1988	2476	2484	1794	1800	91
1989	2953	2967	1846	1855	100
1990	3508	3530	2063	2076	110
1991	4064	4096	2163	2180	119
1992	4656	4699	2253	2273	132
1993	5295	5348	2131	2153	150
1994	5961	6029	1937	1959	177
1995	6739	6827	1844	1869	212
1996	8039	8177	2015	2050	254
1997	9364	9534	2283	2325	293
1998	10920	11140	2662	2717	330

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	12820	13130	3080	3155	366
2000	14930	15490	3499	3631	403
2001	17380	20710	4073	4853	444
2002	19670	22160	4587	5169	489
2003	22200	25800	5171	6011	540
2004	25020	30530	5703	6959	601
2005	27910	35280	6299	7963	669
2006	32750	44370	7304	9895	751
2007	38300	52690	8277	11390	850
2008	43600	59010	8906	12050	943
2009	49820	67370	10220	13820	1046
2010	55110	73900	10960	14700	1143
2011	60040	79720	11350	15070	1230
2012	66020	87960	12140	16180	1314
2013	71790	95870	12910	17240	1403
2014	77160	103200	13510	18070	1489

16.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. From 1985 to 2014, the nominal human capital per capita increases from 132,900 Yuan to 3,631,980 Yuan, an increase of more than 26 times; and the real human capital per capita increases from 132,900 Yuan to 635,930 Yuan, an increase of approximately 3 times.

Figure SH-2.1 illustrates the trends of human capital per capita by

gender for Shanghai. The real human capital per capita of male is similar to that of female for Shanghai. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
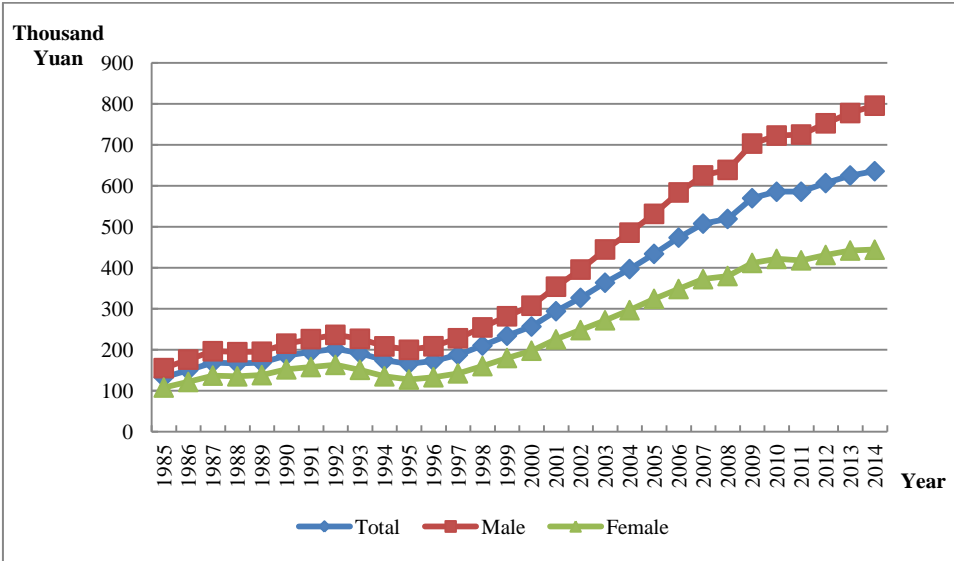
Figure SH-2.1 Human Capital Per Capita by Gender for Shanghai，1985-2014

16.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

16.3.1 Total labor force human capital

The total labor force human capital for Shanghai is reported in Table SH-3.1 From 1985 to 2014, the nominal labor force human capital increases

from 585 billion Yuan to 34,610 billion Yuan, an increase of more than 58 times; and the real labor force human capital increases from 585 billion Yuan to 6,059 billion Yuan, an increase of approximately 9 times.

Table SH-3.1 Nominal and Real Labor Force Human Capital for Shanghai

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	585	583	585	583
1986	690	687	649	647
1987	809	806	704	701
1988	958	955	694	692
1989	1135	1131	710	707
1990	1332	1327	784	781
1991	1509	1505	803	801
1992	1698	1695	821	820
1993	1917	1914	772	770
1994	2153	2149	700	698
1995	2412	2409	660	660
1996	2898	2895	726	726
1997	3535	3534	862	862
1998	4339	4339	1058	1058
1999	5160	5169	1239	1242
2000	6104	6046	1430	1417
2001	6936	6955	1626	1630
2002	7922	7996	1847	1865
2003	9134	9230	2128	2150
2004	10130	10410	2310	2372
2005	11350	11680	2561	2637
2006	13650	14100	3045	3144

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2007	16500	17070	3565	3688
2008	19830	20560	4050	4200
2009	23130	24040	4743	4930
2010	26280	27370	5227	5444
2011	28300	29520	5351	5581
2012	30480	31800	5605	5848
2013	32470	33890	5838	6093
2014	34610	36160	6059	6331

16.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital to the labor force population. From 1985 to 2014, the nominal average labor force human capital increases from 76,800 Yuan to 2,000,120 Yuan, an increase of more than 25 times; and the Real average labor force human capital from 76,800 Yuan to 350,150 Yuan, an increase of approximately 3 times.

Chapter 17   Human Capital for Jiangsu

17.1 Total human capital

Table JS-1.1 presents the results of nominal and real total human capital and real physical capital for Jiangsu. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Jiangsu.

Table JS-1.1 Real Physical Capital, Nominal and Real Human Capital for Jiangsu

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	3007	3011	3007	3011	83
1986	3431	3435	3196	3200	102
1987	3925	3931	3372	3377	123
1988	4688	4694	3305	3310	146
1989	5552	5562	3325	3331	166
1990	6521	6534	3787	3794	186
1991	7490	7507	4180	4189	213
1992	8524	8547	4476	4488	257
1993	9715	9746	4317	4330	316
1994	10899	10940	3923	3937	369
1995	12121	12174	3764	3780	425
1996	14012	14095	3967	3989	486
1997	15896	15994	4397	4423	552
1998	18279	18461	5040	5087	629
1999	20844	21105	5782	5849	711

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	23451	23898	6463	6580	804
2001	27302	30260	7432	8198	904
2002	30524	31671	8364	8664	1013
2003	34042	35239	9204	9515	1176
2004	37755	38940	9791	10090	1370
2005	41283	42477	10460	10754	1612
2006	47159	48557	11744	12081	1879
2007	54340	56150	12957	13380	2179
2008	61130	63210	13830	14284	2515
2009	68450	71540	15539	16225	2922
2010	75660	79460	16546	17363	3413
2011	83320	88290	17297	18315	3987
2012	91410	96990	18493	19600	4547
2013	99530	105640	19663	20851	5104
2014	108180	114740	20903	22152	5633

17.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table JS-2.1 presents human capital per capita for Jiangsu by region. From 1985 to 2014, the nominal human capital per capita increases from 54,810 Yuan to 1,664,910 Yuan, an increase of more than 29 times; and the real human capital per capita increases from 54,810 Yuan to 320,170 Yuan, an increase of approximately 4 times.

Figure JS-2.1 illustrates the trends of human capital per capita by

gender for Jiangsu. The real human capital per capita of male is similar to that of female for Jiangsu. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
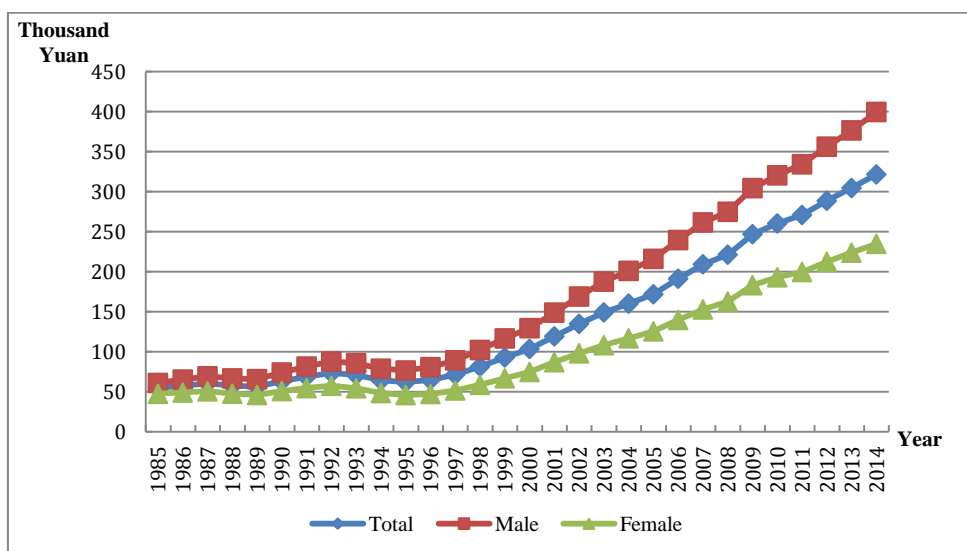
Figure JS-2.1 Human Capital Per Capita by Gender for Jiangsu，1985-2014

Table JS-2.1 Nominal and Real Human Capital Per Capita by Region for Jiangsu

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	54.81	79.02	49.61	54.81	79.02	49.61
1986	62.07	92.62	55.48	57.82	87.05	51.52
1987	70.63	107.59	62.43	60.68	91.51	53.82
1988	82.18	129.10	70.69	57.93	89.56	50.20
1989	94.62	151.66	79.81	56.67	90.70	47.83
1990	109.10	175.88	90.29	63.36	101.73	52.53
1991	123.67	204.94	99.40	69.02	110.06	56.75

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	140.27	237.40	109.26	73.66	117.18	59.75
1993	159.75	273.67	120.95	70.99	113.80	56.39
1994	179.10	306.21	133.59	64.47	101.63	51.18
1995	199.81	336.80	147.41	62.05	96.19	48.98
1996	229.30	382.83	160.47	64.92	98.68	49.79
1997	258.58	420.12	174.71	71.52	106.91	53.14
1998	295.94	474.78	189.59	81.60	120.81	58.25
1999	335.63	529.98	205.16	93.10	136.78	63.80
2000	376.34	580.67	220.99	103.72	149.86	68.65
2001	438.79	668.46	243.33	119.45	172.34	74.48
2002	492.82	730.09	265.87	135.04	191.29	81.21
2003	552.46	798.37	289.86	149.37	207.32	87.49
2004	618.18	869.45	316.69	160.31	217.72	91.39
2005	678.92	930.58	345.28	172.02	228.46	97.30
2006	768.48	1044.65	383.17	191.37	252.42	106.17
2007	878.30	1189.75	422.01	209.43	276.16	111.58
2008	978.82	1315.93	465.10	221.45	290.35	116.45
2009	1088.08	1449.33	515.50	247.01	321.07	129.72
2010	1191.04	1574.69	559.63	260.47	336.72	135.02
2011	1305.38	1707.52	607.51	270.99	347.48	138.35
2012	1427.05	1852.96	655.48	288.70	367.65	145.50
2013	1542.22	1986.86	709.45	304.68	385.44	153.65
2014	1664.91	2124.20	768.02	321.70	403.14	162.77

Figure JS-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

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significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
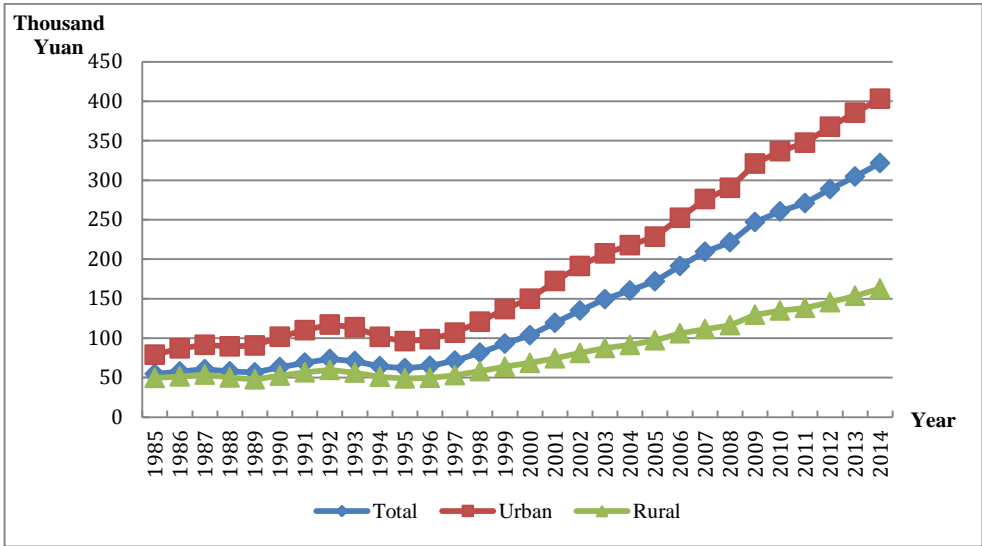
Figure JS-2.2 Real Human Capital Per Capita by Region for Jiangsu，1985-2014

17.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

17.3.1 Total labor force human capital

The total labor force human capital for Jiangsu is reported in Table JS-3.1 From 1985 to 2014, the nominal labor force human capital increases from 1,398 billion Yuan to 42,680 billion Yuan, an increase of more than 29 times; and the real labor force human capital increases from 1,398 billion Yuan to 8,322 billion Yuan, an increase of approximately 4 times.

Table JS-3.1 Nominal and Real Labor Force Human Capital for Jiangsu

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	1398	1398	1398	1398
1986	1631	1630	1519	1518
1987	1896	1895	1630	1628
1988	2258	2257	1595	1593
1989	2658	2657	1592	1592
1990	3106	3103	1804	1802
1991	3481	3479	1950	1948
1992	3861	3859	2043	2042
1993	4301	4298	1929	1928
1994	4788	4784	1742	1741
1995	5319	5316	1668	1667
1996	5948	5945	1708	1707
1997	6695	6697	1877	1877
1998	7588	7600	2123	2126
1999	8610	8622	2421	2425
2000	9876	9811	2752	2735
2001	10829	10794	2980	2971
2002	11979	11961	3309	3305
2003	13311	13339	3625	3632
2004	14388	14510	3754	3786
2005	15769	15922	4014	4051
2006	17844	18039	4477	4525
2007	20364	20603	4901	4958
2008	23685	23989	5407	5476
2009	27676	28067	6339	6426
2010	31950	32438	7041	7147

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	34292	34872	7180	7297
2012	36985	37658	7546	7680
2013	39649	40405	7906	8052
2014	42680	43530	8322	8484

17.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables JS-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 38,490 Yuan to 896,060 Yuan, an increase of more than 22 times; and the Real average labor force human capital from 38,490 Yuan to 174,720 Yuan, an increase of approximately 3 times.

Table JS-3.2 Nominal and Real Average Labor Force Human Capital by Region for Jiangsu

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	38.49	49.18	36.11	38.49	49.18	36.11
1986	43.69	57.48	40.77	40.69	54.02	37.85
1987	49.85	67.29	46.01	42.83	57.24	39.67
1988	57.63	78.87	52.57	40.69	54.72	37.34
1989	66.00	91.77	59.62	39.53	54.88	35.73
1990	76.02	107.15	67.29	44.15	61.98	39.15

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	83.99	119.98	73.63	47.04	64.43	42.04
1992	92.59	133.84	80.22	49.00	66.06	43.87
1993	102.89	151.28	87.63	46.15	62.91	40.86
1994	113.95	171.12	95.04	41.47	56.79	36.41
1995	126.71	192.29	103.07	39.74	54.92	34.25
1996	141.53	213.22	111.75	40.63	54.96	34.67
1997	157.81	233.88	121.37	44.24	59.51	36.92
1998	176.44	257.37	131.61	49.36	65.49	40.44
1999	196.64	283.37	141.45	55.29	73.13	43.99
2000	221.21	312.87	151.97	61.64	80.75	47.21
2001	244.05	337.77	163.47	67.16	87.08	50.03
2002	270.41	367.64	175.17	74.70	96.33	53.51
2003	299.80	401.75	187.98	81.64	104.32	56.74
2004	327.91	431.29	200.11	85.56	108.00	57.74
2005	360.08	466.94	214.17	91.66	114.63	60.35
2006	402.93	513.19	250.40	101.09	124.00	69.38
2007	453.46	571.49	288.40	109.13	132.65	76.25
2008	516.24	647.68	326.67	117.85	142.91	81.79
2009	590.08	737.88	368.73	135.15	163.46	92.78
2010	666.24	829.39	411.20	146.82	177.35	99.21
2011	720.72	887.15	451.96	150.90	180.54	102.93
2012	778.70	950.39	493.13	158.88	188.57	109.46
2013	833.37	1008.83	538.18	166.17	195.71	116.56
2014	896.06	1077.14	581.13	174.72	204.43	123.16

Chapter 18   Human Capital for Zhejiang

18.1 Total human capital

Table ZJ-1.1 presents the results of nominal and real total human capital and real physical capital for Zhejiang. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Zhejiang.

Table ZJ-1.1 Real Physical Capital, Nominal and Real Human Capital for Zhejiang

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	2563	2565	2563	2565	12
1986	2881	2883	2714	2716	14
1987	3290	3292	2874	2875	17
1988	3778	3781	2725	2727	19
1989	4295	4299	2608	2610	22
1990	4878	4883	2901	2904	26
1991	5513	5519	3176	3180	30
1992	6245	6251	3373	3377	35
1993	7147	7156	3236	3240	65
1994	8035	8049	2910	2914	99
1995	8896	8914	2758	2764	140
1996	10334	10367	2928	2937	183
1997	11945	11996	3248	3260	227
1998	13793	13872	3716	3736	273

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	15756	15888	4248	4279	321
2000	17851	18073	4731	4785	377
2001	20881	21265	5506	5601	441
2002	23360	23824	6202	6319	521
2003	26642	27196	6972	7110	634
2004	30185	30920	7620	7796	767
2005	33473	34338	8318	8524	909
2006	38680	39738	9485	9734	1064
2007	44031	45303	10358	10645	1230
2008	49830	51300	11153	11469	1392
2009	56200	57890	12746	13111	1573
2010	62700	64590	13668	14066	1784
2011	70280	72460	14509	14947	2016
2012	77610	80050	15662	16140	2239
2013	85070	87730	16758	17267	2484
2014	93190	96070	17984	18523	2733

18.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table ZJ-2.1 presents human capital per capita for Zhejiang by region. From 1985 to 2014, the nominal human capital per capita increases from 72,370 Yuan to 1,933,040 Yuan, an increase of more than 25 times; and the real human capital per capita increases from 72,370 Yuan to 373,040 Yuan, an increase of approximately 4 times.

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Figure ZJ-2.1 illustrates the trends of human capital per capita by gender for Zhejiang. The real human capital per capita of male is similar to that of female for Zhejiang. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
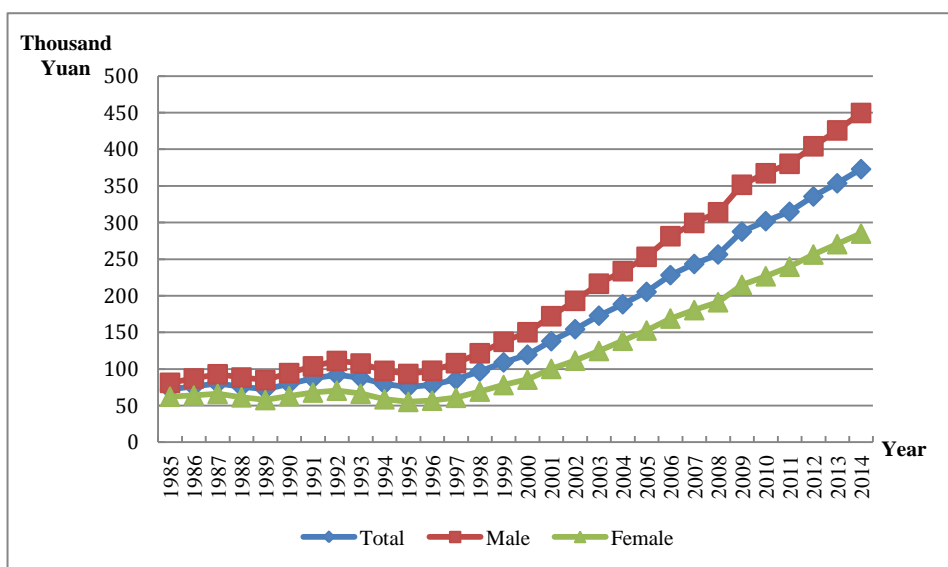
Figure ZJ-2.1 Human Capital Per Capita by Gender for Zhejiang，1985-2014

Table ZJ-2.1 Nominal and Real Human Capital Per Capita by Region for Zhejiang

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	72.37	77.16	70.51	72.37	77.16	70.51
1986	80.91	89.09	77.63	76.22	83.81	73.17
1987	91.93	104.46	86.73	80.29	88.61	76.83
1988	105.05	122.95	97.39	75.77	84.52	72.01
1989	118.79	142.44	108.35	72.14	83.83	66.98
1990	134.25	165.00	120.29	79.84	95.11	72.91
1991	150.99	195.49	130.41	86.98	106.71	77.88

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	170.40	226.23	144.16	92.03	113.09	82.14
1993	194.69	266.81	160.40	88.15	109.86	77.85
1994	218.80	306.58	176.74	79.24	101.23	68.68
1995	242.46	343.66	193.68	75.17	96.99	64.66
1996	276.45	396.61	207.87	78.33	101.94	64.86
1997	315.03	451.48	223.77	85.66	111.47	68.38
1998	359.08	509.12	243.37	96.74	125.08	74.89
1999	405.20	565.93	263.79	109.25	139.74	82.42
2000	451.75	616.21	286.53	119.73	150.79	88.55
2001	523.96	723.75	308.95	138.16	177.83	95.47
2002	582.00	796.32	336.12	154.52	198.03	104.60
2003	661.04	891.02	380.37	172.99	220.48	115.04
2004	747.11	1003.23	415.27	188.60	241.48	120.07
2005	826.87	1092.83	461.13	205.48	259.16	131.75
2006	931.14	1223.93	504.27	228.33	287.09	142.65
2007	1035.36	1347.50	553.07	243.56	304.22	149.86
2008	1146.36	1477.75	605.78	256.58	318.34	155.88
2009	1268.88	1615.72	670.08	287.78	352.65	175.58
2010	1385.43	1746.25	732.19	302.01	366.48	185.01
2011	1525.44	1913.17	795.06	314.92	381.30	190.25
2012	1663.71	2064.41	863.23	335.74	402.58	201.91
2013	1795.71	2207.58	932.50	353.74	420.83	213.01
2014	1933.04	2358.05	1011.85	373.04	440.70	226.16

Figure ZJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
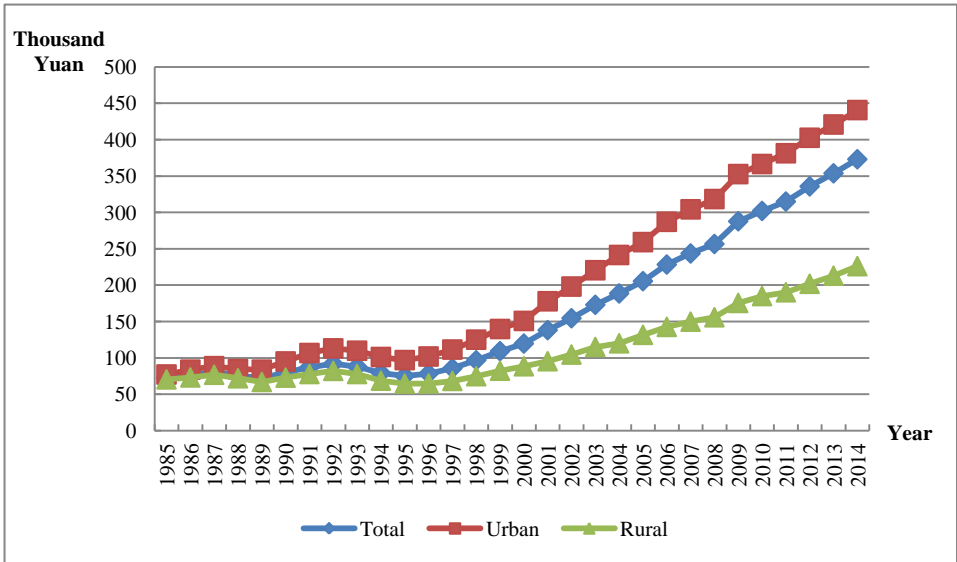
Figure ZJ-2.2 Real Human Capital Per Capita by Region for Zhejiang，1985-2014

18.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

18.3.1 Total labor force human capital

The total labor force human capital for Zhejiang is reported in Table ZJ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 1,130 billion Yuan to 36,420 billion Yuan, an increase of more than 31 times; and the real labor force human capital increases from 1,130 billion Yuan to 7,128 billion Yuan, an increase of approximately 5 times.

Table ZJ-3.1 Nominal and Real Labor Force Human Capital for Zhejiang

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	1130	1130	1130	1130
1986	1310	1309	1234	1233
1987	1516	1515	1325	1324
1988	1736	1736	1254	1254
1989	1982	1982	1205	1205
1990	2251	2250	1341	1340
1991	2500	2499	1448	1447
1992	2739	2738	1496	1496
1993	3002	3001	1384	1384
1994	3281	3280	1212	1212
1995	3617	3616	1145	1145
1996	4088	4089	1190	1191
1997	4658	4662	1307	1307
1998	5417	5421	1505	1506
1999	6274	6281	1739	1741
2000	7269	7237	1970	1962
2001	7925	7902	2146	2141
2002	8653	8642	2361	2359
2003	9571	9576	2567	2568
2004	10601	10669	2737	2754
2005	11823	11908	3001	3021
2006	13758	13875	3449	3477
2007	15889	16048	3818	3854
2008	18600	18813	4244	4291
2009	22099	22389	5097	5162
2010	25616	25992	5668	5749

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	27913	28351	5854	5943
2012	30374	30895	6227	6329
2013	33002	33595	6605	6717
2014	36420	37086	7128	7254

18.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables ZJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 48,510 Yuan to 1,021,200 Yuan, an increase of more than 20 times; and the Real average labor force human capital from 48,510 Yuan to 199,870 Yuan, an increase of approximately 3 times.

Table ZJ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Zhejiang

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	48.51	49.75	48.00	48.51	49.75	48.00
1986	55.01	57.53	53.93	51.81	54.13	50.83
1987	62.46	66.34	60.80	54.59	56.27	53.86
1988	70.85	76.15	68.50	51.16	52.35	50.65
1989	79.97	87.34	76.64	48.63	51.40	47.38
1990	90.21	100.36	85.48	53.73	57.85	51.81

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	99.69	111.85	94.21	57.74	61.06	56.26
1992	109.61	123.86	103.52	59.88	61.92	58.98
1993	120.87	137.64	113.99	55.72	56.68	55.33
1994	132.31	151.73	124.56	48.89	50.10	48.40
1995	144.85	167.14	135.81	45.87	47.17	45.34
1996	161.64	192.07	147.40	47.07	49.37	45.99
1997	181.31	220.20	160.16	50.86	54.37	48.94
1998	204.93	252.40	174.42	56.93	62.01	53.67
1999	230.43	286.57	187.70	63.88	70.76	58.64
2000	258.46	321.36	201.36	70.05	78.64	62.23
2001	281.61	347.82	218.48	76.26	85.46	67.52
2002	306.25	375.13	237.42	83.56	93.29	73.89
2003	335.95	407.38	260.52	90.10	100.80	78.79
2004	369.85	445.44	284.48	95.49	107.22	82.25
2005	407.92	486.77	311.50	103.54	115.44	89.00
2006	460.10	545.74	350.47	115.34	128.01	99.14
2007	516.77	611.25	389.77	124.18	138.00	105.61
2008	585.74	694.14	431.86	133.65	149.53	111.13
2009	672.41	798.22	479.01	155.09	174.22	125.52
2010	752.44	892.18	524.40	166.49	187.24	132.51
2011	811.72	955.51	571.08	170.24	190.43	136.65
2012	876.47	1019.24	620.81	179.68	198.76	145.21
2013	941.54	1085.49	670.51	188.44	206.92	153.16
2014	1021.20	1175.23	722.66	199.87	219.64	161.52

Chapter 19   Human Capital for Anhui

19.1 Total human capital

Table AH-1.1 presents the results of nominal and real total human capital and real physical capital for Anhui. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Anhui.

Table AH-1.1 Real Physical Capital, Nominal and Real Human Capital for Anhui

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1812	1815	1812	1815	38
1986	2073	2077	1951	1955	44
1987	2370	2374	2049	2053	50
1988	2763	2770	1991	1996	56
1989	3180	3190	1948	1954	61
1990	3748	3761	2235	2242	66
1991	4273	4288	2417	2425	68
1992	4840	4859	2527	2536	71
1993	5517	5540	2504	2514	76
1994	6207	6237	2222	2232	83
1995	6956	6991	2172	2182	91
1996	7929	7976	2248	2261	99
1997	8982	9048	2509	2527	108
1998	10068	10151	2805	2827	118
1999	11211	11311	3187	3216	127

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	12561	12712	3540	3581	136
2001	15087	15323	4216	4281	147
2002	17176	17454	4843	4918	160
2003	19568	19909	5412	5504	175
2004	21979	22360	5812	5911	198
2005	24547	24966	6403	6511	224
2006	27496	27961	7083	7201	255
2007	30436	30971	7444	7573	294
2008	33574	34201	7738	7880	341
2009	37020	37780	8613	8789	391
2010	40610	41510	9163	9363	458
2011	44800	45780	9575	9784	537
2012	48910	50000	10227	10451	623
2013	53540	54720	10932	11170	716
2014	58450	59710	11744	11994	817

19.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table AH-2.1 presents human capital per capita for Anhui by region. From 1985 to 2014, the nominal human capital per capita increases from 38,890 Yuan to 1,229,020 Yuan, an increase of more than 30 times; and the real human capital per capita increases from 38,890 Yuan to 246,940 Yuan, an increase of approximately 5 times.

Figure AH-2.1 illustrates the trends of human capital per capita by

gender for Anhui. The real human capital per capita of male is similar to that of female for Anhui. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.

Figure AH-2.1 Human Capital Per Capita by Gender for Anhui，1985-2014

Table AH-2.1 Nominal and Real Human Capital Per Capita by Region for Anhui

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	38.89	86.93	29.97	38.89	86.93	29.97
1986	44.09	99.24	33.52	41.50	93.80	31.47
1987	49.93	111.63	37.76	43.17	96.01	32.74
1988	56.97	127.44	42.60	41.06	90.28	31.01
1989	64.98	147.28	47.89	39.81	90.18	29.35
1990	74.39	168.60	53.69	44.36	100.62	32.00

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	83.78	192.10	59.77	47.40	106.74	34.23
1992	94.00	216.68	66.41	49.08	110.66	35.21
1993	106.32	247.28	74.15	48.26	110.39	34.07
1994	118.64	278.33	81.93	42.47	97.53	29.80
1995	132.37	309.23	90.90	41.33	93.49	29.08
1996	151.33	351.30	99.54	42.91	96.47	29.03
1997	172.33	395.58	108.51	48.14	106.60	31.43
1998	194.02	437.20	118.01	54.06	117.47	34.21
1999	216.94	477.99	127.97	61.67	131.59	37.86
2000	244.29	527.11	139.48	68.85	143.81	41.06
2001	292.97	617.06	155.10	81.87	168.36	45.07
2002	333.34	670.08	171.27	93.99	184.48	50.42
2003	381.36	732.76	189.72	105.47	198.17	54.92
2004	430.25	789.86	210.68	113.77	204.81	58.19
2005	482.93	847.85	234.62	125.97	217.67	63.60
2006	544.15	941.89	264.46	140.17	238.47	71.05
2007	607.61	1038.08	294.13	148.61	249.60	75.11
2008	676.35	1141.56	326.60	155.88	258.94	78.39
2009	753.40	1254.39	364.54	175.28	287.75	88.00
2010	831.07	1366.19	403.01	187.52	304.27	94.09
2011	922.23	1490.89	452.83	197.11	315.03	99.83
2012	1016.63	1614.56	508.26	212.58	333.82	109.42
2013	1120.02	1749.08	569.71	228.69	353.15	119.78
2014	1229.02	1886.88	637.03	246.94	375.02	131.70

Figure AH-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
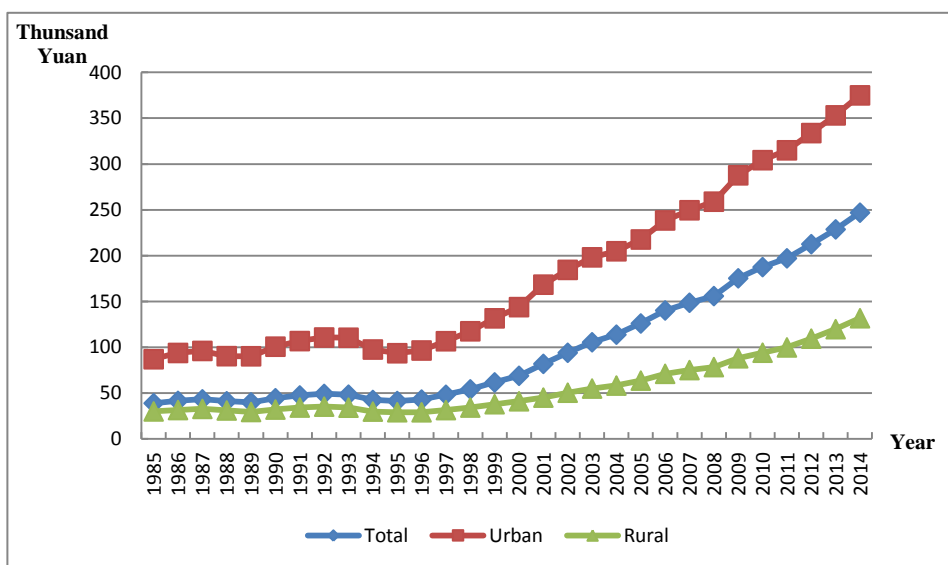
Figure AH-2.2 Real Human Capital Per Capita by Region for Anhui，1985-2014

19.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

19.3.1 Total labor force human capital

The total labor force human capital for Anhui is reported in Table AH-3.1 From 1985 to 2014, the nominal labor force human capital increases from 654 billion Yuan to 18,904 billion Yuan, an increase of more than 27 times; and the real labor force human capital increases from 654 billion

Yuan to 3,815 billion Yuan, an increase of approximately 4 times.

Table AH-3.1 Nominal and Real Labor Force Human Capital for Anhui

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	654	654	654	654
1986	776	775	730	730
1987	923	923	798	798
1988	1120	1120	808	807
1989	1311	1311	803	803
1990	1570	1569	936	935
1991	1792	1791	1015	1014
1992	2023	2023	1058	1057
1993	2273	2272	1033	1032
1994	2545	2544	913	912
1995	2840	2840	889	889
1996	3140	3140	894	894
1997	3484	3487	979	980
1998	3884	3887	1088	1089
1999	4326	4329	1236	1237
2000	4858	4819	1375	1364
2001	5256	5228	1476	1469
2002	5719	5704	1622	1618
2003	6245	6242	1738	1737
2004	6821	6854	1814	1822
2005	7586	7624	1986	1996
2006	8494	8541	2200	2211
2007	9482	9539	2335	2349
2008	10690	10762	2480	2496

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2009	12315	12408	2881	2903
2010	13999	14120	3172	3199
2011	15176	15316	3257	3287
2012	16244	16414	3410	3444
2013	17177	17358	3522	3559
2014	18904	19097	3815	3854

19.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables AH-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 24,960 Yuan to 605,940 Yuan, an increase of more than 23 times; and the real average labor force human capital increases from 24,960 Yuan to 122,280 Yuan, an increase of approximately 3 times.

Table AH-3.2 Nominal and Real Average Labor Force Human Capital by Region for Anhui

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	24.96	46.54	20.69	24.96	46.54	20.69
1986	28.64	54.23	23.37	26.95	51.26	21.95
1987	33.01	63.24	26.45	28.54	54.38	22.94
1988	37.96	73.27	30.03	27.37	51.91	21.86

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	43.21	84.31	33.84	26.47	51.62	20.73
1990	49.73	97.43	38.06	29.66	58.14	22.69
1991	55.26	108.47	42.33	31.28	60.27	24.24
1992	61.02	119.42	46.87	31.89	60.99	24.85
1993	67.77	132.45	52.07	30.79	59.13	23.92
1994	74.97	146.62	57.61	26.88	51.38	20.96
1995	83.35	161.74	63.79	26.10	48.90	20.41
1996	92.61	177.79	69.60	26.37	48.82	20.30
1997	103.12	195.55	75.74	28.97	52.70	21.94
1998	115.08	216.69	82.11	32.23	58.22	23.80
1999	127.97	238.89	88.31	36.57	65.76	26.12
2000	143.81	266.33	95.35	40.70	72.66	28.07
2001	158.30	281.84	103.37	44.46	76.90	30.04
2002	172.82	297.70	111.81	49.02	81.96	32.92
2003	190.28	315.87	121.24	52.95	85.43	35.10
2004	209.93	337.72	130.64	55.82	87.57	36.08
2005	234.86	365.87	141.90	61.48	93.93	38.47
2006	263.14	399.93	166.45	68.14	101.26	44.72
2007	291.90	435.53	191.95	71.88	104.72	49.02
2008	327.16	482.01	217.13	75.88	109.33	52.11
2009	373.96	549.98	244.39	87.49	126.16	59.00
2010	420.85	616.82	270.47	95.36	137.37	63.14
2011	465.43	672.29	303.34	99.89	142.06	66.87
2012	507.12	715.79	339.93	106.46	147.99	73.18
2013	547.60	756.29	377.87	112.28	152.70	79.44
2014	605.94	828.05	421.34	122.28	164.57	87.11

Chapter 20   Human Capital for Fujian

20.1 Total human capital

Table FJ-1.1 presents the results of nominal and real total human capital and real physical capital for Fujian. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Fujian.

Table FJ-1.1 Real Physical Capital, Nominal and Real Human Capital for Fujian

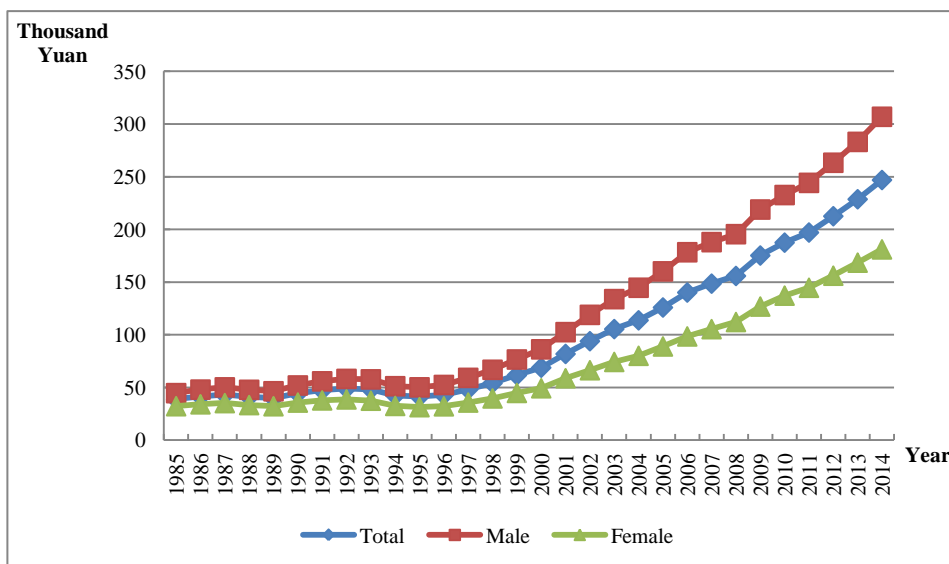| Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1460	1461	1460	1461	25
1986	1679	1680	1587	1588	29
1987	1931	1932	1678	1679	33
1988	2255	2257	1551	1552	36
1989	2625	2629	1518	1520	39
1990	3031	3036	1769	1771	41
1991	3516	3521	1983	1987	44
1992	4084	4091	2175	2180	48
1993	4736	4745	2179	2184	55
1994	5467	5479	1999	2003	65
1995	6305	6320	1991	1995	77
1996	7178	7201	2125	2131	91
1997	8142	8175	2353	2362	105
1998	9085	9126	2621	2632	122
1999	10105	10160	2936	2950	140

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	11400	11519	3221	3252	157
2001	13236	13454	3765	3823	174
2002	14645	14904	4177	4248	192
2003	16114	16412	4549	4629	215
2004	17715	18052	4797	4884	246
2005	19326	19690	5113	5204	285
2006	21731	22167	5691	5798	333
2007	24641	25190	6118	6249	395
2008	27461	28093	6513	6657	475
2009	30470	31196	7352	7519	563
2010	33690	34520	7867	8054	658
2011	37238	38198	8252	8457	767
2012	40323	41374	8713	8931	884
2013	43266	44378	9115	9340	1015
2014	46510	47660	9600	9829	1156

20.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table FJ-2.1 presents human capital per capita for Fujian by region. From 1985 to 2014, the nominal human capital per capita increases from 59,260 Yuan to 1,449,150 Yuan, an increase of more than 23 times; and the real human capital per capita increases from 59,260 Yuan to 299,110 Yuan, an increase of approximately 4 times.

Figure FJ-2.1 illustrates the trends of human capital per capita by

gender for Fujian. The real human capital per capita of male is similar to that of female for Fujian. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.

Figure FJ-2.1 Human Capital Per Capita by Gender for Fujian，1985-2014

Table FJ-2.1 Nominal and Real Human Capital Per Capita by Region for Fujian

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	59.26	80.50	53.59	59.26	80.50	53.59
1986	67.32	94.54	60.01	63.62	88.43	56.93
1987	76.47	111.14	67.13	66.46	94	59.02
1988	87.06	130.55	75.35	59.88	86.94	52.58
1989	98.89	152.69	84.37	57.20	85.59	49.52
1990	111.54	175.89	94.23	65.10	98.50	56.09
1991	127.70	202.12	104.93	72.03	108.22	61.00

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	146.40	234.21	116.14	77.97	116.11	64.86
1993	167.74	269.28	128.61	77.18	114.29	62.89
1994	191.33	304.16	142.96	69.97	103.20	55.70
1995	218.13	343.44	158.71	68.89	100.11	54.06
1996	245.66	384.96	172.92	72.73	104.96	55.88
1997	275.70	428.60	188.19	79.68	114.01	60.03
1998	304.68	465.78	204.01	87.90	123.90	65.40
1999	335.74	505.12	220.61	97.55	136.14	71.30
2000	375.15	557.07	241.02	106.00	145.48	76.89
2001	433.37	650.62	261.92	123.27	172.85	84.15
2002	477.67	707.15	283.82	136.24	189.39	91.37
2003	524.38	763.34	308.66	148.03	203.02	98.38
2004	576.56	826.97	335.15	156.12	211.89	102.42
2005	629.59	887.14	364.96	166.57	223.06	108.49
2006	702.54	972.26	406.46	183.98	241.81	120.47
2007	791.07	1082.21	449.50	196.41	256.09	126.40
2008	875.86	1177.18	498.65	207.73	266.57	134.05
2009	966.39	1275.34	554.51	233.18	293.79	152.26
2010	1061.15	1375.68	614.36	247.79	307.38	163.15
2011	1168.54	1501.88	672.97	258.95	318.99	169.72
2012	1263.66	1597.19	733.69	273.05	331.20	180.62
2013	1352.75	1680.76	803.86	284.99	339.70	193.44
2014	1449.15	1772.29	882.00	299.11	350.83	208.29

Figure FJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

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significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.

Figure FJ-2.2 Real Human Capital Per Capita by Region for Fujian，1985-2014

20.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

20.3.1 Total labor force human capital

The total labor force human capital for Fujian is reported in Table FJ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 519 billion Yuan to 17,879 billion Yuan, an increase of more than 33 times; and the real labor force human capital increases from 519 billion Yuan to 3,737 billion Yuan, an increase of approximately 6 times.

Table FJ-3.1 Nominal and Real Labor Force Human Capital for Fujian

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	519	519	519	519
1986	617	617	583	583
1987	729	728	634	633
1988	864	863	595	594
1989	1016	1016	588	588
1990	1193	1192	697	696
1991	1401	1399	792	791
1992	1613	1612	864	864
1993	1860	1859	864	864
1994	2129	2127	787	786
1995	2436	2434	779	778
1996	2737	2736	821	821
1997	3100	3100	909	909
1998	3576	3578	1045	1046
1999	4090	4096	1201	1202
2000	4649	4634	1328	1324
2001	5115	5110	1476	1474
2002	5631	5633	1629	1629
2003	6216	6218	1777	1777
2004	6808	6847	1864	1875
2005	7464	7510	1992	2004
2006	8514	8571	2257	2272
2007	9648	9721	2431	2449
2008	10934	11028	2630	2651
2009	12545	12665	3064	3092

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2010	14314	14469	3378	3413
2011	15182	15348	3407	3443
2012	16036	16233	3510	3550
2013	16785	16993	3585	3628
2014	17879	18098	3737	3782

20.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables FJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 36,560 Yuan to 730,530 Yuan, an increase of more than 19 times; and the real average labor force human capital increases from 36,560 Yuan to 152,690 Yuan, an increase of approximately 3 times.

Table FJ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Fujian

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	36.56	47.39	34.76	36.56	47.39	34.76
1986	42.13	56.08	39.40	39.81	52.46	37.38
1987	48.17	66.07	44.56	41.87	55.88	39.18
1988	55.02	76.89	50.46	37.87	51.21	35.21
1989	62.71	89.32	56.88	36.30	50.07	33.38

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	71.05	101.94	63.95	41.50	57.09	38.07
1991	81.14	117.13	71.67	45.88	62.71	41.66
1992	91.55	132.89	80.14	49.05	65.88	44.75
1993	103.62	151.16	89.77	48.14	64.16	43.90
1994	116.96	171.49	99.89	43.21	58.18	38.92
1995	132.07	195.04	110.42	42.22	56.85	37.61
1996	146.74	217.90	119.50	44.04	59.41	38.61
1997	163.40	242.50	129.59	47.89	64.51	41.34
1998	182.12	267.69	141.26	53.22	71.21	45.29
1999	201.02	291.38	152.89	59.03	78.53	49.41
2000	221.06	315.14	166.17	63.13	82.30	53.01
2001	238.64	337.32	179.56	68.85	89.62	57.69
2002	256.96	360.63	192.58	74.32	96.58	62.00
2003	278.63	391.19	206.20	79.65	104.04	65.72
2004	300.67	423.93	219.50	82.34	108.62	67.08
2005	324.41	457.66	234.37	86.59	115.08	69.67
2006	360.92	499.42	272.32	95.68	124.21	80.71
2007	401.48	546.57	310.28	101.16	129.34	87.25
2008	449.13	603.36	346.74	108.03	136.63	93.21
2009	508.82	675.58	386.71	124.27	155.63	106.19
2010	570.29	747.82	429.06	134.58	167.09	113.94
2011	609.78	788.10	469.66	136.84	167.39	118.45
2012	648.35	821.51	509.09	141.91	170.35	125.33
2013	683.31	850.51	551.35	145.94	171.90	132.68
2014	730.53	899.24	594.22	152.69	178.01	140.33

Chapter 21   Human Capital for Jiangxi

21.1 Total human capital

Table JX-1.1 presents the results of nominal and real total human capital and real physical capital for Jiangxi. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Jiangxi.

Table JX-1.1 Real   Physical Capital, Nominal and Real Human Capital for Jiangxi

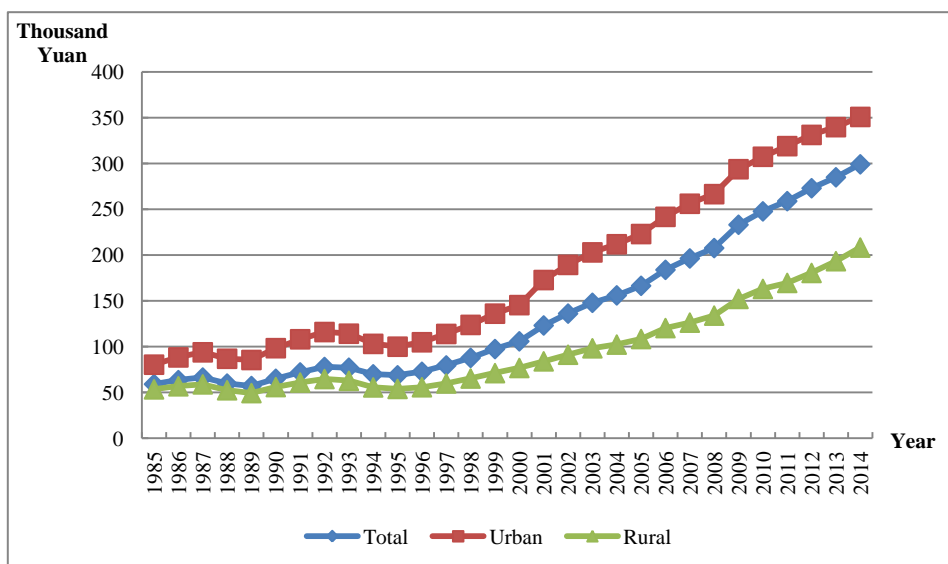| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	1333	1335	1333	1335	35
1986	1521	1523	1422	1424	40
1987	1738	1740	1533	1535	43
1988	2006	2008	1461	1463	45
1989	2280	2283	1397	1399	49
1990	2598	2603	1556	1559	52
1991	2960	2965	1730	1734	55
1992	3374	3381	1877	1882	61
1993	3849	3857	1879	1884	70
1994	4336	4345	1668	1671	79
1995	4874	4886	1601	1605	88
1996	5443	5459	1646	1651	98
1997	6065	6087	1787	1793	110
1998	6774	6804	1973	1981	122

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	7553	7592	2227	2238	135
2000	8439	8510	2472	2491	149
2001	10022	10140	2930	2962	165
2002	11449	11605	3331	3374	189
2003	12992	13175	3738	3787	222
2004	14559	14771	4043	4099	263
2005	15865	16082	4322	4378	310
2006	18259	18528	4910	4979	369
2007	20822	21163	5326	5410	439
2008	23304	23696	5621	5710	522
2009	26409	26883	6407	6517	609
2010	30050	30640	7066	7198	708
2011	33860	34500	7552	7690	817
2012	38300	39060	8300	8459	921
2013	42940	43810	9059	9238	1027
2014	47960	48940	9878	10073	1120

21.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table JX-2.1 presents human capital per capita for Jiangxi by region. From 1985 to 2014, the nominal human capital per capita increases from 42,270 Yuan to 1,229,380 Yuan, an increase of more than 28 times; and the real human capital per capita increases from 42,270 Yuan to 253,210 Yuan, an increase of approximately 4 times.

Figure JX-2.1 illustrates the trends of human capital per capita by gender for Jiangxi. The real human capital per capita of male is similar to that of female for Jiangxi. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.

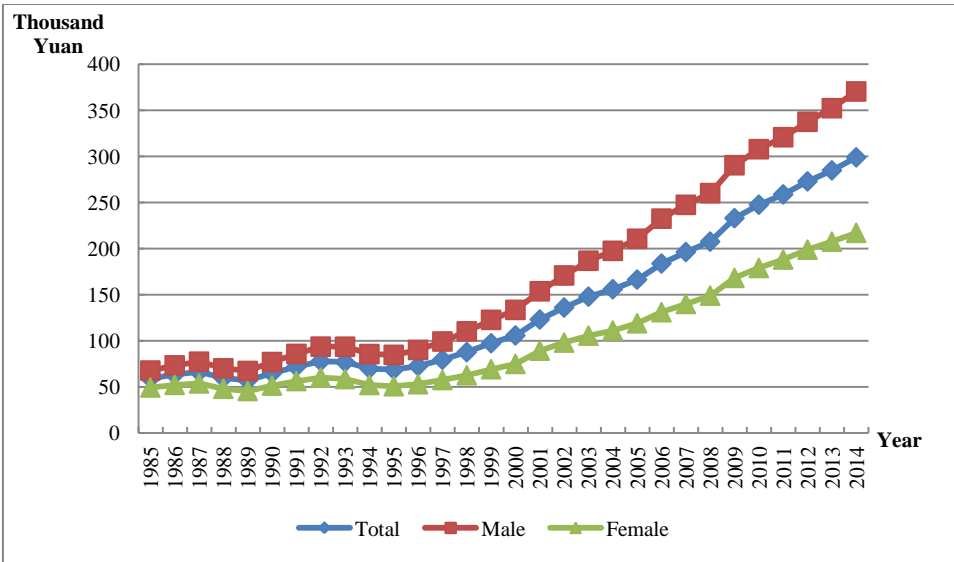**Figure JX-2.1 Human Capital Per Capita by Gender for Jiangxi，1985-2014**

Table JX-2.1 Nominal and Real Human Capital Per Capita by Region for Jiangxi

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	42.27	70.93	35.25	42.27	70.93	35.25
1986	47.61	80.84	39.43	44.53	76.26	36.71
1987	53.77	92.52	44.18	47.44	80.90	39.14
1988	60.82	106.33	49.40	44.31	75.16	36.56
1989	67.82	117.73	55.12	41.56	71.00	34.08
1990	75.81	130.77	61.72	45.41	77.70	37.12
1991	85.75	148.73	68.78	50.13	84.65	40.84

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1992	97.12	171.23	76.12	54.03	90.65	43.67
1993	110.20	195.97	84.72	53.81	89.59	43.20
1994	123.50	220.13	93.49	47.50	79.31	37.63
1995	138.15	245.47	103.40	45.38	75.65	35.57
1996	153.62	276.02	112.37	46.46	78.69	35.59
1997	170.36	306.13	122.81	50.20	84.73	38.10
1998	189.51	343.31	133.74	55.20	94.09	41.08
1999	210.52	383.59	145.59	62.07	106.08	45.59
2000	234.22	427.26	159.37	68.61	115.72	50.35
2001	275.60	505.63	175.59	80.57	137.23	55.93
2002	312.69	558.72	194.01	90.98	151.33	61.85
2003	353.18	613.72	214.93	101.61	164.74	68.12
2004	395.05	661.16	240.90	109.70	171.81	73.76
2005	430.41	693.98	264.35	117.25	177.67	79.20
2006	490.57	777.44	300.34	131.92	197.27	88.57
2007	554.90	864.22	338.64	141.94	210.04	94.39
2008	616.78	941.35	379.84	148.77	216.04	99.60
2009	694.49	1040.36	430.54	168.49	240.21	113.80
2010	782.83	1160.85	482.43	184.07	260.42	123.43
2011	876.99	1285.11	535.71	195.60	274.30	129.79
2012	988.94	1439.84	592.44	214.31	299.41	139.41
2013	1105.46	1594.42	654.19	233.22	323.93	149.54
2014	1229.38	1753.83	722.41	253.21	347.96	161.58

Figure JX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

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significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.

Figure JX-2.2 Real Human Capital Per Capita by Region for Jiangxi，1985-2014

21.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

21.3.1 Total labor force human capital

The total labor force human capital for Jiangxi is reported in Table JX-3.1 From 1985 to 2014, the nominal labor force human capital increases from 456 billion Yuan to 15,978 billion Yuan, an increase of more than 34 times; and the real labor force human capital increases from 456 billion Yuan to 3,347 billion Yuan, an increase of approximately 6 times.

Table JX-3.1 Nominal and Real Labor Force Human Capital for Jiangxi

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	456	456	456	456
1986	532	531	497	497
1987	615	615	542	542
1988	730	730	532	532
1989	872	871	535	534
1990	1043	1042	625	624
1991	1204	1203	704	704
1992	1379	1379	770	770
1993	1578	1578	777	777
1994	1797	1796	698	697
1995	2024	2022	671	671
1996	2224	2223	680	680
1997	2425	2426	723	724
1998	2670	2672	787	788
1999	2936	2939	878	879
2000	3238	3218	966	960
2001	3507	3493	1050	1046
2002	3846	3836	1146	1144
2003	4200	4198	1238	1238
2004	4537	4552	1287	1291
2005	4959	4976	1374	1379
2006	5759	5781	1579	1585
2007	6710	6740	1750	1757
2008	7753	7791	1904	1913
2009	9120	9171	2249	2262

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2010	10614	10688	2532	2548
2011	11617	11706	2629	2649
2012	12730	12842	2805	2829
2013	14054	14189	3017	3044
2014	15978	16144	3347	3380

21.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables JX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 27,790 Yuan to 644,920 Yuan, an increase of more than 22 times; and the real average labor force human capital increases from 27,790 Yuan to 135,090 Yuan, an increase of approximately 3 times.

Table JX-3.2 Nominal and Real Average Labor Force Human Capital by Region for Jiangxi

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	27.79	41.27	24.08	27.79	41.27	24.08
1986	31.61	48.16	26.99	29.56	45.44	25.13
1987	35.78	55.49	30.27	31.56	48.52	26.82
1988	40.42	62.38	34.34	29.46	44.09	25.41
1989	45.77	70.26	38.95	28.07	42.37	24.08

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	52.27	79.86	44.17	31.30	47.45	26.57
1991	58.69	89.52	49.63	34.34	50.95	29.47
1992	65.43	99.48	55.61	36.56	52.67	31.90
1993	73.19	111.16	62.43	36.03	50.82	31.83
1994	81.64	124.42	69.45	31.70	44.82	27.95
1995	90.73	138.77	76.80	30.10	42.77	26.42
1996	98.79	152.19	83.18	30.21	43.39	26.35
1997	107.66	166.71	89.86	32.11	46.14	27.88
1998	117.52	181.93	97.28	34.65	49.86	29.88
1999	127.76	197.05	104.87	38.22	54.49	32.84
2000	139.83	215.11	113.95	41.70	58.26	36.00
2001	151.86	228.17	123.36	45.45	61.92	39.29
2002	165.66	245.42	132.75	49.38	66.47	42.32
2003	180.12	261.34	142.86	53.10	70.15	45.28
2004	195.84	279.79	152.56	55.55	72.71	46.71
2005	213.75	300.53	163.45	59.23	76.94	48.97
2006	244.73	330.69	193.59	67.10	83.91	57.09
2007	279.95	368.55	225.21	73.01	89.57	62.77
2008	317.94	409.43	258.12	78.07	93.97	67.68
2009	367.93	472.35	294.81	90.73	109.06	77.93
2010	420.93	539.57	331.89	100.41	121.04	84.91
2011	466.56	595.09	368.63	105.59	127.02	89.31
2012	515.81	652.76	411.26	113.66	135.74	96.77
2013	571.50	717.60	458.22	122.69	145.79	104.75
2014	644.92	814.76	508.50	135.09	161.65	113.74

Chapter 22   Human Capital for Shandong

22.1 Total human capital

Table SD-1.1 presents the results of nominal and real total human capital and real physical capital for Shandong. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Shandong.

Table SD-1.1 Real Physical Capital, Nominal and Real Human Capital for Shandong

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	3458	3463	3458	3463	100
1986	4037	4044	3866	3872	115
1987	4789	4797	4242	4250	132
1988	5609	5621	4193	4201	148
1989	6527	6544	4147	4158	162
1990	7556	7576	4642	4655	176
1991	8645	8672	5055	5070	193
1992	9867	9900	5411	5430	214
1993	11257	11300	5472	5493	239
1994	12706	12760	4987	5008	262
1995	14272	14338	4761	4784	286
1996	15947	16020	4832	4853	315
1997	17874	17975	5252	5279	349
1998	19953	20073	5882	5916	388

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	22110	22270	6539	6582	433
2000	24580	24930	7216	7312	488
2001	28446	28820	8174	8275	547
2002	32254	32717	9313	9440	619
2003	36258	36894	10336	10508	710
2004	40210	40940	11068	11263	830
2005	44630	45530	12083	12321	985
2006	50250	51340	13464	13750	1169
2007	56030	57320	14402	14727	1371
2008	62220	63740	15213	15577	1595
2009	69010	70850	16880	17324	1855
2010	75360	77360	17919	18384	2155
2011	83210	85450	18838	19333	2483
2012	90380	92780	20044	20559	2817
2013	97300	99820	21134	21670	3169
2014	104740	107320	22316	22851	3531

22.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table SD-2.1 presents human capital per capita for Shandong by region. From 1985 to 2014, the nominal human capital per capita increases from 50,030 Yuan to 1,325,640 Yuan, an increase of more than 25 times; and the real human capital per capita increases from 50,030 Yuan to 282,440 Yuan, an increase of approximately 4 times.

Figure SD-2.1 illustrates the trends of human capital per capita by gender for Shandong. The real human capital per capita of male is similar to that of female for Shandong. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
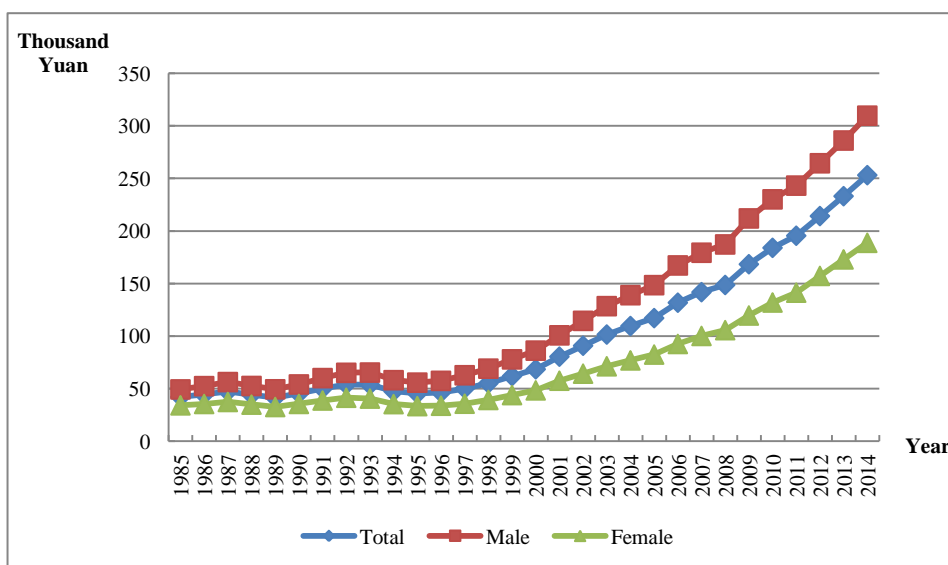

Figure SD-2.1 Human Capital Per Capita by Gender for Shandong，1985-2014

Table SD-2.1 Nominal and Real Human Capital Per Capita by Region for Shandong

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	50.03	77.58	41.93	50.03	77.58	41.93
1986	57.80	91.91	47.10	55.35	87.54	45.25
1987	67.67	109.53	53.86	59.94	95.61	48.17
1988	77.67	126.54	60.67	58.06	91.59	46.38
1989	88.63	145.59	67.89	56.31	91.08	43.65
1990	100.86	166.49	75.76	61.96	101.52	46.84

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	114.67	189.81	84.16	67.05	108.98	50.03
1992	130.01	216.55	93.01	71.30	114.49	52.86
1993	148.03	248.05	102.44	71.96	114.43	52.59
1994	166.51	279.09	112.31	65.35	102.68	47.38
1995	186.37	313.49	122.10	62.17	98.74	43.68
1996	207.63	349.48	132.14	62.91	99.62	43.37
1997	231.80	390.28	143.32	68.11	107.80	45.94
1998	257.35	434.36	154.65	75.86	120.34	50.07
1999	284.70	478.54	166.27	84.20	132.57	54.60
2000	315.27	529.27	179.38	92.55	144.89	59.32
2001	364.54	608.73	195.69	104.75	164.83	63.20
2002	412.96	682.25	211.96	119.24	187.17	68.52
2003	465.38	757.14	230.02	132.67	206.27	73.26
2004	517.15	826.08	250.87	142.35	218.92	76.39
2005	578.78	907.42	273.25	156.70	237.86	81.25
2006	648.02	1007.95	305.35	173.63	261.60	89.90
2007	719.38	1106.47	340.04	184.91	276.65	95.07
2008	796.57	1211.96	377.15	194.77	289.43	99.29
2009	882.19	1328.26	420.84	215.79	317.39	110.71
2010	960.19	1425.89	467.13	228.31	331.11	119.42
2011	1058.02	1556.52	513.70	239.53	345.22	124.01
2012	1147.74	1671.22	563.93	254.54	363.03	133.47
2013	1235.36	1776.09	614.01	268.33	379.03	141.09
2014	1325.64	1878.43	672.17	282.44	392.59	152.11

Figure SD-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
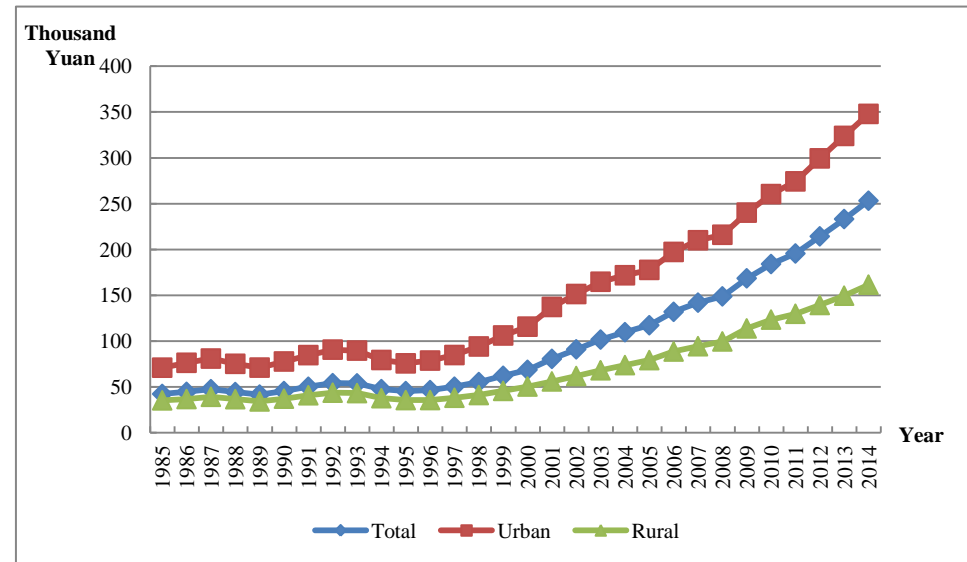

Figure SD-2.2 Real Human Capital Per Capita by Region for Shandong，1985-2014

22.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

22.3.1 Total labor force human capital

The total labor force human capital for Shandong is reported in Table SD-3.1 From 1985 to 2014, the nominal labor force human capital increases from 1,405 billion Yuan to 36,620 billion Yuan, an increase of more than 25 times; and the real labor force human capital increases from 1,405 billion Yuan to 7,877 billion Yuan, an increase of approximately 4 times.

Table SD-3.1 Nominal and Real Labor Force Human Capital for Shandong

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	1405	1405	1405	1405
1986	1653	1652	1583	1583
1987	1942	1941	1721	1720
1988	2318	2318	1734	1734
1989	2737	2737	1740	1739
1990	3201	3199	1967	1966
1991	3667	3666	2145	2145
1992	4172	4171	2290	2289
1993	4751	4748	2314	2313
1994	5356	5353	2109	2108
1995	6037	6031	2021	2019
1996	6692	6690	2035	2034
1997	7449	7451	2196	2196
1998	8381	8387	2477	2478
1999	9356	9364	2773	2775
2000	10405	10494	3064	3088
2001	11272	11249	3266	3260
2002	12200	12186	3567	3563
2003	13409	13412	3882	3883
2004	14781	14868	4128	4152
2005	16398	16500	4500	4527
2006	18473	18606	5023	5058
2007	20690	20865	5391	5436
2008	23083	23300	5709	5762
2009	26137	26418	6457	6525

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2010	29217	29572	7006	7091
2011	30980	31380	7072	7160
2012	32470	32910	7267	7362
2013	34130	34590	7478	7577
2014	36620	37090	7877	7976

22.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables SD-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 33,280 Yuan to 668,250 Yuan, an increase of more than 19 times; and the real average labor force human capital increases from 33,280 Yuan to 143,740 Yuan, an increase of approximately 3 times.

Table SD-3.2 Nominal and Real Average Labor Force Human Capital by Region for Shandong

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	33.28	48.14	28.71	33.28	48.14	28.71
1986	38.37	56.51	32.40	36.75	53.82	31.12
1987	44.48	66.64	36.65	39.41	58.17	32.78
1988	51.01	76.80	41.25	38.15	55.59	31.53
1989	58.17	88.48	46.11	36.97	55.35	29.64

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	66.42	101.50	51.53	40.81	61.89	31.86
1991	75.16	115.44	57.15	43.96	66.28	33.97
1992	84.23	130.04	63.05	46.23	68.75	35.83
1993	94.79	146.82	69.52	46.17	67.73	35.69
1994	105.96	164.52	76.25	41.72	60.52	32.16
1995	118.33	184.34	83.41	39.61	58.06	29.84
1996	130.67	204.13	89.61	39.74	58.19	29.42
1997	144.89	226.91	96.20	42.71	62.67	30.84
1998	160.70	252.59	103.39	47.50	69.98	33.48
1999	177.20	277.14	110.75	52.52	76.78	36.37
2000	193.76	301.11	119.74	57.06	82.43	39.60
2001	210.30	322.21	130.79	60.93	87.25	42.24
2002	225.51	339.62	143.23	65.93	93.17	46.30
2003	244.69	360.35	158.36	70.84	98.17	50.44
2004	266.81	387.13	172.91	74.51	102.59	52.65
2005	294.40	418.43	189.01	80.79	109.68	56.20
2006	328.70	461.63	216.50	89.38	119.81	63.74
2007	366.19	509.94	242.77	95.42	127.50	67.88
2008	407.83	563.72	268.44	100.87	134.62	70.67
2009	459.35	633.51	297.21	113.48	151.38	78.19
2010	510.79	699.92	327.34	122.48	162.53	83.69
2011	550.27	747.15	357.61	125.61	165.71	86.33
2012	583.99	781.66	391.78	130.70	169.80	92.73
2013	620.55	814.63	429.29	135.96	173.85	98.65
2014	668.25	867.05	469.00	143.74	181.21	106.13

Chapter 23   Human Capital for Henan

23.1 Total human capital

Table HeN-1.1 presents the results of nominal and real total human capital and real physical capital for Henan. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Henan.

Table HeN-1.1 Real Physical Capital, Nominal and Real Human Capital for Henan

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	2591	2592	2591	2592	80
1986	2971	2974	2831	2834	90
1987	3424	3427	3079	3082	99
1988	4022	4027	3039	3042	112
1989	4687	4694	2950	2953	122
1990	5454	5463	3405	3410	132
1991	6179	6190	3800	3806	143
1992	6976	6991	4112	4120	156
1993	7861	7880	4194	4205	170
1994	8718	8742	3731	3741	188
1995	9650	9678	3546	3555	212
1996	11116	11161	3674	3688	241
1997	12895	12966	4100	4122	273
1998	14601	14671	4748	4769	309

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	16608	16702	5550	5580	345
2000	18598	18774	6251	6307	385
2001	21850	22120	7260	7349	427
2002	24140	24430	8001	8093	475
2003	26970	27340	8791	8905	535
2004	29870	30270	9227	9345	611
2005	32710	33130	9890	10012	719
2006	37460	37960	11165	11307	867
2007	42270	42850	11939	12097	1062
2008	47210	47880	12442	12612	1297
2009	52850	53640	13992	14195	1586
2010	58050	58960	14475	14702	1937
2011	64300	65240	15538	15759	2325
2012	71080	72080	16746	16973	2747
2013	77120	78180	17659	17896	3205
2014	83440	84510	18760	18987	3681

23.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table HeN-2.1 presents human capital per capita for Henan by region. From 1985 to 2014, the nominal human capital per capita increases from 37,310 Yuan to 1,050,790 Yuan, an increase of more than 27 times; and the real human capital per capita increases from 37,310 Yuan to 236,250 Yuan, an increase of approximately 5 times.

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Figure HeN-2.1 illustrates the trends of human capital per capita by gender for Henan. The real human capital per capita of male is similar to that of female for Henan. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
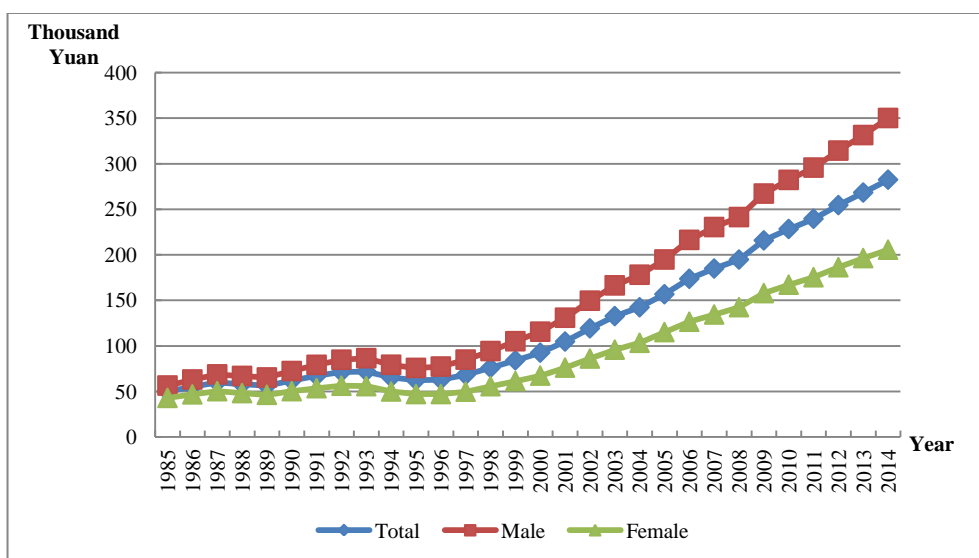

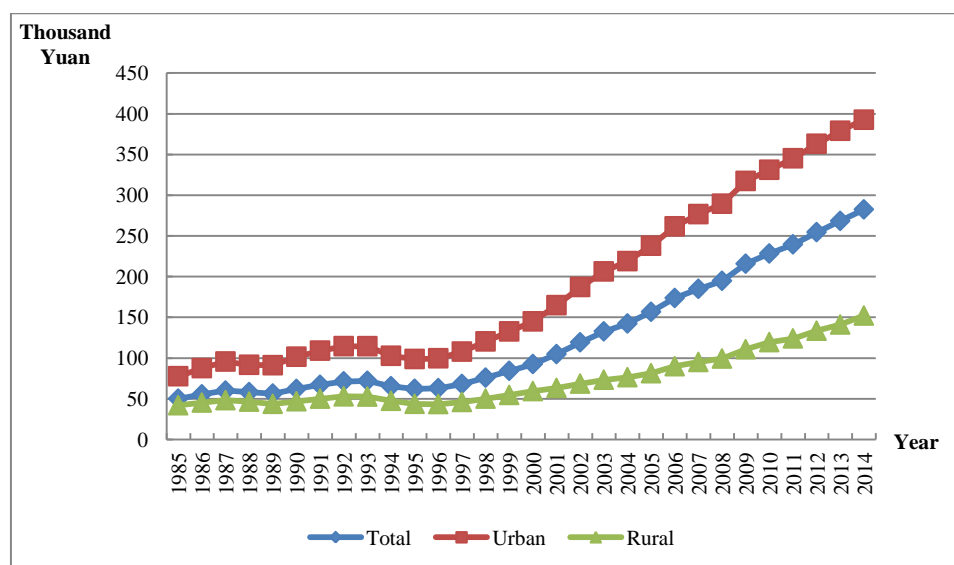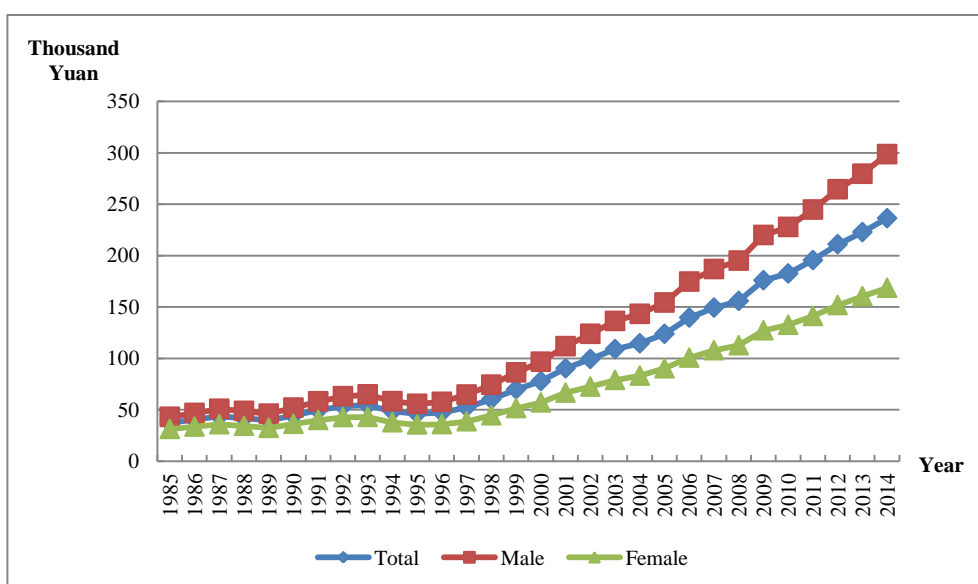**Figure HeN-2.1 Human Capital Per Capita by Gender for Henan，1985-2014**

Table HeN-2.1 Nominal and Real Human Capital Per Capita by Region for Henan

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	37.31	61.21	33.1	37.31	61.21	33.1
1986	42.36	72.51	37.08	40.37	67.9	35.55
1987	48.45	84.87	41.9	43.57	73.72	38.15
1988	55.29	99.94	47.25	41.78	71.45	36.43
1989	62.69	116.82	52.92	39.45	72.68	33.44

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	71.18	136.06	59.3	44.44	84.23	37.14
1991	80.42	159.09	66.09	49.46	93.71	41.4
1992	90.55	185.97	73.4	53.37	101.71	44.67
1993	101.99	214.73	81.85	54.41	106.19	45.17
1994	113.16	242.31	90.32	48.43	94.05	40.36
1995	125.29	272.2	99.69	46.04	90.38	38.3
1996	142.78	313.36	108.57	47.19	95.02	37.61
1997	164.38	365.65	118.08	52.26	108.28	39.37
1998	184.59	402.68	128.48	60.03	121.8	44.12
1999	208.38	449.89	139.26	69.63	140.87	49.25
2000	231.07	482.5	151.24	77.66	152.46	53.92
2001	271.11	561.83	168.94	90.08	176.29	59.81
2002	299.15	589.82	187.67	99.15	185.44	66.04
2003	333.84	633.65	209.03	108.82	195.89	72.54
2004	370.54	673.73	233.53	114.46	197.61	76.89
2005	409.18	719.95	259.61	123.72	206.82	83.72
2006	467.91	800.95	296.99	139.46	227.36	94.36
2007	528.16	880.51	334.96	149.18	237.11	100.97
2008	591.03	957.99	376.74	155.76	242.23	105.25
2009	664.01	1043.9	428.43	175.8	267.09	119.22
2010	731.59	1112.77	481.47	182.42	275.35	121.49
2011	808.72	1199.68	537.91	195.42	281.68	135.73
2012	895.13	1295.88	599.11	210.89	296.54	147.64
2103	972.59	1365.63	664.47	222.7	303.72	159.11
2014	1050.79	1432.53	735.54	236.25	312.33	173.36

Figure HeN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area

remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
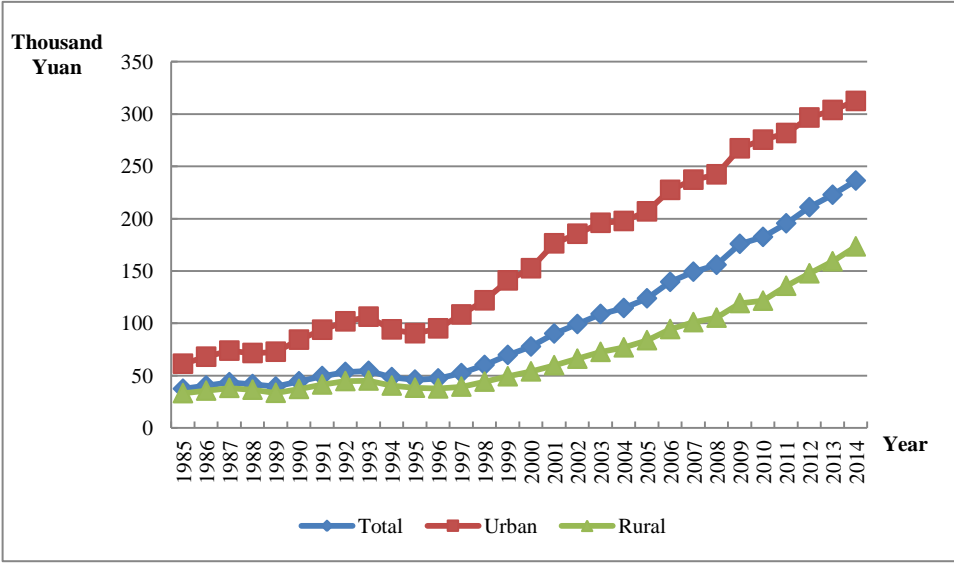
Figure HeN-2.2 Real Human Capital Per Capita by Region for Henan，1985-2014

23.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

23.3.1 Total labor force human capital

The total labor force human capital for Henan is reported in Table HeN-3.1 From 1985 to 2014, the nominal labor force human capital increases from 1,004 billion Yuan to 27,790 billion Yuan, an increase of more than 26 times; and the real labor force human capital increases from

1,004 billion Yuan to 6,303 billion Yuan, an increase of approximately 5 times.

Table HeN-3.1 Nominal and Real Labor Force Human Capital for Henan

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	1004	1004	1004	1004
1986	1170	1170	1115	1115
1987	1369	1368	1231	1230
1988	1642	1641	1241	1240
1989	1949	1949	1226	1226
1990	2299	2298	1435	1435
1991	2555	2554	1573	1572
1992	2817	2817	1666	1666
1993	3102	3102	1664	1663
1994	3425	3424	1476	1476
1995	3793	3792	1405	1404
1996	4197	4199	1402	1403
1997	4730	4738	1523	1525
1998	5312	5322	1751	1753
1999	5865	5874	1987	1990
2000	6517	6524	2219	2221
2001	7224	7241	2434	2439
2002	8028	8038	2690	2693
2003	9092	9106	2995	2999
2004	10228	10275	3190	3205
2005	11620	11674	3546	3562
2006	12973	13035	3908	3926
2007	14453	14525	4130	4150

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2008	16103	16186	4287	4309
2009	18129	18231	4836	4862
2010	20454	20586	5109	5142
2011	21960	22110	5339	5374
2012	23520	23670	5581	5618
2013	25200	25360	5818	5857
2014	27790	27970	6303	6343

23.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables HeN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 25,200 Yuan to 566,970 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 25,200 Yuan to 128,590 Yuan, an increase of approximately 4 times.

Table HeN-3.2 Nominal and Real Average Labor Force Human Capital by Region for Henan

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	25.2	38.77	22.54	25.2	38.77	22.54
1986	28.73	45.41	25.55	27.38	42.51	24.49
1987	33.05	53.27	29.04	29.72	46.27	26.44

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	37.52	62.49	32.67	28.36	44.67	25.19
1989	42.5	73.17	36.62	26.74	45.52	23.14
1990	48.38	85.92	40.99	30.2	53.19	25.67
1991	53.54	96.17	45.41	32.96	56.65	28.44
1992	58.61	106.52	49.97	34.66	58.26	30.41
1993	64.61	118.64	55.15	34.64	58.67	30.43
1994	71.06	131.88	60.63	30.63	51.19	27.09
1995	78.28	146.54	66.95	28.99	48.66	25.72
1996	86.06	160.06	72.75	28.76	48.53	25.2
1997	96.05	180.58	79.18	30.92	53.48	26.4
1998	106.47	198.42	85.95	35.09	60.02	29.51
1999	116.49	214.29	92.32	39.47	67.1	32.65
2000	127.83	231.4	99.04	43.53	73.11	35.31
2001	142.43	252.45	107.77	47.99	79.21	38.15
2002	157.83	272.87	117.63	52.89	85.79	41.39
2003	176.27	295.06	130.44	58.06	91.22	45.27
2004	196.56	316.57	145.34	61.31	92.85	47.86
2005	221.27	344.54	164.25	67.52	98.98	52.97
2006	249.63	375.61	189.71	75.2	106.62	60.28
2007	280.21	411.89	215.25	80.07	110.92	64.89
2008	314.37	452.04	242.08	83.69	114.3	67.63
2009	356.47	504.22	271.92	95.09	129.01	75.67
2010	401.58	557.92	303.3	100.31	138.05	76.53
2011	438.15	597.16	338.76	106.53	140.21	85.48
2012	477.7	631.7	379.77	113.35	144.55	93.59
2013	515.96	655.31	424.96	119.12	145.74	101.76
2014	566.97	706.5	473.16	128.59	154.04	111.52

Chapter 24   Human Capital for Hubei

24.1 Total human capital

Table HuB-1.1 presents the results of nominal and real total human capital and real physical capital for Hubei. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Hubei.

Table HuB-1.1 Real Physical Capital, Nominal and Real Human Capital for Hubei

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	1769	1771	1769	1771	56
1986	2078	2081	1984	1988	62
1987	2460	2465	2186	2190	69
1988	2897	2905	2166	2171	75
1989	3377	3385	2171	2176	80
1990	3969	3981	2479	2487	85
1991	4580	4596	2724	2734	91
1992	5244	5266	2848	2860	99
1993	5990	6020	2748	2762	111
1994	6759	6796	2464	2477	127
1995	7584	7628	2301	2314	148
1996	8717	8783	2415	2433	175
1997	9836	9748	2640	2618	202
1998	11036	11120	3008	3031	232

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	12435	12545	3468	3498	263
2000	13944	14103	3906	3950	295
2001	15891	16119	4434	4497	331
2002	17367	17623	4860	4930	367
2003	19402	19727	5306	5391	406
2004	21216	21591	5527	5625	454
2005	23024	23430	5830	5931	510
2006	25529	26010	6359	6478	584
2007	27923	28484	6636	6765	673
2008	30573	31225	6852	6996	777
2009	33589	34354	7565	7736	901
2010	36760	37988	8045	8311	1055
2011	40651	42851	8416	8867	1248
2012	44664	47184	8987	9491	1447
2013	48440	51210	9483	10022	1668
2014	52530	55480	10083	10644	1908

24.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table HuB-2.1 presents human capital per capita for Hubei by region. From 1985 to 2014, the nominal human capital per capita increases from 39,860 Yuan to 1144,390 Yuan, an increase of more than 27 times; and the real human capital per capita increases from 39,860 Yuan to 219,660 Yuan Yuan, an increase of approximately 5 times.

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Figure HuB-2.1 illustrates the trends of human capital per capita by gender for Hubei. The real human capital per capita of male is similar to that of female for Hubei. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
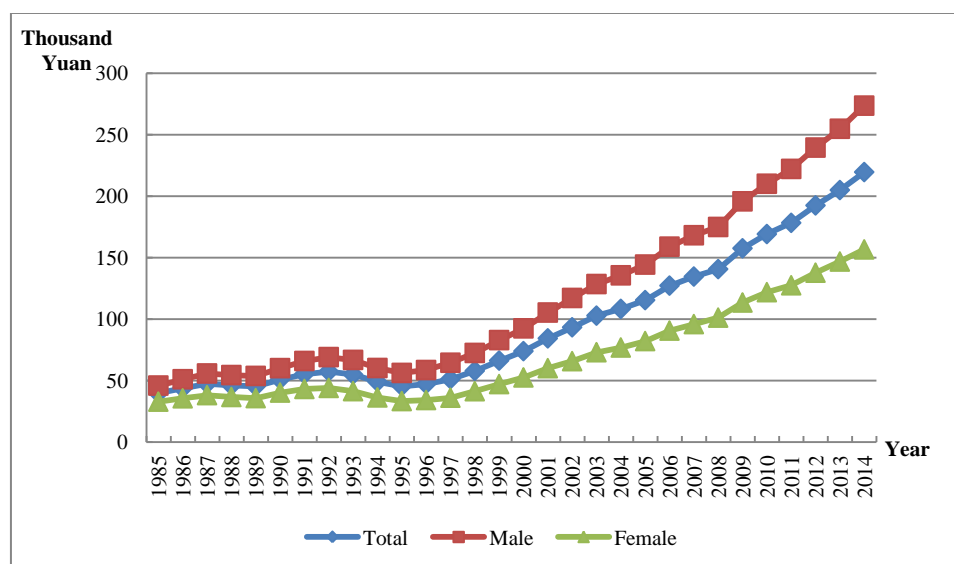
Figure HuB-2.1 Human Capital Per Capita by Gender for Hubei，1985-2014

Table HuB-2.1 Nominal and Real Human Capital Per Capita by Region for Hubei

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	39.86	75.18	29.85	39.86	75.18	29.85
1986	45.96	85.76	33.74	43.89	81.37	32.38
1987	53.53	99.64	38.23	47.56	86.97	34.48
1988	61.76	114.25	43.02	46.18	82.76	33.11
1989	70.65	129.06	48.29	45.42	81.93	31.44
1990	81.59	149.02	54.19	50.96	92.47	34.09

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	93.18	168.83	60.43	55.42	98.65	36.69
1992	105.78	190.09	67.05	57.45	100.52	37.66
1993	119.88	213.57	74.60	55.00	95.07	35.63
1994	134.63	235.64	82.80	49.08	82.59	31.87
1995	150.07	258.77	91.49	45.53	75.52	29.37
1996	170.51	295.39	99.86	47.24	78.22	29.71
1997	191.01	329.40	108.30	51.27	85.02	31.10
1998	212.74	365.02	116.93	57.99	96.23	33.92
1999	237.85	406.30	126.11	66.33	110.20	37.21
2000	264.20	448.74	135.89	74.01	121.72	40.84
2001	302.48	513.92	150.51	84.40	138.84	45.32
2002	333.81	558.21	165.48	93.41	152.02	49.43
2003	376.24	625.54	181.56	102.89	166.04	53.54
2004	416.09	680.79	199.74	108.40	172.93	55.67
2005	456.26	738.20	217.63	115.53	182.58	58.72
2006	511.14	820.08	239.87	127.32	200.03	63.51
2007	566.71	896.03	265.51	134.68	208.74	66.89
2008	628.01	979.26	294.43	140.75	216.24	69.07
2009	700.02	1077.69	327.39	157.66	239.65	76.80
2010	773.36	1173.31	358.36	169.25	253.81	81.53
2011	861.62	1292.71	394.19	178.38	265.06	84.37
2012	956.93	1417.77	433.16	192.55	282.78	90.01
2013	1047.38	1529.70	474.86	205.04	297.09	95.80
2014	1144.39	1646.38	521.66	219.66	313.48	103.28

Figure HuB-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
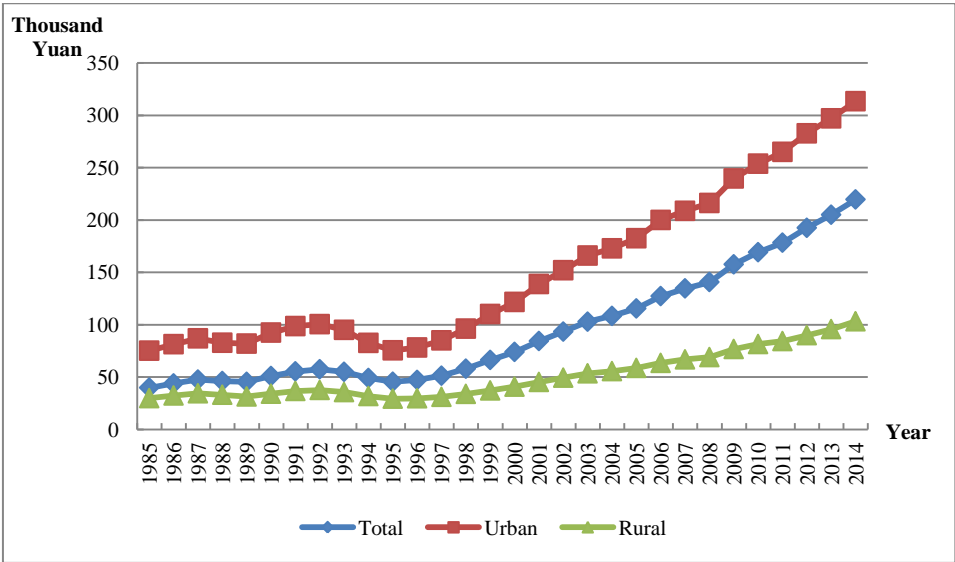
Figure HuB-2.2 Real Human Capital Per Capita by Region for Hubei，1985-2014

24.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

24.3.1 Total labor force human capital

The total labor force human capital for Hubei is reported in Table HuB-3.1 From 1985 to 2014, the nominal labor force human capital increases from 678 billion Yuan to 19,067 billion Yuan, an increase of more than 27 times; and the real labor force human capital increases from 678 billion Yuan to 3,676 billion Yuan, an increase of approximately 4 times.

Table HuB-3.1 Nominal and Real Labor Force Human Capital for Hubei

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	678	678	678	678
1986	825	824	788	788
1987	990	989	880	880
1988	1194	1192	895	894
1989	1418	1417	913	912
1990	1682	1679	1051	1049
1991	1929	1925	1149	1147
1992	2190	2187	1192	1191
1993	2482	2480	1142	1141
1994	2783	2781	1017	1016
1995	3113	3113	946	946
1996	3450	3449	960	960
1997	3914	3918	1056	1057
1998	4503	4511	1233	1235
1999	5119	5128	1434	1436
2000	5895	5853	1661	1650
2001	6378	6355	1794	1788
2002	6898	6893	1945	1944
2003	7489	7537	2071	2083
2004	8139	8193	2144	2157
2005	8935	9000	2285	2301
2006	9826	9905	2473	2492
2007	10643	10736	2553	2575
2008	11643	11751	2628	2651
2009	12873	13003	2916	2945
2010	14366	14524	3161	3195

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	15192	15375	3160	3197
2012	16378	16591	3312	3353
2013	17586	17821	3459	3504
2014	19067	19334	3676	3727

24.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables HuB-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 26,280 Yuan to 591,290 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 26,280 Yuan to 114,000 Yuan, an increase of approximately 3 times.

Table HuB-3.2 Nominal and Real Average Labor Force Human Capital by Region for Hubei

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	26.28	40.81	22.22	26.28	40.81	22.22
1986	30.77	48.79	25.11	29.40	46.29	24.10
1987	35.87	57.56	28.28	31.91	50.24	25.51
1988	41.42	66.36	31.94	31.05	48.07	24.58
1989	47.58	76.15	35.86	30.61	48.34	23.35
1990	54.98	88.15	40.23	34.36	54.70	25.31

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	61.81	98.37	44.37	36.81	57.48	26.94
1992	69.01	109.01	48.73	37.56	57.65	27.37
1993	77.23	121.49	53.70	35.52	54.08	25.65
1994	86.22	134.01	58.78	31.51	46.97	22.62
1995	95.68	147.24	64.26	29.08	42.97	20.63
1996	105.09	160.94	70.36	29.24	42.62	20.93
1997	116.55	177.82	77.32	31.45	45.90	22.20
1998	130.44	198.95	84.67	35.72	52.45	24.56
1999	144.90	220.46	91.74	40.59	59.80	27.07
2000	161.82	246.16	99.85	45.58	66.77	30.01
2001	176.59	266.99	110.41	49.68	72.13	33.24
2002	192.17	287.40	122.13	54.19	78.27	36.48
2003	209.01	309.14	135.85	57.80	82.06	40.06
2004	229.11	335.21	150.06	60.34	85.15	41.82
2005	251.85	366.86	164.58	64.40	90.73	44.40
2006	277.17	399.66	182.62	69.75	97.48	48.35
2007	304.65	432.91	200.44	73.07	100.85	50.50
2008	336.57	471.99	220.42	75.96	104.22	51.70
2009	375.24	520.10	244.38	85.00	115.66	57.32
2010	415.97	570.33	268.73	91.53	123.37	61.14
2011	449.76	610.33	294.87	93.55	125.14	63.11
2012	493.78	665.32	323.88	99.85	132.70	67.30
2013	538.27	718.06	353.86	105.87	139.46	71.39
2014	591.29	784.61	384.45	114.00	149.39	76.11

Chapter 25   Human Capital for Hunan

25.1 Total human capital

Table HuN-1.1 presents the results of nominal and real total human capital and real physical capital for Hunan. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Hunan.

Table HuN-1.1 Real Physical Capital, Nominal and Real Human Capital for Hunan

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	1699	1701	1699	1701	39
1986	1950	1953	1852	1854	43
1987	2247	2250	1946	1949	48
1988	2602	2606	1795	1798	54
1989	2982	2988	1736	1740	57
1990	3524	3442	2044	1997	58
1991	3921	3930	2180	2185	61
1992	4470	4481	2255	2261	66
1993	5075	5090	2188	2195	72
1994	5721	5742	1967	1974	77
1995	6447	6473	1863	1870	84
1996	7177	7212	1922	1931	92
1997	7940	7982	2066	2077	100
1998	8813	8864	2284	2297	109

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	9836	9910	2534	2553	120
2000	10932	11050	2777	2807	132
2001	12902	13068	3303	3345	145
2002	14714	14918	3780	3833	161
2003	16520	16748	4143	4199	178
2004	18650	18919	4469	4532	200
2005	20759	21060	4861	4929	228
2006	22756	23107	5251	5331	263
2007	24907	25319	5435	5525	310
2008	27270	27774	5599	5704	370
2009	29588	30174	6096	6218	436
2010	32054	32723	6404	6538	522
2011	35340	36080	6693	6834	617
2012	38500	39310	7147	7297	720
2013	41730	42590	7444	7598	832
2014	45030	45930	7831	7989	950

25.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table HuN-2.1 presents human capital per capita for Hunan by region. From 1985 to 2014, the nominal human capital per capita increases from 33,540 Yuan to 857,520 Yuan, an increase of more than 24 times; and the real human capital per capita increases from 33,540 Yuan to 149,130 Yuan, an increase of approximately 3 times.

Figure HuN-2.1 illustrates the trends of human capital per capita by gender for Hunan. The real human capital per capita of male is similar to that of female for Hunan. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
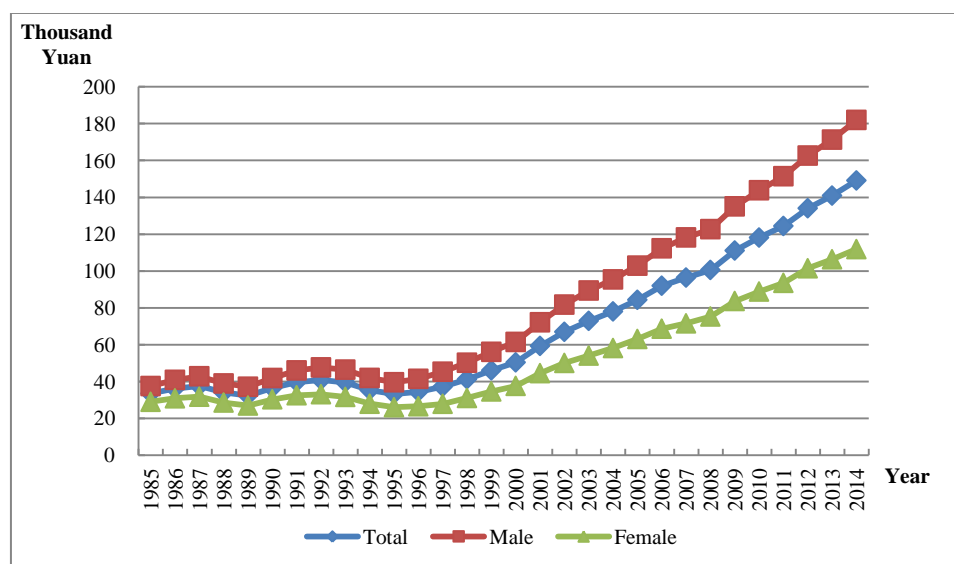
Figure HuN-2.1 Human Capital Per Capita by Gender for Hunan，1985-2014

Table HuN-2.1 Nominal and Real Human Capital Per Capita by Region for Hunan

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	33.54	63.57	27.96	33.54	63.57	27.96
1986	38.14	73.83	31.25	36.22	70.05	29.68
1987	43.45	86.13	35.04	37.64	73.42	30.58
1988	49.42	99.99	39.06	34.08	67.81	27.19
1989	55.64	113.25	43.39	32.38	65.48	25.36

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	62.95	129.68	48.61	36.52	74.53	28.35
1991	71.45	147.25	53.46	39.73	80.52	30.04
1992	80.97	167.45	58.99	40.84	80.67	30.72
1993	91.65	188.94	65.29	39.52	77.53	29.21
1994	102.84	210.58	72.11	35.35	69.24	25.68
1995	115.02	233.65	79.56	33.23	65.05	23.72
1996	128.69	261.15	86.34	34.45	67.83	23.79
1997	142.78	288.91	93.60	37.15	72.85	25.16
1998	159.14	322.86	101.09	41.24	81.01	27.14
1999	178.82	364.79	109.18	46.07	91.89	28.91
2000	198.38	403.50	118.23	50.39	100.34	30.87
2001	231.69	464.55	130.61	59.31	116.81	34.35
2002	260.71	506.90	143.89	66.97	127.97	38.07
2003	290.75	542.72	158.74	72.92	135.12	40.34
2004	325.69	590.23	175.47	78.04	141.16	42.19
2005	360.24	631.53	193.03	84.35	147.93	45.15
2006	398.65	683.23	213.79	91.99	157.52	49.41
2007	441.92	739.47	237.47	96.43	162.06	51.34
2008	489.75	802.77	263.27	100.56	166.29	53.00
2009	539.25	860.06	294.26	111.10	178.69	59.47
2010	591.29	919.48	327.49	118.13	185.29	64.14
2011	656.96	1002.43	360.77	124.42	191.48	66.91
2012	722.15	1081.79	395.14	134.06	202.19	72.13
2013	789.97	1155.38	435.17	140.92	207.40	76.38
2014	857.52	1225.72	478.46	149.13	214.25	82.09

Figure HuN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area

remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
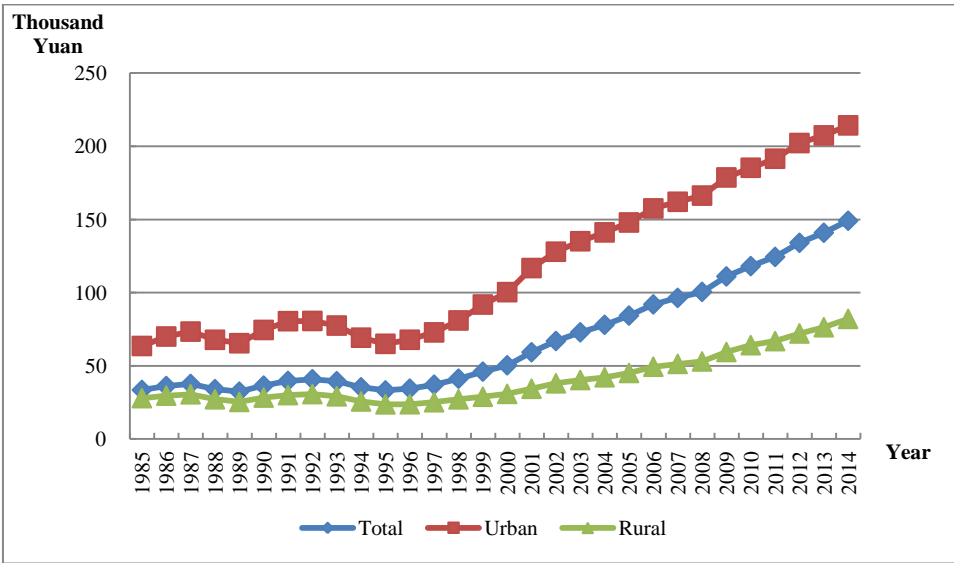
Figure HuN-2.2 Real Human Capital Per Capita by Region for Hunan，1985-2014

25.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

25.3.1 Total labor force human capital

The total labor force human capital for Hunan is reported in Table HuN-3.1 From 1985 to 2014, the nominal labor force human capital increases from 732 billion Yuan to 17,124 billion Yuan, an increase of more than 22 times; and the real labor force human capital increases from 732

billion Yuan to 2,972 billion Yuan, an increase of approximately 3 times.

Table HuN-3.1 Nominal and Real Labor Force Human Capital for Hunan

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	732	732	732	732
1986	855	854	812	811
1987	996	995	864	863
1988	1177	1176	813	812
1989	1376	1375	802	801
1990	1694	1605	984	931
1991	1823	1821	1015	1014
1992	2045	2044	1037	1036
1993	2292	2291	994	993
1994	2539	2538	877	877
1995	2821	2821	819	819
1996	3080	3080	829	829
1997	3399	3401	890	890
1998	3798	3797	991	991
1999	4247	4247	1100	1101
2000	4776	4745	1220	1212
2001	5383	5358	1386	1379
2002	6102	6079	1578	1572
2003	6939	6924	1745	1741
2004	7726	7762	1852	1861
2005	8688	8734	2034	2045
2006	9609	9662	2217	2230
2007	10471	10533	2280	2294
2008	11369	11443	2326	2341

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2009	12337	12423	2533	2551
2010	13348	13450	2659	2679
2011	14161	14281	2673	2695
2012	15048	15188	2786	2812
2013	15943	16097	2836	2864
2014	17124	17305	2972	3002

25.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables HuN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 24,760 Yuan to 482,230 Yuan, an increase of more than 18 times; and the real average labor force human capital increases from 24,760 Yuan to 83,690 Yuan, an increase of approximately 2 times.

Table HuN-3.2 Nominal and Real Average Labor Force Human Capital by Region for Hunan

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	24.76	39.72	21.90	24.76	39.72	21.90
1986	28.15	45.97	24.63	26.73	43.61	23.39
1987	31.95	53.38	27.70	27.71	45.50	24.18
1988	36.24	62.07	30.95	25.03	42.10	21.54

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	40.97	71.59	34.43	23.87	41.39	20.12
1990	47.15	83.01	39.33	27.38	47.70	22.94
1991	52.04	92.38	42.31	28.96	50.51	23.77
1992	57.63	101.86	46.43	29.21	49.07	24.18
1993	64.13	112.91	51.00	27.81	46.33	22.82
1994	70.87	124.58	55.59	24.49	40.96	19.80
1995	78.18	137.12	60.68	22.69	38.18	18.09
1996	85.84	150.18	66.10	23.09	39.00	18.21
1997	94.03	165.05	72.16	24.63	41.62	19.40
1998	103.66	182.02	78.89	27.06	45.67	21.18
1999	114.74	201.68	85.36	29.73	50.81	22.60
2000	126.74	223.53	92.32	32.37	55.59	24.11
2001	141.98	244.46	101.94	36.55	61.47	26.81
2002	157.65	266.49	112.59	40.76	67.28	29.79
2003	176.55	290.41	125.05	44.40	72.30	31.78
2004	194.46	311.43	138.60	46.62	74.48	33.33
2005	215.31	335.74	153.39	50.41	78.65	35.88
2006	237.63	361.60	171.01	54.83	83.37	39.52
2007	262.09	389.07	188.44	57.07	85.27	40.74
2008	287.71	416.89	206.93	58.86	86.36	41.66
2009	316.44	446.02	228.18	64.97	92.67	46.12
2010	347.31	478.74	250.11	69.19	96.48	48.98
2011	377.52	511.43	273.88	71.26	97.69	50.79
2012	409.50	547.19	299.31	75.82	102.27	54.64
2013	443.64	580.24	328.23	78.92	104.16	57.61
2014	482.23	621.74	358.96	83.69	108.68	61.59

Chapter 26   Human Capital for Guangdong

26.1 Total human capital

Table GD-1.1 presents the results of nominal and real total human capital and real physical capital for Guangdong. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Guangdong.

Table GD-1.1 Real Physical Capital, Nominal and Real Human Capital for Guangdong

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	3177	3176	3177	3176	82
1986	3809	3810	3626	3626	93
1987	4376	4378	3755	3757	102
1988	5234	5244	3468	3473	117
1989	6247	6258	3383	3390	129
1990	7358	7373	4086	4093	143
1991	8413	8434	4614	4626	160
1992	9584	9612	4899	4912	189
1993	11002	11042	4628	4644	238
1994	12349	12393	4267	4282	298
1995	13921	13974	4218	4233	365
1996	16774	16848	4742	4763	431
1997	20052	20158	5553	5583	494
1998	24331	24577	6842	6911	569

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	28715	29073	8207	8309	656
2000	32977	33532	9258	9413	742
2001	38353	39749	10827	11215	835
2002	43903	45230	12553	12923	945
2003	49363	50740	14013	14398	1087
2004	54959	56398	15156	15552	1249
2005	60370	61890	16294	16699	1449
2006	68780	70450	18244	18678	1672
2007	77270	79100	19762	20226	1926
2008	85960	87980	20819	21303	2197
2009	96670	99110	23976	24571	2520
2010	107020	109850	25737	26402	2908
2011	118360	121480	26997	27713	3347
2012	129590	133120	28759	29524	3814
2013	140510	144330	30435	31240	4332
2014	152680	156710	32330	33166	4893

26.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table GD-2.1 presents human capital per capita for Guangdong by region. From 1985 to 2014, the nominal human capital per capita increases from 62,840 Yuan to 1,526,850 Yuan, an increase of more than 23 times; and the real human capital per capita increases from 62,840 Yuan to 323,310 Yuan, an increase of approximately 4 times.

Figure GD-2.1 illustrates the trends of human capital per capita by

gender for Guangdong. The real human capital per capita of male is similar to that of female for Guangdong. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
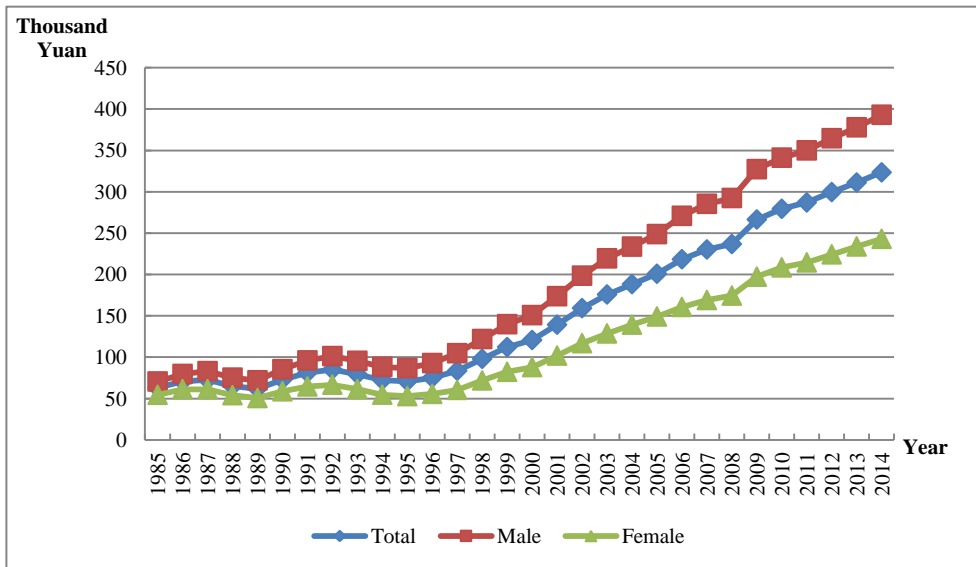
Figure GD-2.1 Human Capital Per Capita by Gender for Guangdong，1985-2014

Table GD-2.1 Nominal and Real Human Capital Per Capita by Region for Guangdong

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	62.84	97.95	51.85	62.84	97.95	51.85
1986	74.45	113.36	61.47	70.88	108.27	58.37
1987	84.70	130.39	68.29	72.68	110.41	59.12
1988	98.26	149.38	76.37	65.11	97.67	51.13
1989	114.13	171.03	85.37	61.81	91.74	46.70
1990	131.08	191.39	95.71	72.79	105.40	53.64

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	147.88	217.98	105.56	81.10	117.34	59.22
1992	166.07	246.17	116.94	84.89	122.25	61.95
1993	188.46	283.18	128.98	79.28	115.27	56.66
1994	209.04	313.45	142.25	72.23	105.45	51.01
1995	232.99	350.38	156.49	70.60	104.22	48.67
1996	265.27	388.28	170.52	74.99	107.73	49.79
1997	301.42	431.33	184.77	83.47	117.22	53.16
1998	347.93	493.33	199.32	97.84	136.38	58.46
1999	392.26	545.77	214.11	112.11	153.34	64.27
2000	429.65	582.50	230.28	120.62	160.13	69.13
2001	493.00	667.25	251.08	139.17	184.91	75.67
2002	556.65	751.49	271.10	159.16	211.21	82.87
2003	618.86	828.09	293.53	175.68	231.12	89.36
2004	682.31	903.35	319.00	188.16	245.74	93.65
2005	743.58	972.29	346.26	200.69	259.30	98.98
2006	822.75	1068.32	380.56	218.24	279.88	107.08
2007	899.68	1157.98	416.21	230.10	292.54	113.15
2008	977.01	1245.88	452.45	236.63	298.34	116.26
2009	1073.70	1362.21	493.18	266.30	334.22	129.57
2010	1161.18	1464.18	533.60	279.25	348.43	135.84
2011	1257.92	1574.97	573.72	286.92	355.94	138.31
2012	1349.34	1680.04	616.49	299.45	369.35	144.43
2013	1435.78	1773.08	662.10	311.00	380.58	150.98
2014	1526.85	1874.04	712.22	323.31	393.20	159.06

Figure GD-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

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capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
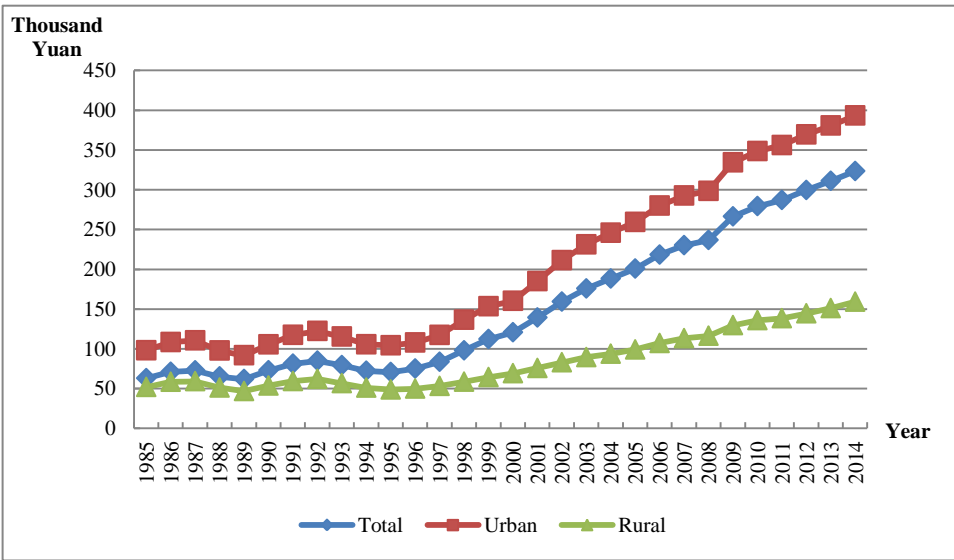
Figure GD-2.2 Real Human Capital Per Capita by Region for Guangdong，1985-2014

26.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

26.3.1 Total labor force human capital

The total labor force human capital for Guangdong is reported in Table GD-3.1 From 1985 to 2014, the nominal labor force human capital increases from 1,365 billion Yuan to 62,820 billion Yuan, an increase of more than 45 times; and the real labor force human capital increases from 1,365 billion

Yuan to 13,340 billion Yuan, an increase of approximately 9 times.

Table GD-3.1 Nominal and Real Labor Force Human Capital for Guangdong

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	1365	1365	1365	1365
1986	1585	1584	1508	1508
1987	1843	1842	1582	1581
1988	2233	2232	1479	1479
1989	2679	2678	1451	1451
1990	3219	3217	1787	1786
1991	3665	3662	2008	2007
1992	4095	4094	2090	2090
1993	4582	4581	1926	1925
1994	5061	5061	1748	1748
1995	5565	5566	1685	1685
1996	6936	6940	1958	1960
1997	8653	8663	2393	2395
1998	10748	10760	3017	3021
1999	12991	13002	3706	3710
2000	15710	15711	4399	4398
2001	17119	17130	4825	4829
2002	18893	18934	5398	5410
2003	21231	21273	6024	6037
2004	23408	23539	6456	6491
2005	25860	26022	6981	7024
2006	29172	29385	7739	7794
2007	32642	32896	8354	8420
2008	37078	37405	8989	9067

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2009	42547	42956	10563	10664
2010	48516	49018	11677	11797
2011	51638	52201	11804	11930
2012	55061	55675	12247	12384
2013	58440	59120	12693	12836
2014	62820	63560	13340	13494

26.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables GD-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 45,330 Yuan to 896,150 Yuan, an increase of more than 18 times; and the real average labor force human capital increases from 45,330 Yuan to 190,300 Yuan, an increase of approximately 3 times.

Table GD-3.2 Nominal and Real Average Labor Force Human Capital by Region for Guangdong

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	45.33	62.12	39.62	45.33	62.12	39.62
1986	51.80	71.83	44.49	49.30	68.61	42.25
1987	59.77	83.42	50.19	51.30	70.64	43.45
1988	69.34	96.93	55.92	45.93	63.38	37.44

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	80.50	112.19	61.96	43.60	60.18	33.89
1990	93.73	129.15	68.86	52.02	71.12	38.59
1991	104.42	144.37	75.70	57.21	77.72	42.47
1992	114.94	159.77	82.60	58.65	79.34	43.76
1993	127.34	178.02	90.26	53.53	72.47	39.65
1994	140.25	196.86	98.06	48.43	66.23	35.16
1995	154.62	217.59	106.42	46.81	64.72	33.10
1996	179.69	248.89	116.50	50.73	69.06	34.02
1997	208.80	284.05	127.38	57.74	77.19	36.65
1998	239.27	319.61	138.66	67.17	88.36	40.66
1999	269.16	351.04	149.94	76.78	98.63	45.01
2000	302.65	387.37	162.29	84.74	106.49	48.72
2001	327.94	416.41	174.92	92.43	115.39	52.72
2002	356.06	451.21	188.02	101.73	126.82	57.47
2003	392.04	495.04	203.14	111.23	138.16	61.85
2004	427.82	536.97	218.85	117.99	146.07	64.25
2005	468.28	582.48	236.87	126.41	155.34	67.71
2006	511.95	632.66	265.06	135.82	165.74	74.58
2007	558.26	686.11	294.25	142.87	173.33	79.99
2008	614.15	750.93	324.32	148.89	179.82	83.33
2009	677.33	825.02	358.14	168.16	202.42	94.09
2010	740.40	896.59	392.58	178.20	213.36	99.94
2011	778.96	936.16	428.53	178.06	211.57	103.31
2012	815.16	971.79	467.79	181.31	213.65	109.59
2013	850.66	1003.11	507.68	184.76	215.31	115.77
2014	896.15	1051.73	546.81	190.30	220.67	122.12

Chapter 27   Human Capital for Guangxi

27.1 Total human capital

Table GX-1.1 presents the results of nominal and real total human capital and real physical capital for Guangxi. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Guangxi.

Table GX-1.1 Real Physical Capital, Nominal and Real Human Capital for Guangxi

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1281	1283	1281	1283	35
1986	1481	1483	1395	1397	38
1987	1713	1716	1506	1508	41
1988	1989	1993	1458	1460	42
1989	2286	2290	1370	1373	43
1990	2628	2634	1539	1543	44
1991	2997	3005	1706	1711	46
1992	3411	3421	1832	1838	48
1993	3894	3907	1733	1738	54
1994	4401	4417	1553	1558	60
1995	4937	4956	1471	1477	66
1996	5549	5569	1551	1556	73
1997	6226	6255	1727	1735	79
1998	6987	7020	1998	2007	87

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	7729	7770	2263	2275	95
2000	8606	8671	2525	2544	104
2001	9724	9799	2835	2857	114
2002	10836	10930	3189	3216	125
2003	12385	12535	3606	3649	139
2004	13812	14006	3852	3905	158
2005	14998	15208	4079	4137	184
2006	16519	16714	4431	4483	216
2007	18274	18489	4625	4679	258
2008	19990	20228	4688	4743	314
2009	22010	22298	5279	5348	398
2010	23625	23955	5499	5576	518
2011	25850	26210	5684	5763	657
2012	27949	28319	5956	6034	797
2013	30099	30470	6270	6348	910
2014	32108	32469	6551	6625	1025

27.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table GX-2.1 presents human capital per capita for Guangxi by region. From 1985 to 2014, the nominal human capital per capita increases from 36,790 Yuan to 834,300 Yuan, an increase of more than 21 times; and the real human capital per capita increases from 36,790 Yuan to 170,220 Yuan, an increase of approximately 4 times.

Figure GX-2.1 illustrates the trends of human capital per capita by gender for Guangxi. The real human capital per capita of male is similar to that of female for Guangxi. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
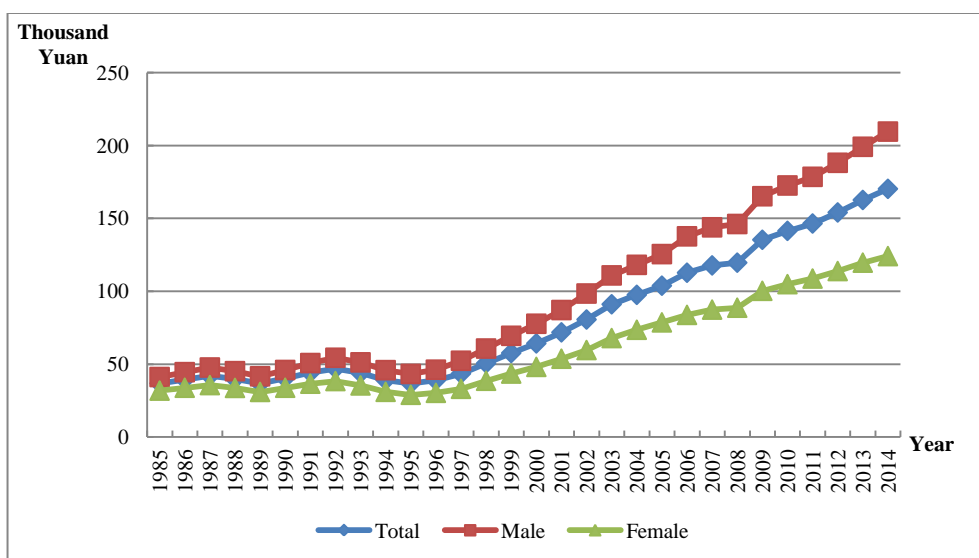
Figure GX-2.1 Human Capital Per Capita by Gender for Guangxi，1985-2014

Table GX-2.1 Nominal and Real Human Capital Per Capita by Region for Guangxi

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	36.79	75.63	30.95	36.79	75.63	30.95
1986	41.92	89.87	34.48	39.48	84.62	32.47
1987	47.82	106.08	38.49	42.03	90.65	34.25
1988	54.30	122.13	43.07	39.80	84.64	32.37
1989	61.14	138.39	47.92	36.65	80.12	29.21
1990	68.87	156.77	53.38	40.32	92.33	31.17

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	77.61	177.79	58.86	44.17	101.96	33.37
1992	87.42	200.87	64.91	46.95	107.66	34.91
1993	98.64	226.75	72.12	43.89	98.56	32.57
1994	110.50	252.84	79.56	38.98	87.64	28.40
1995	123.00	279.93	87.29	36.65	82.23	26.28
1996	138.98	311.16	94.33	38.84	86.64	26.44
1997	156.61	344.81	101.94	43.43	95.34	28.35
1998	176.70	382.63	109.86	50.53	108.96	31.56
1999	196.64	413.79	118.39	57.58	121.23	34.63
2000	218.80	445.07	127.96	64.20	130.39	37.62
2001	246.18	495.63	139.56	71.77	143.34	41.20
2002	273.76	543.98	151.26	80.57	159.07	44.96
2003	312.60	621.23	164.53	91.01	180.04	48.28
2004	349.62	686.90	179.54	97.50	191.23	50.22
2005	381.60	733.18	196.07	103.78	198.17	53.98
2006	420.08	779.69	217.41	112.68	207.40	59.32
2007	465.05	840.40	240.28	117.70	211.69	61.38
2008	509.92	896.52	264.74	119.58	209.88	62.33
2009	564.04	970.20	292.78	135.28	232.00	70.70
2010	607.51	1015.82	322.25	141.41	236.06	75.26
2011	666.02	1086.49	354.10	146.45	238.87	77.85
2012	722.76	1146.60	389.17	154.02	244.27	82.91
2013	780.57	1202.43	427.64	162.60	250.92	88.73
2014	834.30	1247.73	468.88	170.22	254.77	95.48

Figure GX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
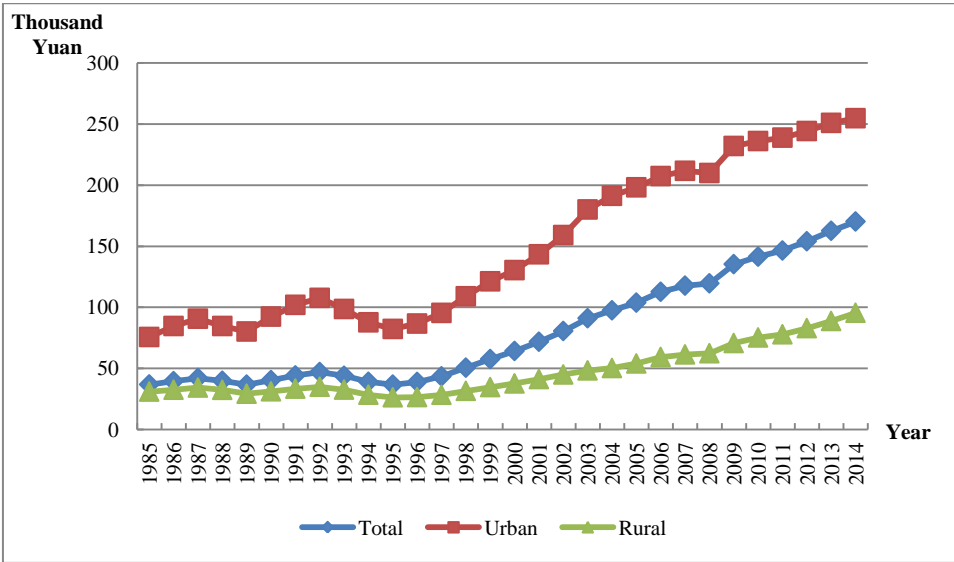
Figure GX-2.2 Real Human Capital Per Capita by Region for Guangxi，1985-2014

27.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

27.3.1 Total labor force human capital

The total labor force human capital for Guangxi is reported in Table GX-3.1 From 1985 to 2014, the nominal labor force human capital increases from 478 billion Yuan to 10,248 billion Yuan, an increase of more than 20 times; and the real labor force human capital increases from 478 billion Yuan to 2,090 billion Yuan, an increase of approximately 3 times.

Table GX-3.1 Nominal and Real Labor Force Human Capital for Guangxi

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	478	478	478	478
1986	563	563	530	530
1987	662	662	582	582
1988	784	783	575	574
1989	914	914	548	548
1990	1072	1071	628	627
1991	1235	1234	703	703
1992	1399	1399	752	752
1993	1575	1575	701	701
1994	1771	1771	625	625
1995	2002	2001	597	597
1996	2281	2280	637	637
1997	2573	2574	714	714
1998	2891	2893	827	828
1999	3235	3239	947	948
2000	3683	3675	1081	1078
2001	3963	3959	1157	1155
2002	4232	4231	1247	1247
2003	4512	4517	1315	1317
2004	4857	4880	1355	1362
2005	5293	5321	1442	1450
2006	5781	5812	1555	1564
2007	6301	6336	1597	1606
2008	6876	6917	1614	1624
2009	7635	7684	1834	1845
2010	8510	8568	1982	1995

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	8961	9020	1971	1983
2012	9341	9401	1990	2003
2013	9678	9738	2015	2027
2014	10248	10306	2090	2102

27.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables GX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 26,150 Yuan to 439,870 Yuan, an increase of more than 15 times; and the real average labor force human capital increases from 26,150 Yuan to 89,710 Yuan, an increase of approximately 2 times.

Table GX-3.2 Nominal and Real Average Labor Force Human Capital by Region for Guangxi

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	26.15	46.58	22.66	26.15	46.58	22.66
1986	29.85	55.88	25.25	28.10	52.62	23.78
1987	34.10	66.47	28.17	29.99	56.79	25.08
1988	38.46	74.97	31.60	28.22	51.95	23.75
1989	43.22	84.48	35.24	25.93	48.91	21.48
1990	48.92	96.54	39.35	28.65	56.86	22.98

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	54.66	108.27	43.30	31.11	62.09	24.55
1992	60.72	119.95	47.51	32.62	64.29	25.55
1993	67.42	133.67	52.31	30.03	58.10	23.63
1994	75.08	148.80	57.37	26.50	51.58	20.48
1995	83.94	165.98	63.08	25.02	48.76	18.99
1996	94.40	184.09	68.74	26.38	51.26	19.27
1997	105.52	203.50	74.66	29.27	56.27	20.76
1998	117.93	224.25	80.68	33.73	63.86	23.17
1999	131.54	245.76	86.57	38.52	72.00	25.32
2000	147.71	268.41	93.64	43.34	78.64	27.53
2001	158.40	285.65	101.82	46.23	82.61	30.06
2002	168.09	300.70	110.05	49.53	87.93	32.71
2003	178.90	315.84	118.95	52.15	91.53	34.90
2004	192.84	334.74	127.26	53.80	93.19	35.60
2005	209.93	356.95	136.70	57.20	96.48	37.64
2006	230.42	382.02	154.45	61.99	101.62	42.14
2007	252.71	410.39	171.99	64.06	103.38	43.94
2008	277.01	440.42	190.05	65.02	103.11	44.75
2009	306.76	477.66	209.08	73.67	114.22	50.49
2010	338.54	515.15	227.90	78.83	119.71	53.22
2011	362.89	538.49	248.77	79.80	118.39	54.69
2012	386.46	558.14	271.79	82.34	118.91	57.90
2013	410.18	576.40	296.58	85.38	120.28	61.54
2014	439.87	605.30	322.34	89.71	123.59	65.64

Chapter 28   Human Capital for Hainan

28.1 Total human capital

Table HaN-1.1 presents the results of nominal and real total human capital and real physical capital for Hainan. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Hainan.

Table HaN-1.1 Real Physical Capital, Nominal and Real Human Capital for Hainan

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	251	251	251	251	6
1986	292	293	279	280	8
1987	337	337	293	294	9
1988	380	381	259	260	10
1989	448	450	241	242	11
1990	525	526	271	272	13
1991	616	618	308	309	15
1992	752	755	354	355	20
1993	859	861	336	337	25
1994	1009	1012	311	312	32
1995	1151	1155	313	314	37
1996	1283	1286	334	335	41
1997	1433	1439	370	371	44
1998	1606	1612	426	427	47

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	1783	1793	480	483	51
2000	1989	2011	530	535	55
2001	2197	2215	593	598	60
2002	2508	2535	681	689	64
2003	2861	2900	779	789	70
2004	3124	3166	818	829	77
2005	3378	3424	873	885	85
2006	3834	3889	977	991	94
2007	4319	4505	1049	1095	106
2008	4930	5253	1125	1200	122
2009	5432	6096	1247	1402	138
2010	5923	6475	1299	1422	162
2011	6176	6338	1278	1313	188
2012	6605	6750	1325	1355	224
2013	7003	7135	1372	1398	265
2014	7392	7518	1415	1440	310

28.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table HaN-2.1 presents human capital per capita for Hainan by region. From 1985 to 2014, the nominal human capital per capita increases from 46,210 Yuan to 950,790 Yuan, an increase of more than 19 times; and the real human capital per capita increases from 46,210 Yuan to 182,030 Yuan, an increase of approximately 3 times.

Figure HaN-2.1 illustrates the trends of human capital per capita by

gender for Hainan. The real human capital per capita of male is similar to that of female for Hainan. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
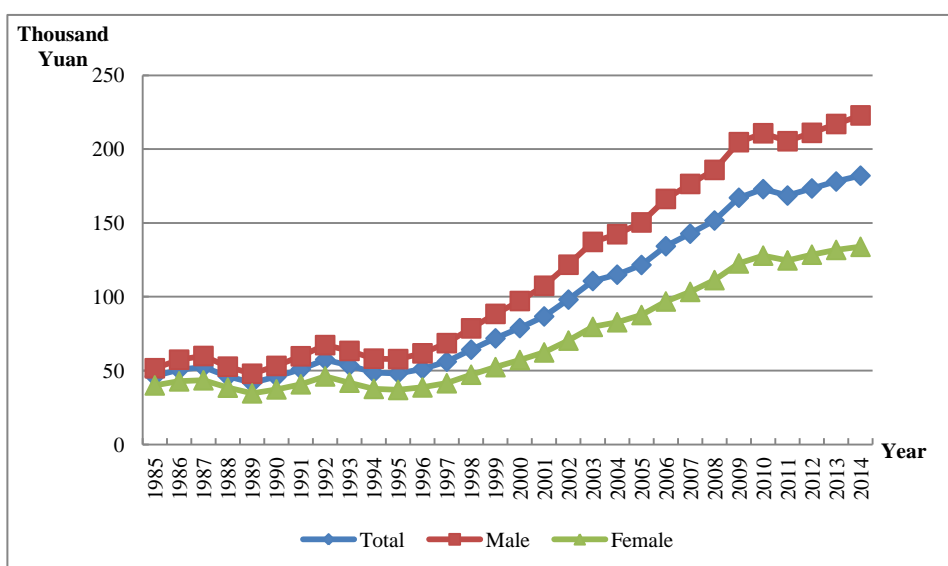
Figure HaN-2.1 Human Capital Per Capita by Gender for Hainan，1985-2014

Table HaN-2.1 Nominal and Real Human Capital Per Capita by Region for Hainan

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	46.21	79.95	38.92	46.21	79.95	38.92
1986	52.96	94.08	43.05	50.62	90.72	40.96
1987	60.18	109.15	47.16	52.40	95.86	40.87
1988	67.57	129.03	52.16	46.16	87.64	35.76
1989	77.68	147.53	57.58	41.76	79.34	30.96
1990	88.68	165.90	63.62	45.83	89.58	31.65

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	102.00	190.57	69.92	50.97	98.94	33.57
1992	122.03	234.97	76.76	57.48	111.92	35.64
1993	136.69	254.80	84.75	53.42	98.11	33.78
1994	157.81	293.67	92.81	48.65	90.03	28.85
1995	177.22	324.60	100.91	48.16	89.98	26.50
1996	196.11	354.26	108.58	51.08	93.70	27.49
1997	217.54	388.39	116.81	56.09	101.21	29.49
1998	241.99	428.47	125.14	64.16	114.40	32.71
1999	266.93	467.41	133.61	71.84	125.93	35.89
2000	296.00	513.92	142.59	78.80	136.41	38.22
2001	321.34	548.80	154.11	86.70	147.44	42.03
2002	361.23	615.84	165.54	98.09	167.12	45.05
2003	406.63	691.70	178.83	110.69	188.85	48.23
2004	439.01	736.06	193.32	114.98	194.72	49.01
2005	470.49	776.80	208.93	121.55	202.87	52.08
2006	526.96	863.46	227.64	134.26	222.82	55.47
2007	587.48	956.09	246.57	142.73	235.88	56.57
2008	664.80	1081.05	265.72	151.65	251.37	56.03
2009	727.66	1172.03	286.97	167.06	273.90	61.13
2010	788.24	1257.05	308.04	172.90	281.12	62.02
2011	814.50	1271.32	329.28	168.57	269.48	61.50
2012	864.13	1329.37	352.31	173.36	273.00	63.77
2013	908.86	1374.65	378.68	178.07	275.98	66.64
2014	950.79	1411.11	409.11	182.03	277.20	70.04

Figure HaN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

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capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
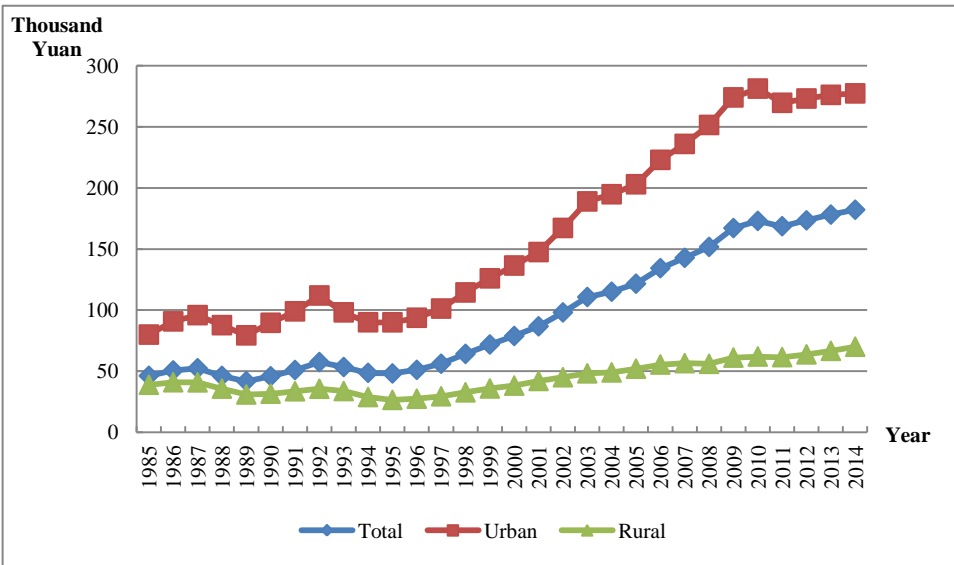
Figure HaN-2.2 Real Human Capital Per Capita by Region for Hainan，1985-2014

28.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

28.3.1 Total labor force human capital

The total labor force human capital for Hainan is reported in Table HaN-3.1 From 1985 to 2014, the nominal labor force human capital increases from 93 billion Yuan to 2,375 billion Yuan, an increase of more than 24 times; and the real labor force human capital increases from 93 billion Yuan to 447 billion Yuan, an increase of approximately 4 times.

Table HaN-3.1 Nominal and Real Labor Force Human Capital for Hainan

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	93	93	93	93
1986	113	113	108	108
1987	138	138	121	121
1988	154	154	105	105
1989	181	182	98	98
1990	214	214	111	111
1991	250	250	125	125
1992	292	292	137	137
1993	341	340	133	133
1994	392	392	121	121
1995	450	450	122	122
1996	506	506	132	132
1997	568	568	146	146
1998	642	643	170	171
1999	726	727	195	196
2000	821	819	218	218
2001	890	890	240	240
2002	951	952	258	259
2003	1021	1022	278	278
2004	1129	1135	295	296
2005	1247	1254	321	323
2006	1358	1366	344	346
2007	1486	1496	358	361
2008	1659	1670	375	377
2009	1875	1889	427	430
2010	2065	2081	448	452

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	2127	2143	434	438
2012	2193	2211	433	437
2013	2247	2264	432	436
2014	2375	2394	447	450

28.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables HaN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 33,720 Yuan to 482,470 Yuan, an increase of more than 13 times; and the real average labor force human capital increases from 33,720 Yuan to 90,700 Yuan, an increase of approximately 2 times.

Table HaN-3.2 Nominal and Real Average Labor Force Human Capital by Region for Hainan

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	33.72	47.53	30.13	33.72	47.53	30.13
1986	38.91	58.05	33.43	37.19	55.98	31.81
1987	44.58	70.45	36.55	38.82	61.87	31.67
1988	49.20	79.92	40.49	33.62	54.28	27.76
1989	55.97	91.23	44.46	30.10	49.06	23.91
1990	64.17	104.76	49.07	33.14	56.57	24.41
1991	72.84	119.57	53.83	36.32	62.08	25.85
1992	83.14	137.72	58.76	39.10	65.60	27.29

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1993	95.01	157.90	64.35	37.16	60.80	25.65
1994	106.83	176.60	70.31	32.95	54.14	21.86
1995	120.29	197.07	76.78	32.63	54.63	20.16
1996	133.12	216.40	82.58	34.64	57.24	20.91
1997	147.67	237.31	88.61	38.05	61.84	22.37
1998	163.53	259.11	95.14	43.34	69.18	24.86
1999	179.55	280.61	101.52	48.33	75.60	27.27
2000	197.16	303.93	108.92	52.48	80.67	29.20
2001	209.93	323.46	117.46	56.67	86.90	32.03
2002	220.53	340.11	126.51	59.90	92.30	34.43
2003	233.15	357.48	136.89	63.40	97.60	36.92
2004	251.53	381.85	147.35	65.65	101.02	37.35
2005	272.38	407.52	159.24	70.10	106.43	39.69
2006	295.61	440.81	173.94	74.91	113.76	42.38
2007	319.62	474.49	188.57	77.11	117.06	43.26
2008	349.28	516.02	203.52	78.88	119.99	42.92
2009	384.51	565.26	219.95	87.50	132.10	46.85
2010	413.83	600.54	236.48	89.82	134.30	47.61
2011	426.95	612.39	255.11	87.14	129.81	47.65
2012	441.20	622.49	274.92	87.11	127.84	49.77
2013	455.52	630.88	294.72	87.63	126.66	51.86
2014	482.47	660.29	314.12	90.70	129.71	53.78

Chapter 29   Human Capital for Chongqing

29.1 Total human capital

Table CQ-1.1 presents the results of nominal and real total human capital and real physical capital for Chongqing. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Chongqing.

Table CQ-1.1 Real Physical Capital, Nominal and Real Human Capital for Chongqing

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	897	898	897	898	31
1986	1034	1035	992	993	34
1987	1196	1197	1045	1046	36
1988	1393	1394	992	993	40
1989	1605	1607	976	977	43
1990	1857	1860	1114	1116	47
1991	2158	2162	1210	1212	50
1992	2499	2504	1260	1263	54
1993	2892	2899	1229	1231	60
1994	3313	3324	1085	1088	66
1995	3763	3776	1032	1036	75
1996	4258	4278	1065	1070	83
1997	4763	4791	1153	1160	93
1998	5184	5216	1302	1310	107

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	5807	5858	1468	1482	122
2000	6576	6672	1720	1745	139
2001	7236	7336	1861	1886	158
2002	8014	8132	2068	2099	182
2003	9105	9291	2336	2384	215
2004	10338	10641	2558	2633	255
2005	10965	11277	2692	2768	303
2006	12146	12430	2912	2980	354
2007	13851	14174	3171	3246	414
2008	15654	16037	3394	3477	480
2009	17511	17964	3860	3957	553
2010	19172	19666	4095	4200	641
2011	21415	21950	4343	4452	749
2012	23451	24035	4636	4750	861
2013	25422	26037	4892	5010	976
2014	27509	28144	5200	5321	1106

29.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table CQ-2.1 presents human capital per capita for Chongqing by region. From 1985 to 2014, the nominal human capital per capita increases from 37,090 Yuan to 1,191,730 Yuan, an increase of more than 31 times; and the real human capital per capita increases from 37,090Yuan to 225,270 Yuan, an increase of approximately 5 times.

Figure CQ-2.1 illustrates the trends of human capital per capita by

gender for Chongqing. The real human capital per capita of male is similar to that of female for Chongqing. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
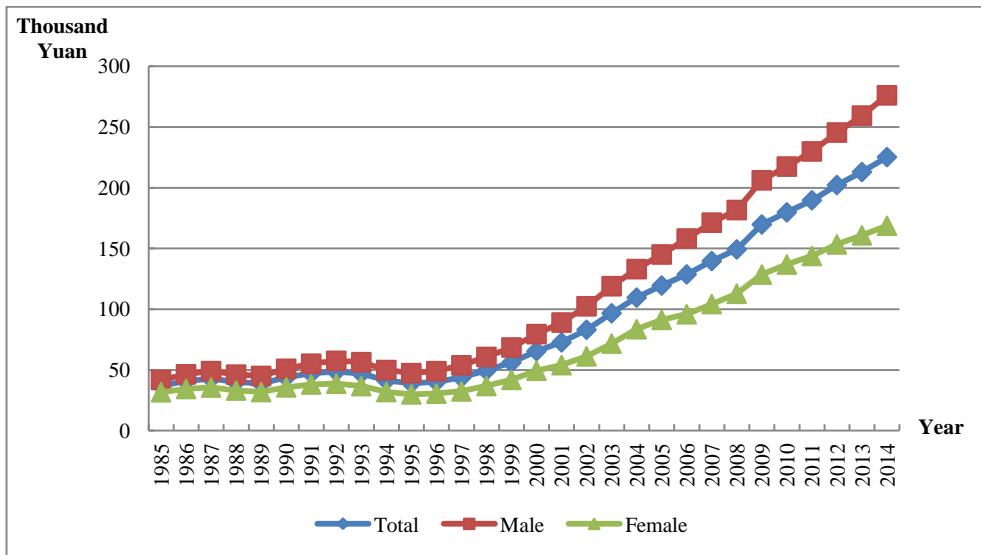
Figure CQ-2.1 Human Capital Per Capita by Gender for Chongqing，1985-2014

Table CQ-2.1 Nominal and Real Human Capital Per Capita by Region for Chongqing

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	37.09	73.31	28.26	37.09	73.31	28.26
1986	42.53	85.47	31.49	40.81	82.02	30.22
1987	48.93	99.61	35.25	42.77	87.06	30.81
1988	56.25	115.66	39.40	40.07	82.39	28.07
1989	63.96	131.93	43.81	38.91	80.25	26.65
1990	73.06	152.21	48.61	43.83	91.31	29.16
1991	84.08	174.58	53.69	47.14	97.88	30.10

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	96.50	198.89	59.34	48.66	100.28	29.92
1993	110.87	225.12	66.40	47.09	95.62	28.21
1994	126.14	252.68	73.62	41.32	82.75	24.11
1995	142.37	280.01	81.58	39.05	76.80	22.38
1996	160.89	319.17	88.86	40.23	79.80	22.22
1997	180.58	360.19	96.39	43.71	87.18	23.33
1998	197.21	387.00	105.74	49.51	97.17	26.55
1999	221.86	438.42	114.85	56.10	110.86	29.04
2000	250.70	501.98	124.23	65.56	131.26	32.48
2001	282.85	540.18	137.35	72.75	138.89	35.31
2002	322.10	591.83	151.19	83.13	152.78	39.03
2003	376.88	672.26	166.75	96.70	172.51	42.79
2004	442.92	765.45	184.90	109.61	189.41	45.75
2005	486.85	799.44	205.00	119.53	196.25	50.32
2006	536.72	853.15	230.48	128.70	204.53	55.25
2007	610.12	948.53	257.32	139.68	217.19	58.92
2008	688.55	1048.59	287.60	149.28	227.37	62.36
2009	770.43	1147.63	323.28	169.81	252.89	71.24
2010	841.74	1227.74	355.52	179.78	262.15	75.91
2011	935.58	1339.28	392.07	189.72	271.57	79.50
2012	1023.20	1434.82	433.33	202.25	283.57	85.64
2013	1106.97	1520.23	477.85	212.99	292.56	91.96
2014	1191.73	1604.05	525.50	225.27	303.23	99.34

Figure CQ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

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significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
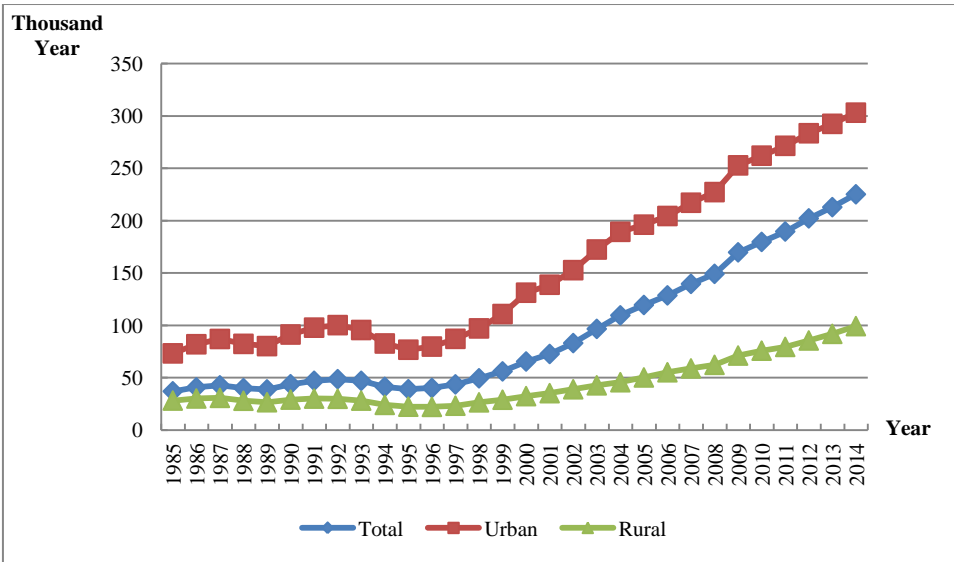
Figure CQ-2.2 Real Human Capital Per Capita by Region for Chongqing，1985-2014

29.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

29.3.1 Total labor force human capital

The total labor force human capital for Chongqing is reported in Table CQ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 387 billion Yuan to 9,821 billion Yuan, an increase of more than 24 times; and the real labor force human capital increases from 387 billion Yuan to 1,857 billion Yuan, an increase of approximately 4 times.

Table CQ-3.1 Nominal and Real Labor Force Human Capital for Chongqing

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	387	386	387	386
1986	457	457	439	438
1987	544	543	475	475
1988	651	651	464	463
1989	769	768	468	467
1990	907	906	544	543
1991	1051	1050	589	589
1992	1184	1183	597	597
1993	1323	1322	562	562
1994	1464	1464	479	479
1995	1624	1624	445	445
1996	1748	1747	437	437
1997	1898	1901	459	460
1998	2091	2094	525	526
1999	2306	2309	583	584
2000	2557	2531	669	662
2001	2692	2674	692	688
2002	2844	2833	734	731
2003	2998	2992	769	768
2004	3178	3199	786	792
2005	3420	3446	840	846
2006	3903	3937	936	944
2007	4442	4485	1017	1027
2008	5014	5068	1087	1099
2009	5828	5898	1284	1300
2010	6807	6898	1453	1473

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	7453	7557	1512	1532
2012	8115	8235	1604	1627
2013	8816	8949	1697	1723
2014	9821	9967	1857	1885

29.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables CQ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 25,870 Yuan to 626,750 Yuan, an increase of more than 23 times; and the real average labor force human capital increases from 25,870 Yuan to 118,500 Yuan, an increase of approximately 4 times.

Table CQ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Chongqing

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	25.87	44.42	21.14	25.87	44.42	21.14
1986	29.81	52.27	23.81	28.61	50.17	22.85
1987	34.54	61.58	26.95	30.19	53.83	23.55
1988	39.61	71.02	30.45	28.22	50.59	21.69
1989	45.16	81.43	34.19	27.47	49.54	20.80
1990	51.60	93.69	38.40	30.96	56.21	23.03

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	58.23	104.82	42.64	32.64	58.77	23.91
1992	64.72	115.76	46.93	32.64	58.37	23.66
1993	72.15	128.33	51.55	30.65	54.51	21.90
1994	79.96	141.07	55.96	26.18	46.20	18.33
1995	88.70	154.59	60.70	24.33	42.40	16.65
1996	96.53	169.08	65.55	24.13	42.28	16.39
1997	105.70	185.70	71.15	25.58	44.95	17.22
1998	116.72	206.54	77.17	29.30	51.86	19.38
1999	128.78	229.40	82.73	32.55	58.00	20.92
2000	142.23	255.13	88.63	37.19	66.71	23.17
2001	155.45	269.84	95.33	39.97	69.38	24.51
2002	169.54	283.87	103.17	43.78	73.28	26.63
2003	185.55	299.58	111.11	47.61	76.88	28.51
2004	204.79	317.75	116.96	50.68	78.63	28.94
2005	228.36	341.87	121.55	56.06	83.92	29.84
2006	260.27	382.25	138.97	62.40	91.64	33.32
2007	296.06	428.43	161.35	67.79	98.10	36.95
2008	334.20	474.93	185.60	72.45	102.98	40.24
2009	385.08	538.56	210.66	84.84	118.67	46.42
2010	439.34	605.50	235.98	93.79	129.29	50.39
2011	482.60	653.25	268.71	97.87	132.46	54.49
2012	525.49	694.59	305.30	103.84	137.28	60.34
2013	569.28	735.52	343.42	109.57	141.54	66.09
2014	626.75	797.09	382.67	118.50	150.68	72.34

Chapter 30   Human Capital for Sichuan

30.1 Total human capital

Table SC-1.1 presents the results of nominal and real total human capital and real physical capital for Sichuan. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Sichuan.

Table SC-1.1 Real Physical Capital, Nominal and Real Human Capital for Sichuan

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	2297	2300	2297	2300	60
1986	2622	2625	2503	2506	67
1987	3001	3005	2675	2679	73
1988	3466	3470	2572	2574	79
1989	3958	3963	2444	2448	83
1990	4545	4553	2707	2711	88
1991	5222	5232	3017	3022	94
1992	5970	5981	3224	3231	101
1993	6834	6849	3155	3162	108
1994	7747	7770	2857	2865	117
1995	8722	8750	2706	2714	130
1996	9804	9843	2773	2784	145
1997	10907	10963	2930	2945	162
1998	12091	12163	3254	3273	183

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	13469	13573	3671	3698	204
2000	14917	15065	4056	4093	229
2001	16705	16894	4434	4482	255
2002	18506	18747	4919	4981	286
2003	20186	20469	5284	5354	323
2004	21964	22297	5479	5557	367
2005	23569	23912	5781	5861	419
2006	27204	27586	6499	6588	485
2007	31310	31780	7040	7142	566
2008	34940	35450	7472	7578	660
2009	38730	39320	8212	8332	762
2010	42150	42810	8654	8785	881
2011	47120	47850	9169	9307	1013
2012	51260	52070	9719	9865	1152
2013	55310	56140	10193	10341	1297
2014	59550	60400	10796	10945	1442

30.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table SC-2.1 presents human capital per capita for Sichuan by region. From 1985 to 2014, the nominal human capital per capita increases from 33,920 Yuan to 941,510 Yuan, an increase of more than 26 times; and the real human capital per capita increases from 33,920 Yuan to 170,690 Yuan, an increase of approximately 4 times.

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Figure SC-2.1 illustrates the trends of human capital per capita by gender for Sichuan. The real human capital per capita of male is similar to that of female for Sichuan. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
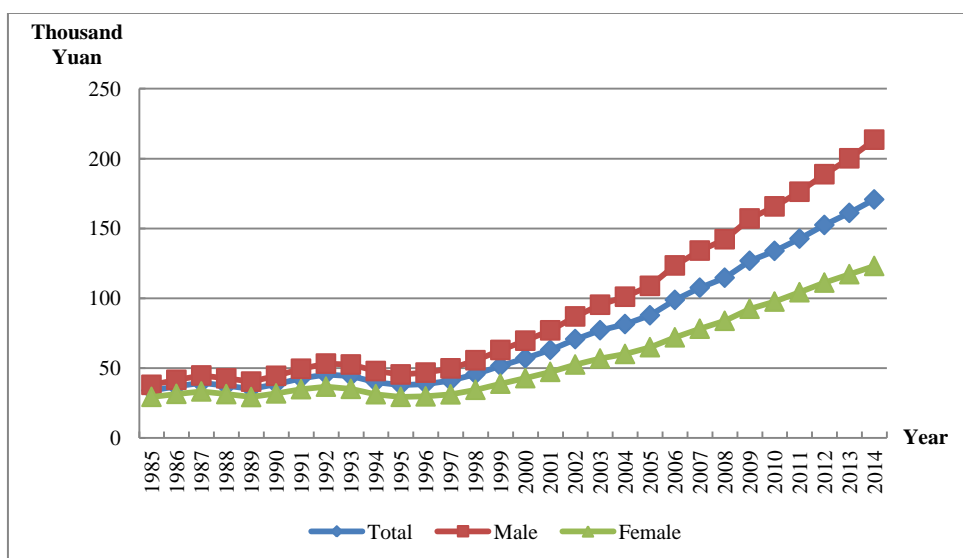
Figure SC-2.1 Human Capital Per Capita by Gender for Sichuan，1985-2014

Table SC-2.1 Nominal and Real Human Capital Per Capita by Region for Sichuan

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	33.92	66.89	27.88	33.92	66.89	27.88
1986	38.60	77.72	31.04	36.84	74.16	29.65
1987	44.09	90.33	34.69	39.30	78.28	31.38
1988	50.30	104.96	38.69	37.32	74.01	29.53
1989	56.81	119.25	42.95	35.08	71.39	27.03
1990	64.64	137.46	47.67	38.50	81.07	28.57

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	73.70	157.54	52.66	42.58	89.08	30.91
1992	83.96	178.44	58.19	45.34	91.90	32.65
1993	95.78	201.17	64.91	44.22	88.62	31.21
1994	108.22	225.03	71.73	39.91	77.51	28.15
1995	121.49	248.49	79.35	37.69	71.92	26.33
1996	136.38	281.65	86.79	38.58	74.25	26.39
1997	152.24	315.70	94.65	40.90	79.18	27.41
1998	169.22	351.60	103.31	45.54	88.36	30.07
1999	189.10	396.40	112.16	51.54	101.55	32.98
2000	209.71	440.72	121.91	57.02	113.25	35.63
2001	237.19	494.80	134.54	62.96	124.90	38.29
2002	265.92	548.37	148.03	70.68	139.11	42.13
2003	294.29	596.04	162.86	77.04	148.39	45.94
2004	326.52	648.42	179.93	81.45	154.33	48.24
2005	357.68	692.11	198.53	87.73	161.97	52.39
2006	413.46	778.16	221.96	98.77	177.85	57.26
2007	478.12	877.44	248.20	107.50	189.36	60.40
2008	536.13	951.25	276.80	114.65	196.08	63.79
2009	597.89	1025.04	310.25	126.77	209.88	70.82
2010	652.05	1079.74	344.43	133.88	213.94	76.28
2011	732.93	1179.23	381.43	142.62	222.31	79.84
2012	803.95	1251.22	421.72	152.43	229.46	86.55
2013	874.05	1313.13	466.16	161.08	234.25	93.06
2014	941.51	1373.52	513.60	170.69	240.93	101.22

Figure SC-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

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capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
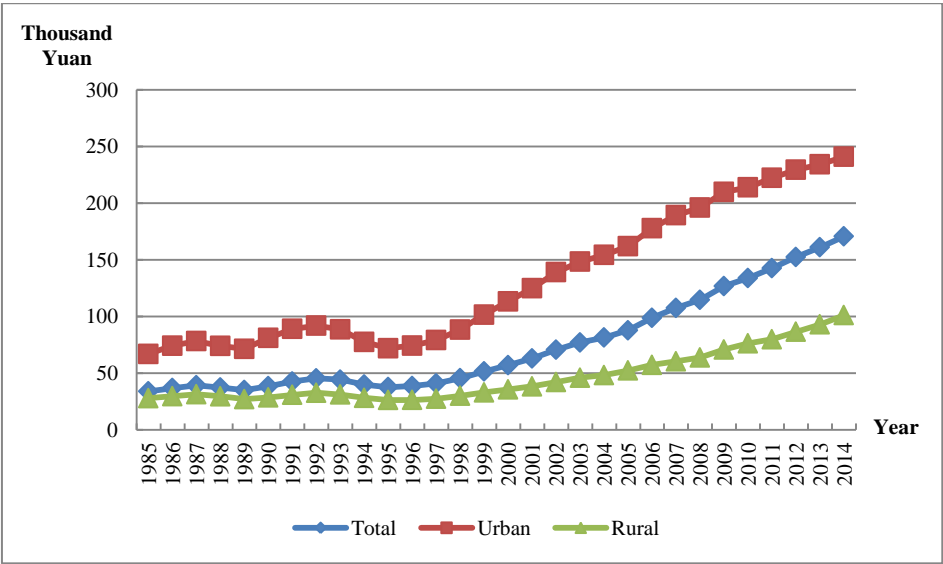
Figure SC-2.2 Real Human Capital Per Capita by Region for Sichuan，1985-2014

30.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

30.3.1 Total labor force human capital

The total labor force human capital for Sichuan is reported in Table SC-3.1 From 1985 to 2014, the nominal labor force human capital increases from 945 billion Yuan to 23,578 billion Yuan, an increase of more than 23 times; and the real labor force human capital increases from 945 billion

Yuan to 4,329 billion Yuan, an increase of approximately 3 times.

Table SC-3.1 Nominal and Real Labor Force Human Capital for Sichuan

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	945	944	945	944
1986	1118	1118	1068	1067
1987	1330	1329	1187	1186
1988	1596	1595	1187	1186
1989	1889	1887	1168	1167
1990	2226	2224	1326	1325
1991	2572	2570	1489	1488
1992	2906	2905	1579	1578
1993	3250	3249	1510	1510
1994	3589	3588	1336	1336
1995	3969	3968	1242	1242
1996	4305	4305	1231	1231
1997	4725	4729	1284	1285
1998	5226	5234	1423	1425
1999	5772	5782	1590	1593
2000	6402	6356	1756	1744
2001	6699	6669	1795	1788
2002	7064	7048	1897	1893
2003	7414	7408	1964	1962
2004	7694	7733	1941	1950
2005	8101	8146	2008	2018
2006	9298	9353	2252	2265
2007	10547	10614	2411	2426
2008	12057	12142	2618	2636

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2009	14007	14120	3012	3035
2010	16189	16334	3365	3393
2011	17689	17848	3486	3517
2012	19264	19454	3704	3739
2013	21097	21308	3942	3978
2014	23578	23800	4329	4370

30.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables SC-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 23,920 Yuan to 534,630 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 23,920 Yuan to 98,160 Yuan, an increase of approximately 3 times.

Table SC-3.2 Nominal and Real Average Labor Force Human Capital by Region for Sichuan

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	23.92	41.39	20.35	23.92	41.39	20.35
1986	27.44	48.65	22.93	26.20	46.42	21.90
1987	31.69	57.27	25.95	28.27	49.63	23.47
1988	36.16	66.01	29.34	26.88	46.55	22.40

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	41.07	75.56	32.97	25.40	45.23	20.75
1990	46.92	86.92	37.03	27.95	51.26	22.19
1991	52.55	97.09	41.13	30.42	54.90	24.14
1992	58.49	107.07	45.32	31.77	55.14	25.43
1993	65.06	118.59	49.81	30.23	52.24	23.95
1994	71.88	130.28	54.10	26.76	44.87	21.24
1995	79.50	142.84	58.72	24.88	41.34	19.48
1996	87.03	157.23	63.64	24.88	41.45	19.36
1997	95.86	173.80	69.36	26.05	43.59	20.09
1998	105.99	193.84	75.50	28.87	48.72	21.98
1999	117.11	216.19	81.28	32.25	55.39	23.90
2000	129.99	242.48	87.55	35.65	62.31	25.59
2001	139.64	256.52	93.91	37.43	64.75	26.73
2002	150.01	271.75	101.17	40.29	68.94	28.79
2003	160.41	285.37	108.95	42.48	71.05	30.73
2004	171.54	298.99	116.51	43.27	71.16	31.24
2005	185.32	316.11	125.01	45.93	73.98	32.99
2006	213.02	354.72	145.82	51.59	81.07	37.62
2007	242.85	393.48	168.64	55.51	84.92	41.04
2008	277.09	437.94	192.29	60.17	90.27	44.31
2009	318.67	492.45	218.74	68.53	100.83	49.93
2010	361.72	546.04	245.61	75.19	108.19	54.40
2011	400.59	586.65	275.27	78.95	110.60	57.62
2012	439.49	620.08	308.23	84.50	113.72	63.26
2013	483.34	659.94	342.92	90.31	117.73	68.46
2014	534.63	718.60	379.06	98.16	126.05	74.70

Chapter 31   Human Capital for Guizhou

31.1 Total human capital

Table GZ-1.1 presents the results of nominal and real total human capital and real physical capital for Guizhou. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Guizhou.

Table GZ-1.1 Real Physical Capital, Nominal and Real Human Capital for Guizhou

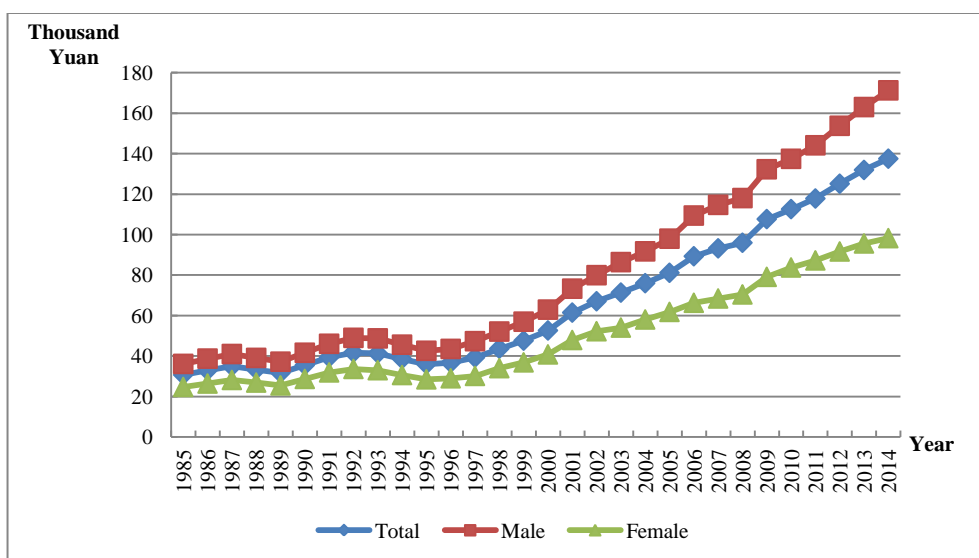| Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	842	843	842	843	23
1986	964	966	915	916	25
1987	1117	1118	985	986	27
1988	1292	1294	955	956	29
1989	1479	1481	923	924	30
1990	1720	1724	1051	1054	32
1991	2023	2028	1181	1184	34
1992	2346	2353	1268	1272	36
1993	2726	2734	1269	1273	38
1994	3157	3169	1196	1201	40
1995	3617	3632	1127	1132	42
1996	4055	4080	1153	1161	45
1997	4490	4524	1235	1244	50
1998	4981	5026	1367	1379	55

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	5383	5431	1489	1502	61
2000	5934	6015	1648	1671	69
2001	7116	7318	1936	1991	78
2002	7716	7854	2121	2158	90
2003	8336	8479	2263	2301	102
2004	9244	9408	2411	2454	116
2005	9965	10128	2572	2614	132
2006	11013	11179	2795	2837	151
2007	12041	12210	2875	2915	172
2008	13122	13307	2915	2956	198
2009	14275	14496	3215	3264	226
2010	15150	15392	3313	3366	265
2011	16471	16712	3424	3475	306
2012	17704	17945	3584	3633	358
2013	18866	19107	3728	3774	417
2014	19877	20086	3835	3877	480

31.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table GZ-2.1 presents human capital per capita for Guizhou by region. From 1985 to 2014, the nominal human capital per capita increases from 30,690 Yuan to 712,500 Yuan, an increase of more than 22 times; and the real human capital per capita increases from 30,690 Yuan to 137,470 Yuan, an increase of approximately 3 times.

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Figure GZ-2.1 illustrates the trends of human capital per capita by gender for Guizhou. The real human capital per capita of male is similar to that of female for Guizhou. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.

Figure GZ-2.1 Human Capital Per Capita by Gender for Guizhou，1985-2014

Table GZ-2.1 Nominal and Real Human Capital Per Capita by Region for Guizhou

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	30.69	71.21	21.23	30.69	71.21	21.23
1986	34.65	82.43	23.43	32.88	77.47	22.40
1987	39.61	97.15	26.01	34.93	83.23	23.51
1988	45.03	113.13	28.90	33.29	79.77	22.28
1989	50.71	129.67	31.96	31.64	77.55	20.74
1990	58.05	153.61	35.32	35.47	90.87	22.30

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Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	67.39	179.40	39.04	39.35	102.14	23.45
1992	77.17	203.88	43.17	41.71	106.79	24.26
1993	88.72	232.74	47.92	41.29	105.28	23.17
1994	101.68	265.24	52.93	38.53	98.34	20.71
1995	115.26	297.12	58.44	35.91	92.19	18.34
1996	128.92	338.16	63.34	36.67	94.86	18.44
1997	142.77	379.94	68.35	39.26	103.08	19.24
1998	158.91	428.59	73.79	43.61	115.70	20.85
1999	171.95	463.67	79.38	47.57	126.56	22.50
2000	189.44	516.03	85.53	52.61	141.99	24.20
2001	225.77	627.26	93.52	61.44	168.55	26.17
2002	243.89	661.04	101.54	67.04	179.60	28.61
2003	262.74	694.92	110.32	71.32	187.12	30.48
2004	291.31	763.85	119.95	75.97	198.73	31.47
2005	314.19	808.21	130.49	81.10	209.02	33.53
2006	351.80	867.42	144.05	89.27	220.80	36.29
2007	390.26	921.82	158.53	93.18	221.57	37.18
2008	431.87	981.94	173.82	95.94	220.58	37.47
2009	477.95	1047.46	191.92	107.64	238.64	41.79
2010	514.77	1080.71	211.42	112.56	238.81	44.87
2011	566.66	1142.54	233.06	117.79	239.77	47.20
2012	617.88	1195.29	257.11	125.09	244.24	50.65
2013	667.46	1239.04	281.87	131.90	247.01	54.18
2014	712.50	1267.64	308.74	137.47	246.79	57.95

Figure GZ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
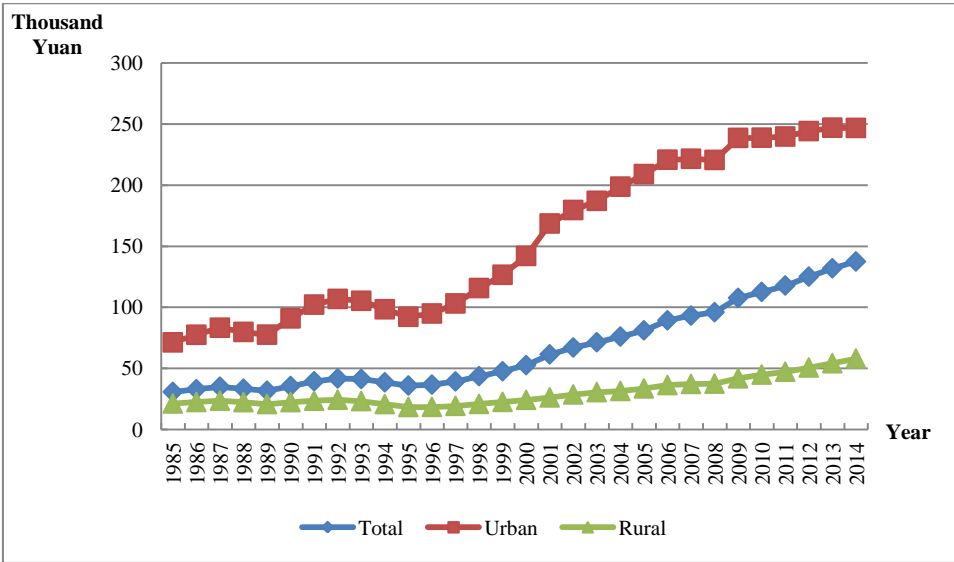
Figure GZ-2.2 Real Human Capital Per Capita by Region for Guizhou，1985-2014

31.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

31.3.1 Total labor force human capital

The total labor force human capital for Guizhou is reported in Table GZ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 284 billion Yuan to 5,820 billion Yuan, an increase of more than 19 times; and the real labor force human capital increases from 284 billion Yuan to 1,116 billion Yuan, an increase of approximately 3 times.

Table GZ-3.1 Nominal and Real Labor Force Human Capital for Guizhou

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	284	284	284	284
1986	343	343	326	326
1987	416	416	367	367
1988	494	494	366	365
1989	582	582	364	364
1990	689	689	422	421
1991	823	822	481	481
1992	962	962	522	521
1993	1118	1118	522	522
1994	1285	1285	488	488
1995	1460	1461	455	455
1996	1592	1593	454	454
1997	1738	1739	479	479
1998	1895	1896	521	522
1999	2058	2061	570	571
2000	2241	2232	624	621
2001	2380	2376	650	649
2002	2534	2531	699	698
2003	2702	2706	736	737
2004	2871	2886	750	754
2005	3106	3123	801	806
2006	3326	3345	843	848
2007	3587	3609	853	859
2008	3890	3915	859	865
2009	4320	4351	967	974
2010	4797	4833	1044	1052

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	5007	5043	1037	1045
2012	5186	5221	1045	1052
2013	5385	5420	1058	1065
2014	5820	5851	1116	1123

31.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables GZ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 21,190 Yuan to 355,350 Yuan, an increase of more than 15 times; and the real average labor force human capital increases from 21,190 Yuan to 68,160 Yuan, an increase of approximately 2 times.

Table GZ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Guizhou

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	21.19	40.89	15.73	21.19	40.89	15.73
1986	24.36	48.83	17.60	23.12	45.89	16.82
1987	28.21	58.36	19.78	24.89	50.00	17.87
1988	32.19	68.18	21.99	23.82	48.08	16.95
1989	36.43	79.28	24.35	22.76	47.42	15.81
1990	41.47	92.68	27.03	25.38	54.83	17.06

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	47.29	105.71	30.11	27.66	60.19	18.09
1992	53.50	119.12	33.36	29.00	62.39	18.74
1993	60.51	134.60	36.99	28.25	60.88	17.89
1994	68.34	150.98	40.69	25.96	55.98	15.92
1995	76.78	167.90	44.67	23.94	52.09	14.02
1996	83.93	185.46	48.13	23.92	52.03	14.01
1997	91.64	204.71	51.86	25.25	55.54	14.60
1998	100.39	225.88	55.79	27.62	60.98	15.77
1999	109.23	247.61	59.46	30.27	67.59	16.85
2000	119.13	271.78	63.59	33.15	74.78	17.99
2001	126.79	287.96	68.59	34.63	77.38	19.19
2002	134.03	304.06	73.75	36.96	82.61	20.78
2003	141.81	321.19	79.40	38.60	86.49	21.93
2004	150.48	339.11	85.11	39.29	88.22	22.33
2005	162.30	360.88	91.34	41.86	93.33	23.47
2006	176.90	382.96	102.01	44.82	97.48	25.70
2007	194.14	409.84	112.74	46.19	98.51	26.44
2008	213.47	437.81	123.84	47.16	98.35	26.70
2009	239.62	475.60	136.09	53.65	108.35	29.64
2010	267.59	508.61	148.41	58.25	112.39	31.50
2011	286.78	526.99	164.39	59.38	110.59	33.29
2012	306.27	541.69	182.89	61.70	110.69	36.03
2013	325.59	555.86	203.29	63.97	110.81	39.07
2014	355.35	590.04	225.83	68.16	114.87	42.39

Chapter 32   Human Capital for Yunnan

32.1 Total human capital

Table YN-1.1 presents the results of nominal and real total human capital and real physical capital for Yunnan. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six-education categories respectively. Column 5 is the real physical capital of Yunnan.

Table YN-1.1 Real Physical Capital, Nominal and Real Human Capital for Yunnan

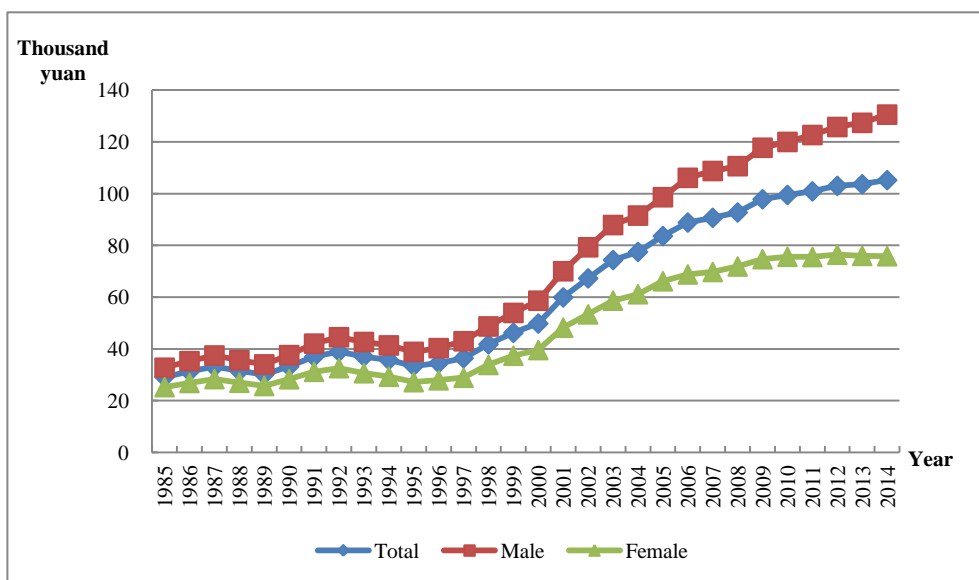| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	898	899	898	899	57
1986	1040	1041	983	984	59
1987	1201	1203	1062	1063	61
1988	1388	1390	1026	1027	63
1989	1595	1598	994	996	65
1990	1837	1841	1115	1117	69
1991	2134	2138	1255	1258	76
1992	2494	2500	1340	1344	85
1993	2913	2921	1292	1295	94
1994	3370	3382	1261	1266	102
1995	3859	3873	1195	1199	111
1996	4373	4395	1248	1255	121
1997	4862	4882	1332	1337	132
1998	5733	5785	1545	1559	147

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	6379	6449	1728	1747	161
2000	6813	6896	1884	1908	174
2001	8148	8275	2284	2320	188
2002	9151	9310	2576	2622	203
2003	10283	10482	2865	2921	223
2004	11415	11637	3001	3062	249
2005	12574	12817	3260	3325	277
2006	13651	13896	3474	3538	307
2007	14797	15067	3557	3625	341
2008	16051	16351	3655	3727	376
2009	17016	17318	3856	3927	435
2010	18165	18477	3966	4036	529
2011	19449	19742	4050	4115	646
2012	20512	20795	4154	4215	779
2013	21414	21678	4200	4253	928
2014	22400	22634	4290	4336	1100

32.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table YN-2.1 presents human capital per capita for Yunnan by region. From 1985 to 2014, the nominal human capital per capita increases from 29,110 Yuan to 549,430 Yuan, an increase of more than 17 times; and the real human capital per capita increases from 29,110 Yuan to 105,230 Yuan, an increase of approximately 3 times.

Figure YN-2.1 illustrates the trends of human capital per capita by

gender for Yunnan. The real human capital per capita of male is similar to that of female for Yunnan. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.

Figure YN-2.1 Human Capital Per Capita by Gender for Yunnan，1985-2014

Table YN-2.1 Nominal and Real Human Capital Per Capita by Region for Yunnan

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	29.11	65.97	23.11	29.11	65.97	23.11
1986	33.07	77.82	25.64	31.24	74.25	24.1
1987	37.43	89.82	28.59	33.09	79.8	25.2
1988	42.59	105.42	31.83	31.48	77.34	23.62
1989	48.24	122.7	35.33	30.06	76.35	22.04
1990	54.74	143.79	39.13	33.21	88.07	23.6
1991	62.74	164.93	43.41	36.91	97.32	25.49

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	72.37	192.46	47.97	38.89	102.86	25.89
1993	83.49	222.39	53.29	37.02	100.05	23.33
1994	95.37	253.8	58.79	35.7	97.34	21.47
1995	107.9	284.54	64.71	33.41	90.72	19.4
1996	120.91	318.98	69.88	34.52	93.73	19.25
1997	132.93	345.06	75.53	36.41	96.93	20.03
1998	155.1	414.97	81.45	41.78	113.84	21.36
1999	170.73	451.93	87.51	46.24	125.48	22.79
2000	180.12	459.86	94.17	49.82	130.83	24.93
2001	213.81	548.6	103.25	59.92	159.09	27.17
2002	239.03	594.99	112.75	67.28	173.76	29.52
2003	266.94	647.73	123.02	74.37	186.74	31.89
2004	294.71	693.91	134.51	77.49	188.55	32.93
2005	322.57	742.67	146.19	83.64	198.43	35.43
2006	349.09	774.17	159.94	88.84	202.99	38.08
2007	377.22	810.47	174.66	90.68	200.66	39.27
2008	407.23	853.02	189.71	92.73	200.38	40.24
2009	431.75	871.35	207.39	97.84	203.63	43.89
2010	455.72	882.24	226.22	99.5	198.63	46.21
2011	484.51	905.33	246.13	100.89	194.49	47.93
2012	508.67	914.61	267.65	103.01	190.76	50.94
2013	528.46	912.34	289.82	103.65	184.03	53.72
2014	549.43	911.84	313.73	105.23	179.27	57.06

Figure YN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
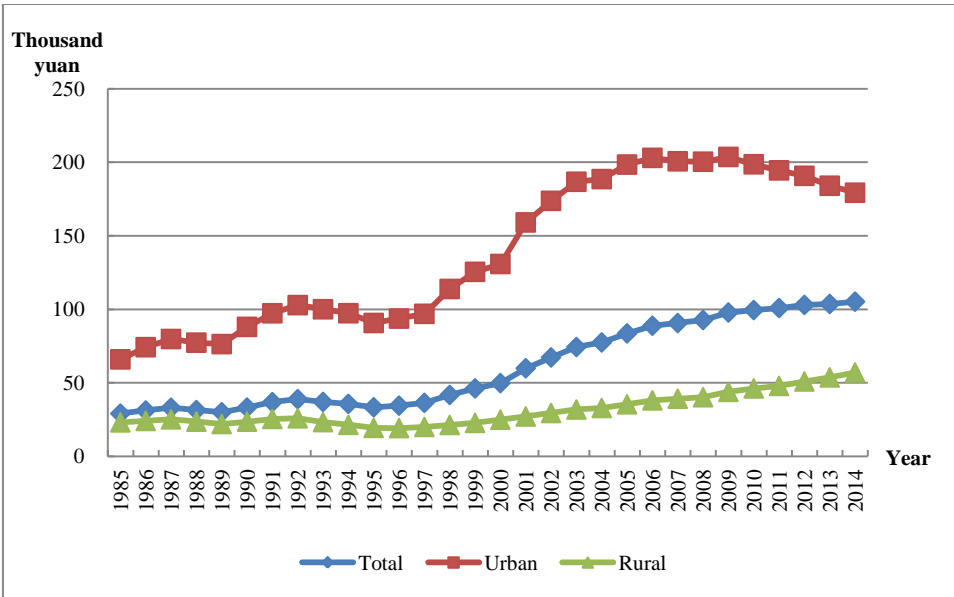
Figure YN-2.2 Real Human Capital Per Capita by Region for Yunnan，1985-2014

32.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

32.3.1 Total labor force human capital

The total labor force human capital for Yunnan is reported in Table YN-3.1 From 1985 to 2014, the nominal labor force human capital increases from 337 billion Yuan to 9,209 billion Yuan, an increase of more than 26 times; and the real labor force human capital increases from 337 billion Yuan to 1,748 billion Yuan, an increase of approximately 4 times.

Table YN-3.1 Nominal and Real Labor Force Human Capital for Yunnan

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	337	337	337	337
1986	407	407	385	384
1987	498	498	440	440
1988	588	587	434	434
1989	687	687	428	428
1990	804	803	488	487
1991	958	957	563	563
1992	1115	1114	599	599
1993	1304	1303	578	577
1994	1521	1520	568	568
1995	1772	1771	547	547
1996	2013	2014	573	573
1997	2274	2275	621	622
1998	2571	2574	691	692
1999	2863	2867	773	774
2000	3181	3172	878	875
2001	3439	3436	957	956
2002	3757	3758	1048	1048
2003	4096	4110	1128	1132
2004	4469	4496	1161	1168
2005	4923	4955	1262	1270
2006	5394	5431	1357	1367
2007	5845	5885	1390	1400
2008	6336	6381	1426	1437
2009	6919	6969	1553	1564
2010	7577	7631	1640	1653

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	7923	7976	1634	1646
2012	8269	8323	1658	1670
2013	8638	8690	1678	1688
2014	9209	9258	1748	1757

32.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables YN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 21,070 Yuan to 331,910 Yuan, an increase of more than 14 times; and the real average labor force human capital increases from 21,070 Yuan to 62,980 Yuan, an increase of approximately 2 times.

Table YN-3.2 Nominal and Real Average Labor Force Human Capital by Region for Yunnan

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	21.07	42.89	16.86	21.07	42.89	16.86
1986	24.5	52.36	18.91	23.16	49.96	17.78
1987	28.84	63.52	21.3	25.5	56.43	18.78
1988	32.53	72.22	24	24.03	52.99	17.81
1989	36.47	81.95	26.9	22.73	50.99	16.78
1990	41.22	94.16	30.2	25.01	57.67	18.22

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	47.2	108.94	33.72	27.77	64.28	19.8
1992	53.23	124.15	37.48	28.61	66.36	20.23
1993	60.4	141.94	41.83	26.76	63.86	18.31
1994	68.42	161.72	46.33	25.55	62.02	16.91
1995	77.68	184.05	51.12	23.99	58.68	15.32
1996	86.43	204.88	55.17	24.6	60.2	15.2
1997	96.19	226.23	59.52	26.28	63.55	15.78
1998	106.58	247.1	64.24	28.64	67.79	16.85
1999	116.36	265.3	68.82	31.41	73.66	17.93
2000	126.88	284.62	73.89	35.01	80.97	19.56
2001	137.45	302.47	80.82	38.25	87.72	21.27
2002	149.36	323.7	88.33	41.64	94.54	23.13
2003	160.72	340.88	96.79	44.25	98.27	25.09
2004	174.06	361.13	105.66	45.2	98.13	25.87
2005	189.31	389	114.74	48.51	103.93	27.81
2006	206.17	412.14	125.25	51.88	108.06	29.82
2007	222.61	432.71	135.77	52.92	107.14	30.52
2008	238.9	452.03	146.94	53.78	106.18	31.16
2009	258.62	473.38	159.74	58.03	110.63	33.8
2010	277.94	487.97	172.75	60.17	109.86	35.29
2011	291.48	496.12	187.26	60.13	106.58	36.46
2012	303.58	495.45	203.49	60.88	103.34	38.73
2013	314.52	490.17	221.13	61.08	98.88	40.98
2014	331.91	500.17	239.26	62.98	98.34	43.52

Chapter 33   Human Capital for Tibet

33.1 Total human capital

Table XZ-1.1 presents the results of nominal and real total human capital and real physical capital for Tibet. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Tibet.

Table XZ-1.1 Real Physical Capital, Nominal and Real Human Capital for Tibet

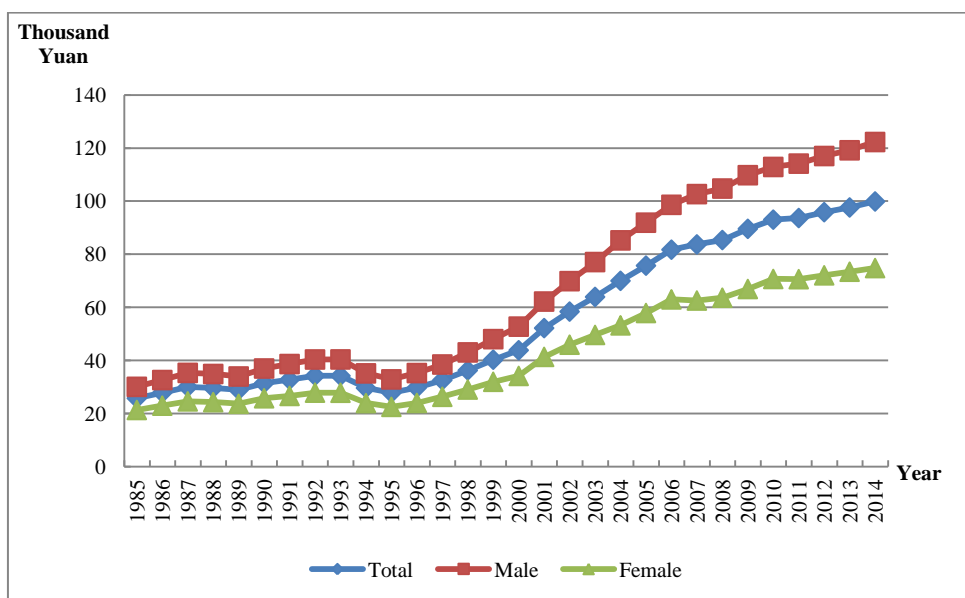| Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	47	47	47	47	5
1986	55	55	51	51	5
1987	64	64	57	57	6
1988	75	75	57	57	6
1989	87	87	57	57	6
1990	101	102	63	63	7
1991	118	118	67	67	7
1992	136	136	71	71	9
1993	157	157	72	72	10
1994	177	177	63	63	12
1995	201	201	60	60	15
1996	238	239	66	66	17
1997	280	282	74	74	19
1998	320	321	83	84	21
1999	361	363	94	95	24

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	401	403	104	105	26
2001	486	498	126	130	29
2002	555	621	143	160	35
2003	620	662	159	169	44
2004	705	723	176	180	57
2005	784	821	193	202	73
2006	875	892	211	215	91
2007	939	954	220	223	110
2008	1025	1068	227	236	131
2009	1104	1146	241	250	154
2010	1187	1239	254	265	190
2011	1270	1293	259	263	220
2012	1362	1383	268	272	258
2013	1451	1471	276	280	307
2014	1545	1564	286	289	361

33.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table XZ-2.1 presents human capital per capita for Tibet by region. From 1985 to 2014, the nominal human capital per capita increases from 25,770 Yuan to 540,440 Yuan, an increase of more than 19 times; and the real human capital per capita increases from 25,770 Yuan to 99,910 Yuan, an increase of approximately 3 times.

Figure XZ-2.1 illustrates the trends of human capital per capita by

gender for Tibet. The real human capital per capita of male is similar to that of female for Tibet. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.

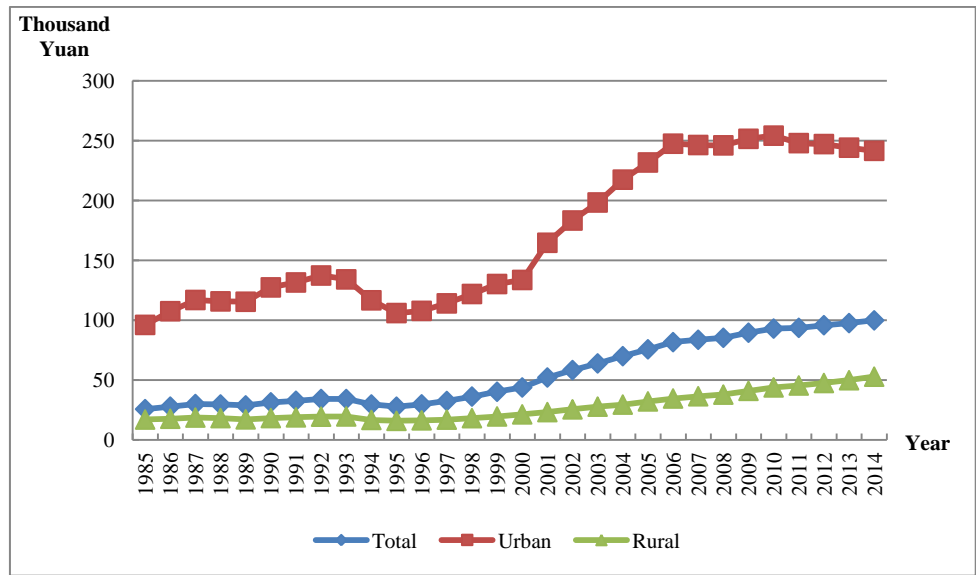**Figure XZ-2.1 Human Capital Per Capita by Gender for Tibet, 1985-2014**

Table XZ-2.1 Nominal and Real Human Capital Per Capita by Region for Tibet

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	25.77	96.12	17.06	25.77	96.12	17.06
1986	29.69	115.09	18.85	27.86	107.56	17.74
1987	34.05	135.57	20.86	30.02	116.94	18.73
1988	38.95	158.13	23.17	29.66	115.78	18.26
1989	44.44	182.77	25.8	28.87	115.47	17.21
1990	50.82	212.23	28.7	31.44	127.45	18.29
1991	57.77	239.69	32.31	32.73	131.58	18.9

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	65.7	272.81	36.13	34.22	137.39	19.48
1993	74.53	306.9	40.69	34.21	134.17	19.66
1994	82.66	334.97	45.23	29.65	116.68	16.73
1995	92.56	369.2	50.73	27.8	106.02	15.97
1996	107.27	411.22	55.27	29.75	107.85	16.40
1997	123.85	456.04	60.51	32.56	114.12	17.00
1998	138.97	486.36	65.85	36.26	121.95	18.23
1999	154.36	516.50	71.33	40.29	130.29	19.65
2000	168.39	532.07	77.45	43.84	133.69	21.38
2001	200.67	650.43	85.12	52.19	164.74	23.29
2002	226.11	731.11	93.38	58.41	183.34	25.57
2003	249.73	797.51	102.64	63.95	198.41	27.86
2004	280.24	891.63	112.66	70.00	217.47	29.57
2005	307.22	964.75	123.83	75.73	231.83	32.21
2006	338.49	1049.59	136.35	81.74	247.52	34.64
2007	357.93	1075.32	149.82	83.72	246.44	36.52
2008	385.61	1135.28	164.28	85.37	246.15	37.89
2009	410.14	1177.62	180.16	89.60	251.61	41.04
2010	435.13	1216.23	197.05	93.05	254.26	43.92
2011	459.80	1248.08	213.83	93.67	248.02	45.52
2012	487.04	1288.83	231.21	95.88	247.22	47.60
2013	513.10	1317.69	251.14	97.65	244.21	49.91
2014	540.44	1346.43	272.78	99.91	241.56	52.89

Figure XZ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

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significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.

Figure XZ-2.2 Real Human Capital Per Capita by Region for Tibet, 1985-2014

33.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

33.3.1 Total labor force human capital

The total labor force human capital for Tibet is reported in Table XZ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 18 billion Yuan to 603 billion Yuan, an increase of more than 32 times; and the real labor force human capital increases from 18 billion Yuan to 113 billion Yuan, an increase of approximately 5 times.

Table XZ-3.1 Nominal and Real Labor Force Human Capital for Tibet

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	18	18	18	18
1986	21	21	19	19
1987	24	24	21	21
1988	28	28	22	22
1989	32	32	21	21
1990	38	38	24	24
1991	44	44	25	25
1992	51	51	27	27
1993	60	60	28	28
1994	70	70	25	25
1995	80	80	24	24
1996	93	93	26	26
1997	107	108	28	28
1998	126	126	33	33
1999	147	147	38	39
2000	171	171	45	45
2001	180	179	47	47
2002	194	193	51	50
2003	213	213	55	55
2004	232	234	59	59
2005	256	257	64	64
2006	284	286	70	70
2007	317	320	75	76
2008	357	360	80	81
2009	407	410	90	91
2010	466	470	100	101

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	497	501	102	103
2012	529	533	105	106
2013	562	567	108	109
2014	603	607	113	114

33.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables XZ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 17,950 Yuan to 325,580 Yuan, an increase of more than 17 times; and the real average labor force human capital increases from 17,950 Yuan to 61,000 Yuan, an increase of approximately 2 times.

Table XZ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Tibet

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	17.95	54.48	14.27	17.95	54.48	14.27
1986	20.35	64.58	15.79	19.11	60.35	14.86
1987	23.03	76.24	17.39	20.42	65.76	15.61
1988	26.28	89.20	19.36	20.21	65.31	15.26
1989	29.67	102.84	21.46	19.42	64.97	14.31
1990	33.71	118.30	23.76	21.02	71.05	15.14

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1991	38.75	137.70	26.31	22.12	75.59	15.39
1992	44.64	159.64	29.13	23.39	80.40	15.71
1993	51.79	185.53	32.36	23.94	81.11	15.64
1994	59.47	210.53	35.80	21.39	73.34	13.24
1995	67.66	235.08	39.65	20.37	67.51	12.48
1996	76.29	250.96	43.44	21.27	65.81	12.89
1997	86.22	269.18	47.77	22.79	67.36	13.42
1998	97.82	291.44	52.42	25.63	73.08	14.51
1999	109.66	312.40	57.22	28.72	78.81	15.76
2000	123.33	334.72	62.60	32.19	84.10	17.28
2001	128.63	362.98	69.13	33.69	91.94	18.91
2002	135.28	393.21	76.37	35.37	98.61	20.91
2003	145.19	424.81	84.25	37.68	105.69	22.86
2004	155.06	459.37	92.92	39.25	112.04	24.39
2005	167.34	498.87	101.96	41.90	119.88	26.52
2006	181.67	531.54	112.48	44.55	125.35	28.57
2007	199.09	570.50	123.50	47.13	130.74	30.11
2008	218.38	604.93	135.40	48.89	131.16	31.23
2009	240.69	638.35	148.62	53.13	136.39	33.85
2010	265.56	667.57	162.97	57.30	139.56	36.32
2011	278.88	679.89	176.90	57.41	135.11	37.66
2012	292.32	691.25	190.85	58.22	132.59	39.29
2013	306.96	701.48	206.59	59.09	130.01	41.06
2014	325.58	729.22	223.39	61.00	130.83	43.31

Chapter 34   Human Capital for Shaanxi

34.1 Total human capital

Table SaX-1.1 presents the results of nominal and real total human capital and real physical capital for Shaanxi. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Shaanxi.

Table SaX-1.1 Real Physical Capital, Nominal and Real Human Capital for Shaanxi

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	770	772	770	772	33
1986	962	962	909	910	39
1987	1111	1111	976	977	44
1988	1327	1329	986	988	49
1989	1584	1586	984	985	54
1990	1844	1848	1119	1121	57
1991	2163	2169	1233	1236	61
1992	2535	2544	1320	1324	65
1993	2950	2962	1350	1355	70
1994	3382	3396	1218	1223	75
1995	3833	3850	1160	1165	80
1996	4376	4407	1201	1209	85
1997	4964	5010	1298	1309	91
1998	5446	5498	1447	1460	98

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	6129	6197	1665	1683	107
2000	6813	6905	1852	1876	118
2001	8042	8826	2156	2360	129
2002	8874	9120	2402	2468	142
2003	9697	9990	2582	2659	158
2004	10683	10990	2759	2837	178
2005	11561	11970	2951	3054	204
2006	13163	13507	3305	3391	237
2007	14934	15327	3562	3656	282
2008	16846	17310	3778	3882	339
2009	18805	19460	4199	4345	405
2010	20912	21748	4490	4671	489
2011	22895	23511	4653	4779	580
2012	25317	25973	5007	5138	680
2013	27784	28481	5338	5471	785
2014	30201	30928	5709	5847	898

34.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table SaX-2.1 presents human capital per capita for Shaanxi by region. From 1985 to 2014, the nominal human capital per capita increases from 28,520 Yuan to 939,560 Yuan, an increase of more than 31 times; and the real human capital per capita increases from 28,520 Yuan to 177,610 Yuan, an increase of approximately 5 times.

Figure SaX-2.1 illustrates the trends of human capital per capita by

gender for Shaanxi. The real human capital per capita of male is similar to that of female for Shaanxi. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
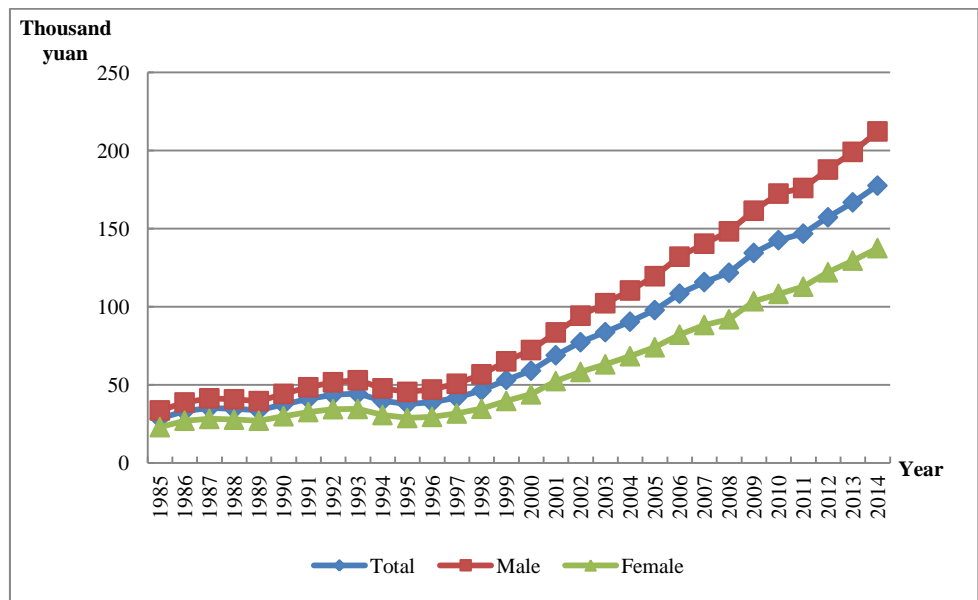
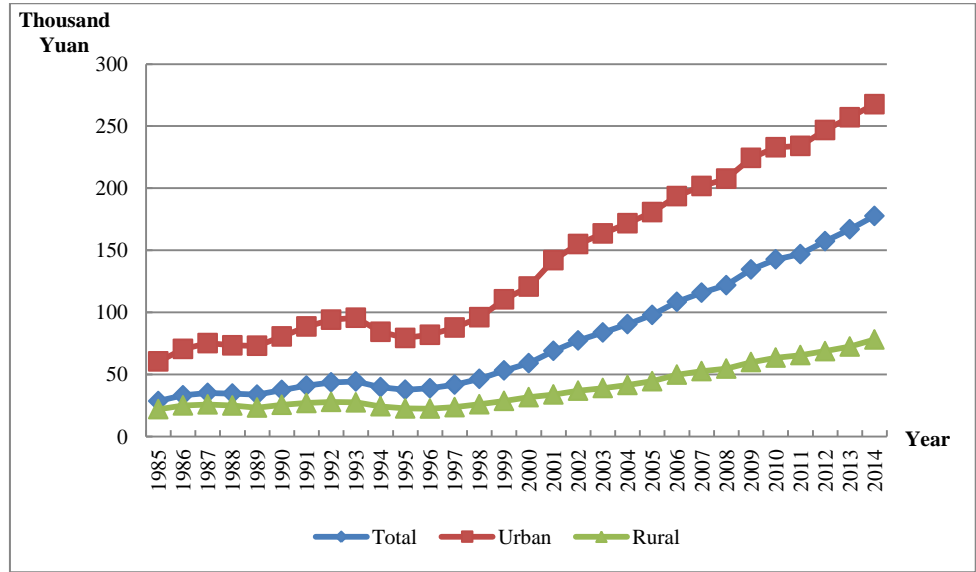**Figure SaX-2.1 Human Capital Per Capita by Gender for Shaanxi，1985-2014**

Table SaX-2.1 Nominal and Real Human Capital Per Capita by Region for Shaanxi

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	28.52	60.48	22.04	28.52	60.48	22.04
1986	35.09	75.18	26.38	33.16	70.53	25.06
1987	39.94	87.54	28.97	35.12	75.20	25.88
1988	46.55	102.64	32.66	34.59	73.42	24.98
1989	54.26	120.17	36.90	33.70	73.09	23.32
1990	61.85	135.91	41.26	37.52	80.57	25.54

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	71.94	160.35	45.90	41.00	88.59	26.99
1992	83.78	189.37	50.87	43.61	94.09	27.88
1993	96.92	219.39	56.70	44.34	95.62	27.49
1994	110.46	247.96	62.97	39.77	84.29	24.39
1995	124.58	275.40	69.98	37.69	79.34	22.61
1996	141.59	313.53	76.46	38.85	81.89	22.54
1997	159.92	353.46	83.35	41.80	87.76	23.62
1998	174.78	378.02	91.02	46.44	96.07	25.98
1999	196.00	422.54	98.97	53.23	110.47	28.70
2000	217.29	463.22	108.18	59.08	120.75	31.69
2001	257.43	545.33	118.96	69.00	142.01	33.87
2002	285.74	584.50	130.23	77.35	155.00	36.93
2003	314.68	621.54	142.56	83.80	163.51	39.06
2004	350.38	672.46	156.34	90.48	171.76	41.51
2005	383.69	713.89	170.74	97.93	180.71	44.53
2006	432.03	780.74	191.94	108.46	193.57	49.86
2007	485.73	855.94	213.09	115.85	201.72	52.67
2008	543.37	935.85	236.08	121.86	207.68	54.69
2009	602.48	1011.06	263.52	134.53	224.37	59.96
2010	664.64	1088.36	292.51	142.70	232.91	63.57
2011	722.67	1155.78	318.71	146.87	234.01	65.59
2012	795.57	1250.82	344.43	157.34	246.81	68.75
2013	868.79	1339.34	376.10	166.92	257.08	72.46
2014	939.56	1416.26	412.67	177.61	267.59	78.13

Figure SaX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.

Figure SaX-2.2 Real Human Capital Per Capita by Region for Shaanxi，1985-2014

34.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

34.3.1 Total labor force human capital

The total labor force human capital for Shaanxi is reported in Table SaX-3.1 From 1985 to 2014, the nominal labor force human capital increases from 352 billion Yuan to 12,107 billion Yuan, an increase of more than 33 times; and the real labor force human capital increases from 352

billion Yuan to 2,289 billion Yuan, an increase of approximately 5 times.

Table SaX-3.1 Nominal and Real Labor Force Human Capital for Shaanxi

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	352	352	352	352
1986	423	422	400	399
1987	508	507	447	446
1988	599	598	447	446
1989	696	694	433	432
1990	828	826	503	502
1991	940	938	538	536
1992	1054	1053	553	552
1993	1189	1188	549	548
1994	1323	1321	482	481
1995	1479	1477	452	451
1996	1622	1620	450	450
1997	1789	1788	474	474
1998	1993	1991	535	534
1999	2225	2222	609	609
2000	2520	2475	691	679
2001	2732	2694	739	729
2002	2990	2966	815	809
2003	3281	3274	877	875
2004	3568	3594	925	932
2005	3964	3993	1014	1022
2006	4579	4617	1155	1164
2007	5355	5403	1284	1295
2008	6174	6235	1391	1404

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2009	7238	7319	1620	1638
2010	8546	8651	1838	1861
2011	9302	9424	1893	1918
2012	10022	10162	1984	2012
2013	10847	11004	2084	2115
2014	12107	12285	2289	2322

34.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables SaX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 21,380 Yuan to 536,790 Yuan, an increase of more than 24 times; and the real average labor force human capital increases from 21,380 Yuan to 101,480 Yuan, an increase of approximately 4 times.

Table SaX-3.2 Nominal and Real Average Labor Force Human Capital by Region for Shaanxi

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	21.38	40.24	17.61	21.38	40.24	17.61
1986	24.91	48.24	19.81	23.56	45.25	18.81
1987	29.06	57.21	22.36	25.58	49.15	19.98
1988	33.37	65.76	25.14	24.87	47.04	19.23

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1989	37.98	74.87	28.02	23.63	45.54	17.71
1990	43.85	86.69	31.30	26.63	51.39	19.38
1991	49.26	97.62	34.76	28.16	53.94	20.44
1992	55.00	110.11	38.40	28.83	54.71	21.04
1993	61.71	124.23	42.45	28.49	54.14	20.59
1994	68.74	138.43	46.65	25.04	47.06	18.07
1995	76.74	154.52	51.12	23.45	44.52	16.51
1996	84.46	170.42	55.07	23.44	44.51	16.23
1997	93.24	188.19	59.39	24.69	46.72	16.83
1998	103.16	206.99	64.25	27.68	52.60	18.34
1999	113.97	226.10	69.28	31.22	59.12	20.09
2000	127.66	251.08	75.27	34.98	65.45	22.05
2001	138.86	263.45	82.36	37.54	68.60	23.45
2002	150.89	277.46	89.71	41.13	73.58	25.44
2003	164.14	291.66	97.49	43.88	76.73	26.71
2004	178.62	307.95	105.66	46.30	78.66	28.05
2005	197.73	332.14	114.95	50.60	84.08	29.98
2006	224.84	367.79	132.52	56.71	91.19	34.42
2007	257.31	415.23	151.18	61.68	97.86	37.36
2008	291.00	460.81	170.52	65.54	102.26	39.50
2009	334.10	520.44	192.91	74.77	115.49	43.90
2010	384.10	587.90	216.99	82.59	125.81	47.16
2011	417.72	631.82	241.44	85.00	127.92	49.69
2012	450.27	671.74	265.77	89.15	132.55	53.05
2013	486.11	710.87	294.23	93.41	136.45	56.69
2014	536.79	771.80	323.95	101.48	145.82	61.33

Chapter 35 Human Capital for Gansu

35.1 Total human capital

Table GS-1.1 presents the results of nominal and real total human capital and real physical capital for Gansu. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Gansu.

Table GS-1.1 Real Physical Capital, Nominal and Real Human Capital for Gansu

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	457	457	457	457	29
1986	535	536	503	503	31
1987	626	627	547	548	34
1988	737	737	544	545	37
1989	865	866	542	542	39
1990	1010	1011	612	613	41
1991	1153	1155	664	666	44
1992	1312	1315	707	709	46
1993	1501	1505	700	702	48
1994	1694	1700	637	639	50
1995	1911	1919	601	603	52
1996	2145	2155	613	616	55
1997	2402	2418	667	671	58
1998	2679	2700	751	757	62
1999	2958	2984	849	857	68

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
2000	3243	3278	935	945	75
2001	3690	3734	1022	1034	84
2002	4151	4202	1151	1165	95
2003	4664	4731	1279	1297	107
2004	5170	5242	1386	1405	121
2005	5743	5822	1513	1534	137
2006	6263	6348	1629	1652	155
2007	6851	6945	1689	1713	176
2008	7436	7539	1694	1718	201
2009	8010	8124	1801	1828	229
2010	8536	8660	1842	1869	263
2011	9233	9363	1885	1912	302
2012	9836	9968	1948	1975	347
2013	10385	10516	1998	2024	396
2014	10916	11042	2056	2080	450

35.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table GS-2.1 presents human capital per capita for Gansu by region. From 1985 to 2014, the nominal human capital per capita increases from 24,250 Yuan to 512,250 Yuan, an increase of more than 20 times; and the real human capital per capita increases from 24,250 Yuan to 96,480 Yuan, an increase of approximately 3 times.

Figure GS-2.1 illustrates the trends of human capital per capita by

gender for Gansu. The real human capital per capita of male is similar to that of female for Gansu. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
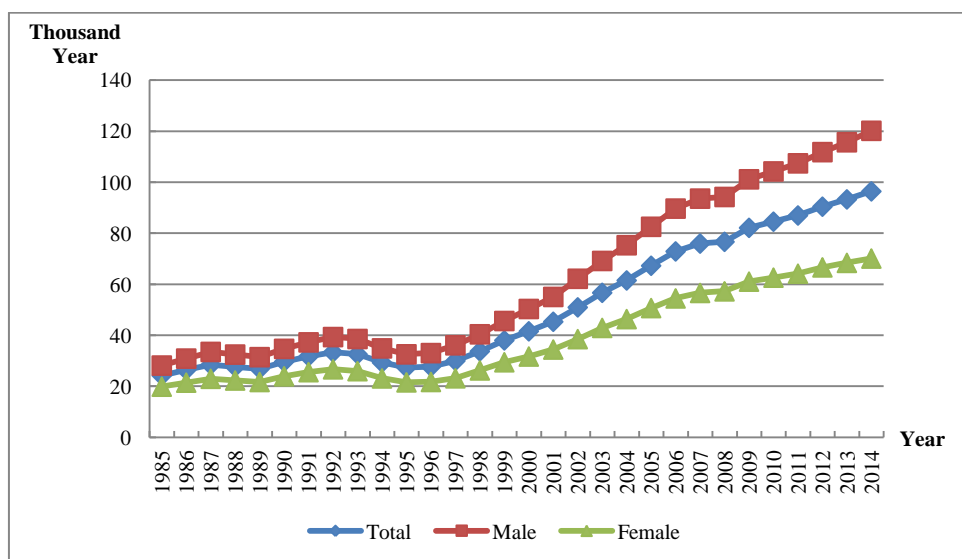
Figure GS-2.1 Human Capital Per Capita by Gender for Gansu，1985-2014

Table GS-2.1 Nominal and Real Human Capital Per Capita by Region for Gansu

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	24.25	59.71	16.44	24.25	59.71	16.44
1986	28.14	69.58	18.49	26.43	65.03	17.44
1987	32.59	80.72	20.78	28.49	69.60	18.41
1988	37.41	91.68	23.36	27.65	65.54	17.84
1989	42.90	104.12	26.24	26.86	62.98	17.04
1990	48.94	117.68	29.40	29.66	69.85	18.23
1991	55.11	132.74	32.80	31.76	74.54	19.47

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	61.91	149.33	36.50	33.38	78.15	20.36
1993	69.94	168.96	40.89	32.64	76.76	19.70
1994	78.03	187.78	45.54	29.35	68.46	17.76
1995	87.03	208.84	50.71	27.38	64.04	16.44
1996	97.08	234.53	55.65	27.74	65.20	16.45
1997	108.11	263.36	60.90	30.03	71.22	17.49
1998	120.43	295.34	66.50	33.77	80.68	19.31
1999	132.52	325.44	72.37	38.05	91.46	21.40
2000	144.33	352.23	78.90	41.61	99.78	23.31
2001	163.73	387.34	87.12	45.36	106.54	24.40
2002	183.99	421.73	95.43	51.00	116.81	26.49
2003	206.75	461.20	104.50	56.71	126.60	28.60
2004	229.65	495.56	114.52	61.55	134.29	30.05
2005	255.52	519.62	125.57	67.32	139.14	31.99
2006	280.36	567.26	140.12	72.93	150.10	35.21
2007	308.42	606.94	155.21	76.01	152.66	36.69
2008	336.70	645.11	171.20	76.70	150.24	37.23
2009	365.57	680.82	189.43	82.18	157.14	40.31
2010	392.09	707.47	209.10	84.60	156.41	42.94
2011	426.23	745.83	229.85	87.03	156.00	44.66
2012	456.86	774.03	250.84	90.48	157.03	47.27
2013	485.07	794.07	273.43	93.33	156.87	49.84
2014	512.25	809.54	298.06	96.48	156.49	53.21

Figure GS-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is

significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
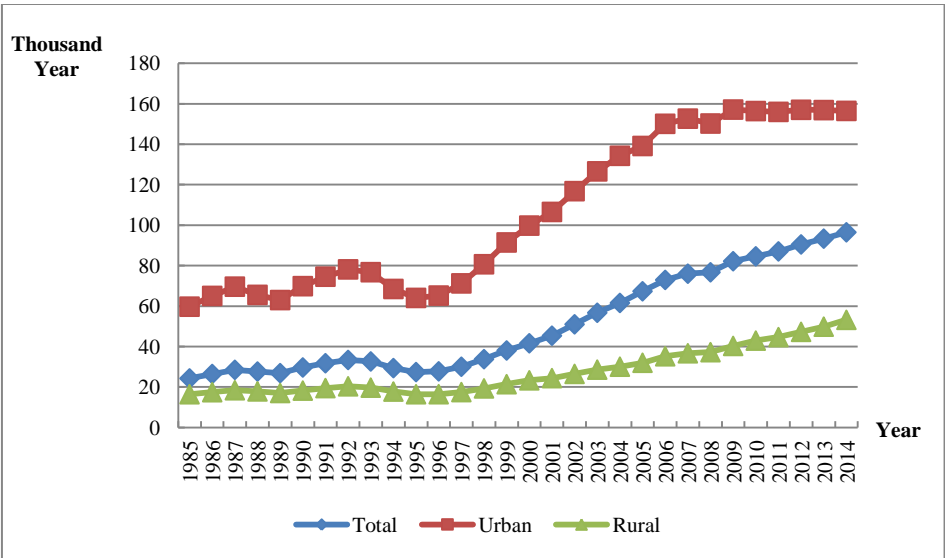
Figure GS-2.2 Real Human Capital Per Capita by Region for Gansu，1985-2014

35.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

35.3.1 Total labor force human capital

The total labor force human capital for Gansu is reported in Table GS-3.1 From 1985 to 2014, the nominal labor force human capital increases from 195 billion Yuan to 4,917 billion Yuan, an increase of more than 24 times; and the real labor force human capital increases from 195 billion Yuan to 919 billion Yuan, an increase of approximately 4 times.

Table GS-3.1 Nominal and Real Labor Force Human Capital for Gansu

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	195	195	195	195
1986	234	234	220	220
1987	282	282	247	247
1988	344	343	254	254
1989	415	414	260	260
1990	498	497	302	302
1991	575	574	331	331
1992	651	651	351	351
1993	736	736	344	344
1994	829	829	312	312
1995	932	932	293	293
1996	1017	1017	291	291
1997	1116	1117	310	311
1998	1226	1228	344	345
1999	1351	1352	388	389
2000	1493	1485	431	429
2001	1603	1600	444	444
2002	1735	1734	481	481
2003	1878	1880	515	515
2004	2064	2074	552	555
2005	2369	2381	623	626
2006	2530	2543	656	659
2007	2755	2772	676	680
2008	3009	3028	681	686
2009	3347	3372	747	753
2010	3730	3763	801	808

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	3998	4032	811	819
2012	4276	4314	841	849
2013	4549	4587	868	876
2014	4917	4956	919	927

35.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables GS-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 18,350 Yuan to 333,540 Yuan, an increase of more than 17 times; and the real average labor force human capital increases from 18,350 Yuan to 62,350 Yuan, an increase of approximately 2 times.

Table GS-3.2 Nominal and Real Average Labor Force Human Capital by Region for Gansu

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	18.35	41.51	12.84	18.35	41.51	12.84
1986	21.38	48.83	14.45	20.09	45.63	13.63
1987	24.97	57.33	16.29	21.84	49.43	14.43
1988	28.83	65.24	18.50	21.31	46.64	14.13
1989	33.09	74.07	20.91	20.74	44.80	13.58
1990	38.13	84.45	23.61	23.11	50.12	14.64

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	42.88	94.81	26.27	24.72	53.24	15.59
1992	47.66	105.25	29.05	25.70	55.08	16.20
1993	53.11	117.20	32.21	24.79	53.24	15.52
1994	59.05	129.97	35.59	22.21	47.38	13.88
1995	65.72	143.87	39.35	20.67	44.12	12.76
1996	71.61	157.19	42.99	20.48	43.70	12.71
1997	78.28	172.30	47.04	21.76	46.59	13.51
1998	85.84	189.10	51.34	24.11	51.65	14.91
1999	93.97	207.02	55.65	27.02	58.18	16.46
2000	103.02	226.57	60.62	29.73	64.19	17.91
2001	111.80	239.77	65.93	30.99	65.95	18.46
2002	120.98	254.87	71.50	33.54	70.59	19.84
2003	130.66	268.85	77.44	35.81	73.80	21.20
2004	143.33	287.99	83.46	38.33	78.04	21.90
2005	163.05	311.79	90.08	42.88	83.49	22.95
2006	175.21	331.37	102.19	45.42	87.68	25.68
2007	190.93	351.89	114.83	46.85	88.51	27.14
2008	208.10	373.22	128.15	47.12	86.92	27.87
2009	229.50	401.03	143.35	51.24	92.56	30.50
2010	253.39	431.25	159.23	54.39	95.34	32.70
2011	272.86	451.04	176.43	55.36	94.34	34.28
2012	291.70	467.20	194.63	57.38	94.78	36.68
2013	310.18	479.83	212.97	59.21	94.79	38.82
2014	333.54	500.99	231.67	62.35	96.84	41.36

Chapter 36   Human Capital for Qinghai

36.1 Total human capital

Table QH-1.1 presents the results of nominal and real total human capital and real physical capital for Qinghai. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Qinghai.

Table QH-1.1 Real Physical Capital, Nominal and Real Human Capital for Qinghai

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	109	109	109	109	11
1986	125	126	118	118	12
1987	145	145	128	128	13
1988	167	168	126	126	14
1989	193	193	123	124	15
1990	221	222	134	134	16
1991	256	256	144	144	17
1992	295	295	154	154	19
1993	339	340	158	158	23
1994	390	391	148	149	26
1995	443	444	143	143	30
1996	496	497	145	145	35
1997	557	559	155	155	41
1998	619	621	170	171	48

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	686	690	189	190	56
2000	762	767	211	213	65
2001	882	892	238	241	78
2002	982	995	259	262	93
2003	1092	1107	281	285	109
2004	1203	1220	300	304	127
2005	1329	1349	328	333	146
2006	1486	1506	361	366	167
2007	1654	1675	377	381	190
2008	1833	1856	379	384	217
2009	2038	2067	410	416	254
2010	2244	2275	429	435	302
2011	2481	2518	446	453	364
2012	2704	2745	472	479	447
2013	2937	2979	493	500	558
2014	3190	3235	520	528	685

36.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table QH-2.1 presents human capital per capita for Qinghai by region. From 1985 to 2014, the nominal human capital per capita increases from 28,110 Yuan to 627,700 Yuan, an increase of more than 21 times; and the real human capital per capita increases from 28,110 Yuan to 102,390 Yuan, an increase of approximately 3 times.

Figure QH-2.1 illustrates the trends of human capital per capita by gender for Qinghai. The real human capital per capita of male is similar to that of female for Qinghai. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
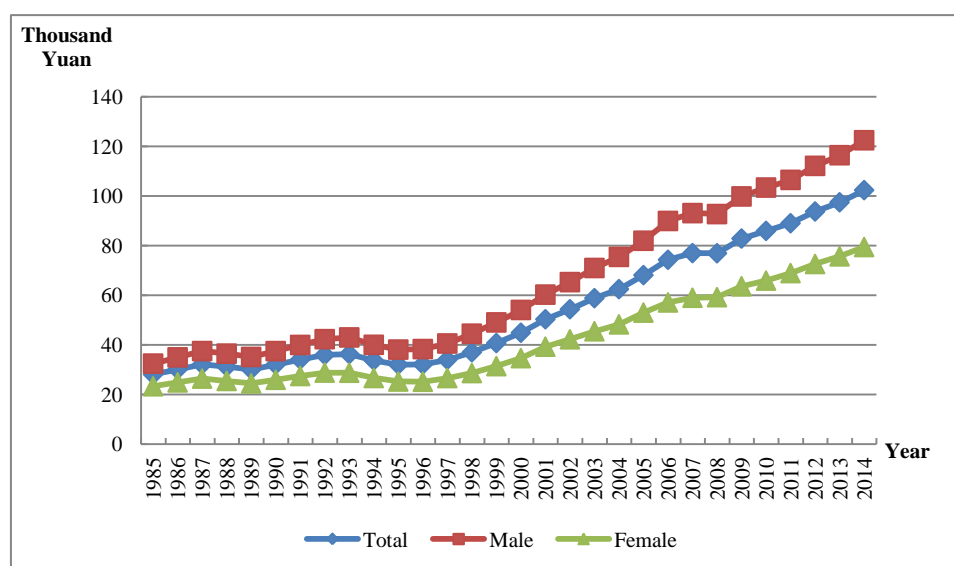
Figure QH-2.1 Human Capital Per Capita by Gender for Qinghai，1985-2014

Table QH-2.1 Nominal and Real Human Capital Per Capita by Region for Qinghai

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	28.11	55.91	19.56	28.11	55.91	19.56
1986	31.97	64.00	21.62	30.15	60.15	20.46
1987	36.34	72.98	23.95	32.18	63.63	21.54
1988	41.43	83.68	26.82	31.23	61.52	20.76
1989	46.98	95.05	30.02	30.09	59.57	19.69

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	53.16	107.76	33.55	32.10	64.50	20.45
1991	60.53	121.73	37.44	34.12	67.03	21.69
1992	68.84	137.62	41.65	35.99	69.78	22.64
1993	78.22	154.87	46.57	36.34	68.88	22.91
1994	88.85	174.99	51.81	33.76	63.18	21.12
1995	99.71	194.20	57.51	32.08	58.57	20.26
1996	110.32	213.04	62.80	32.15	57.68	20.33
1997	122.52	235.13	68.66	34.03	60.57	21.33
1998	134.64	255.90	74.79	37.06	65.53	23.01
1999	147.69	278.25	81.25	40.78	71.61	25.10
2000	162.16	302.71	88.52	44.94	78.22	27.50
2001	186.53	350.83	97.76	50.37	88.01	30.01
2002	206.58	384.39	107.49	54.39	94.45	32.07
2003	228.32	419.45	118.70	58.86	101.24	34.55
2004	250.56	453.60	130.91	62.51	107.23	36.12
2005	275.82	493.29	144.13	68.15	116.96	38.57
2006	305.87	531.61	160.11	74.33	123.82	42.38
2007	338.16	572.21	177.48	77.01	125.38	43.79
2008	372.13	614.08	196.20	76.94	123.55	43.10
2009	411.65	664.53	218.07	82.88	129.56	47.11
2010	450.06	708.38	241.62	85.97	131.41	49.33
2011	495.05	764.17	265.27	89.04	133.73	50.90
2012	537.49	811.80	290.50	93.79	137.89	54.06
2013	581.05	859.18	317.23	97.49	140.23	56.94
2014	627.70	908.52	347.05	102.39	144.10	60.71

Figure QH-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area

remains larger than that in rural area. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
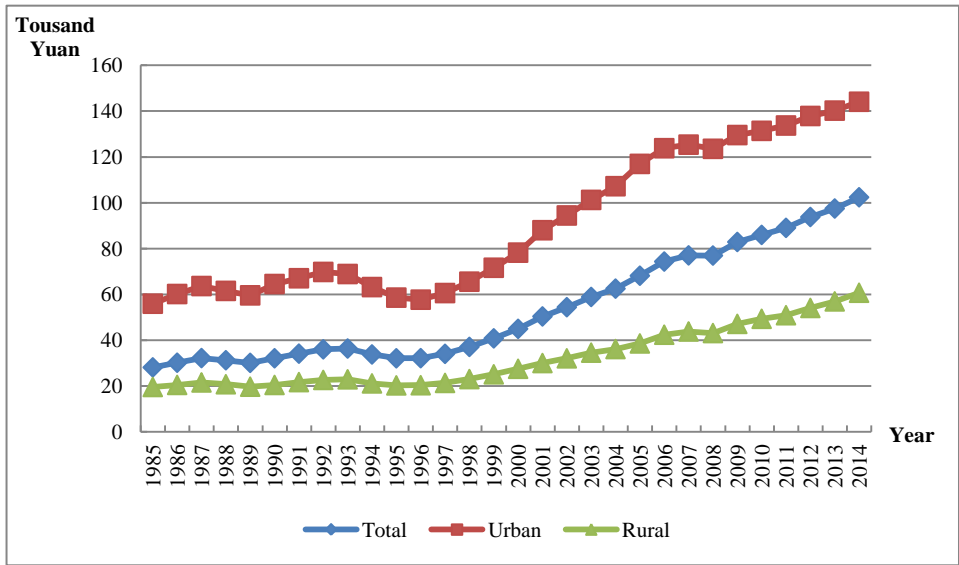
Figure QH-2.2 Real Human Capital Per Capita by Region for Qinghai，1985-2014

36.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

36.3.1 Total labor force human capital

The total labor force human capital for Qinghai is reported in Table QH-3.1 From 1985 to 2014, the nominal labor force human capital increases from 40 billion Yuan to 1,449 billion Yuan, an increase of more than 35 times; and the real labor force human capital increases from 40 billion Yuan

to 238 billion Yuan, an increase of approximately 5 times.

Table QH-3.1 Nominal and Real Labor Force Human Capital for Qinghai

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	40	40	40	40
1986	48	48	45	45
1987	58	58	51	51
1988	71	71	53	53
1989	87	87	56	56
1990	107	106	64	64
1991	125	125	70	70
1992	144	144	75	75
1993	167	167	78	78
1994	192	192	73	73
1995	219	219	71	71
1996	247	247	72	72
1997	277	278	77	77
1998	311	311	86	86
1999	345	345	96	96
2000	382	381	106	106
2001	418	418	114	114
2002	457	459	121	122
2003	501	503	130	131
2004	548	552	138	139
2005	599	604	149	150
2006	666	672	163	164
2007	747	753	171	173
2008	835	843	174	175

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2009	944	954	191	193
2010	1066	1078	205	207
2011	1146	1159	207	209
2012	1237	1251	217	219
2013	1332	1347	225	227
2014	1449	1465	238	240

36.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables QH-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 20,360 Yuan to 419,040 Yuan, an increase of more than 19 times; and the real average labor force human capital increases from 20,360 Yuan to 68,810 Yuan, an increase of approximately 2 times.

Table QH-3.2 Nominal and Real Average Labor Force Human Capital by Region for Qinghai

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	20.36	36.89	15.26	20.36	36.89	15.26
1986	23.62	43.53	16.87	22.28	40.91	15.96
1987	27.25	50.63	18.68	24.14	44.14	16.80
1988	31.61	59.14	21.39	23.85	43.47	16.56

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	36.62	68.94	24.37	23.46	43.20	15.98
1990	42.58	80.80	27.75	25.70	48.36	16.91
1991	48.26	91.06	31.02	27.21	50.14	17.97
1992	54.28	101.90	34.56	28.41	51.67	18.79
1993	61.51	115.01	38.61	28.63	51.15	18.99
1994	69.05	128.24	42.91	26.32	46.30	17.49
1995	77.49	142.82	47.58	25.02	43.08	16.76
1996	85.52	156.52	51.83	25.02	42.38	16.78
1997	94.53	171.28	56.49	26.35	44.12	17.55
1998	103.78	186.02	61.48	28.67	47.63	18.91
1999	112.93	199.73	66.50	31.30	51.40	20.54
2000	123.16	214.70	72.07	34.25	55.48	22.39
2001	134.51	233.24	78.75	36.58	58.51	24.18
2002	146.13	251.31	86.07	38.79	61.75	25.68
2003	158.71	270.61	94.29	41.28	65.31	27.45
2004	172.23	290.44	103.07	43.28	68.66	28.44
2005	187.03	311.41	112.55	46.50	73.84	30.12
2006	206.54	336.15	125.66	50.57	78.29	33.26
2007	229.29	365.67	139.56	52.56	80.12	34.43
2008	253.55	396.11	154.52	52.70	79.70	33.95
2009	282.69	432.58	171.96	57.18	84.34	37.15
2010	313.78	469.08	190.76	60.20	87.02	38.95
2011	337.18	493.69	209.86	60.96	86.40	40.27
2012	362.05	517.71	230.37	63.52	87.94	42.87
2013	388.13	543.64	251.95	65.54	88.73	45.22
2014	419.04	576.82	275.06	68.81	91.49	48.12

Chapter 37   Human Capital for Ningxia

37.1 Total human capital

Table NX-1.1 presents the results of nominal and real total human capital and real physical capital for Ningxia. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Ningxia.

Table NX-1.1 Real Physical Capital, Nominal and Real Human Capital for Ningxia

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	149	150	149	150	11
1986	175	175	166	166	12
1987	205	205	181	181	13
1988	241	241	182	182	14
1989	281	281	180	181	14
1990	327	327	196	196	15
1991	374	375	211	212	16
1992	429	430	224	225	17
1993	491	492	224	225	18
1994	557	559	206	207	19
1995	631	633	200	200	20
1996	721	724	213	214	21
1997	824	816	235	233	22
1998	926	930	264	265	23

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	1035	1041	298	300	25
2000	1150	1161	332	335	28
2001	1346	1363	382	386	31
2002	1530	1549	435	440	35
2003	1744	1769	487	494	40
2004	1953	1980	525	532	47
2005	2166	2197	574	582	55
2006	2540	2585	659	670	64
2007	2875	2925	708	720	75
2008	3209	3265	728	740	91
2009	3584	3652	807	822	110
2010	3906	3980	846	862	133
2011	4294	4368	875	890	155
2012	4693	4773	937	953	181
2013	5083	5165	981	997	210
2014	5479	5563	1038	1053	251

37.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table NX-2.1 presents human capital per capita for Ningxia by region. From 1985 to 2014, the nominal human capital per capita increases from 38,780 Yuan to 949,950 Yuan, an increase of more than 23 times; and the real human capital per capita increases from 38,780 Yuan to 179,920 Yuan, an increase of approximately 4 times.

Figure NX-2.1 illustrates the trends of human capital per capita by gender for Ningxia. The real human capital per capita of male is similar to that of female for Ningxia. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
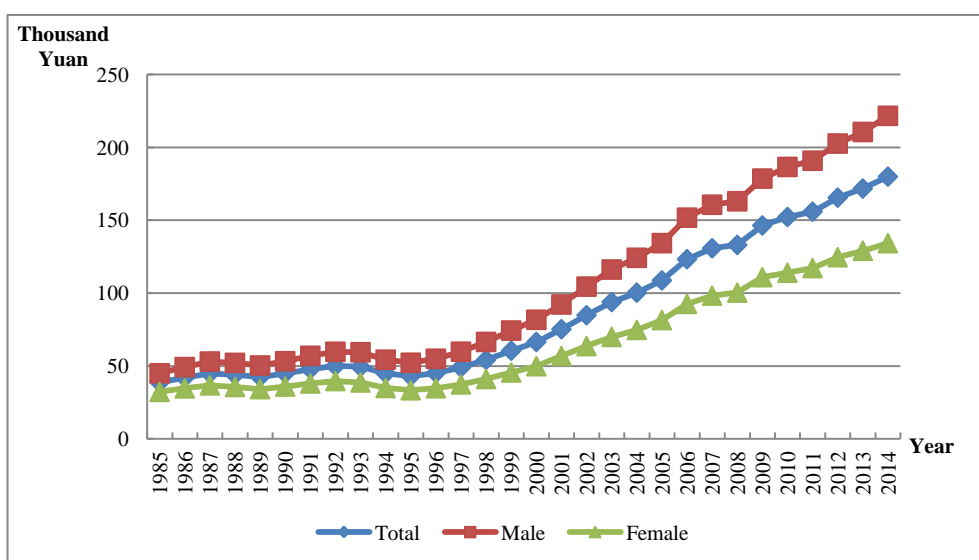
Figure NX-2.1 Human Capital Per Capita by Gender for Ningxia，1985-2014

Table NX-2.1 Nominal and Real Human Capital Per Capita by Region for Ningxia

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	38.78	75.08	28.12	38.78	75.08	28.12
1986	44.42	86.44	31.57	42.10	81.55	30.04
1987	50.97	99.10	35.69	44.97	85.07	32.25
1988	58.24	114.38	39.77	44.02	83.42	31.06
1989	66.06	130.26	44.18	42.48	81.76	29.12
1990	74.89	147.47	49.35	44.92	87.73	29.84

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Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	84.69	167.10	54.86	47.83	92.99	31.50
1992	95.71	188.87	61.02	50.07	96.17	32.90
1993	108.25	212.62	68.32	49.42	93.98	32.37
1994	121.39	237.19	75.92	44.94	84.00	29.58
1995	136.11	265.20	84.17	43.06	80.07	28.17
1996	152.74	298.46	91.78	45.19	84.53	28.74
1997	172.03	337.95	99.96	48.99	92.12	30.24
1998	190.64	372.35	108.76	54.26	101.50	32.97
1999	210.11	407.19	118.12	60.52	112.01	36.50
2000	230.10	440.22	128.32	66.49	121.46	39.85
2001	265.51	501.66	141.86	75.25	136.63	43.11
2002	298.29	549.78	156.42	84.84	150.49	47.82
2003	336.22	608.22	171.99	93.89	164.03	51.55
2004	372.86	657.89	189.22	100.30	171.76	54.27
2005	410.34	705.58	208.08	108.72	181.30	58.97
2006	475.11	808.56	230.76	123.28	204.30	63.91
2007	531.43	885.36	254.18	130.78	212.85	66.47
2008	586.96	957.17	278.76	133.07	213.28	66.35
2009	650.34	1040.00	307.10	146.42	230.94	72.00
2010	703.05	1096.05	337.51	152.22	234.59	75.62
2011	765.10	1165.68	369.73	155.89	235.82	77.06
2012	829.13	1236.28	404.19	165.51	244.72	82.84
2013	889.87	1298.18	440.16	171.74	248.76	86.91
2014	949.95	1356.13	479.26	179.92	254.77	93.14

Figure NX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

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capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
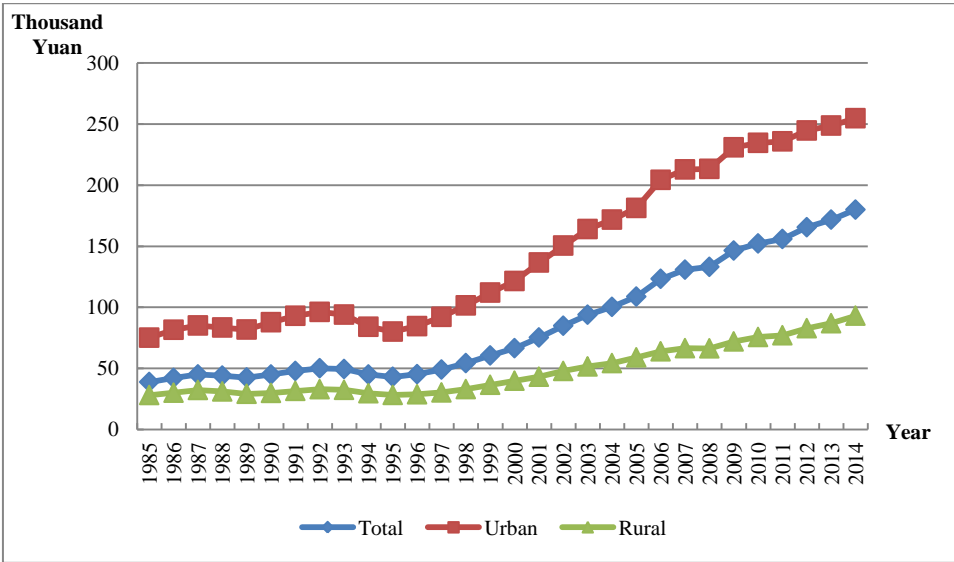
Figure NX-2.2 Real Human Capital Per Capita by Region for Ningxia，1985-2014

37.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

37.3.1 Total labor force human capital

The total labor force human capital for Ningxia is reported in Table NX-3.1 From 1985 to 2014, the nominal labor force human capital increases from 50 billion Yuan to 1,934 billion Yuan, an increase of more than 37 times; and the real labor force human capital increases from 50 billion Yuan to 368 billion Yuan, an increase of approximately 6 times.

Table NX-3.1 Nominal and Real Labor Force Human Capital for Ningxia

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	50	50	50	50
1986	59	59	56	56
1987	71	71	63	63
1988	88	88	66	66
1989	107	107	69	69
1990	131	131	78	78
1991	152	152	86	86
1992	176	176	92	92
1993	202	202	92	92
1994	231	231	86	86
1995	264	265	84	84
1996	300	301	89	89
1997	343	343	98	98
1998	391	391	112	112
1999	442	443	128	128
2000	497	499	144	144
2001	546	549	155	156
2002	599	603	171	172
2003	661	666	185	187
2004	734	739	198	200
2005	816	822	217	219
2006	908	915	237	239
2007	1018	1027	252	254
2008	1142	1152	261	263
2009	1299	1312	294	297
2010	1479	1494	321	325

| Year | Nominal Labor Force Human Capital (Billions of Yuan) | | Real Labor Force Human Capital (Billions of 1985 Yuan) | |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	1561	1576	319	322
2012	1656	1673	332	335
2013	1755	1773	340	343
2014	1934	1952	368	371

37.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables NX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 25,470 Yuan to 518,760 Yuan, an increase of more than 19 times; and the real average labor force human capital increases from 25,470 Yuan to 98,660 Yuan, an increase of approximately 3 times.

Table NX-3.2 Nominal and Real Average Labor Force Human Capital by Region for Ningxia

| Year | Nominal Average Labor Force Human Capital (Thousands of Yuan) | | | Real Average Labor Force Human Capital (Thousands of 1985 Yuan) | | |
	Total	Urban	Rural	Total	Urban	Rural
1985	25.47	42.76	19.76	25.47	42.76	19.76
1986	29.47	49.88	22.33	27.94	47.05	21.25
1987	34.46	58.70	25.38	30.41	50.38	22.93
1988	39.87	69.16	28.41	30.14	50.44	22.19
1989	46.07	81.16	31.70	29.62	50.94	20.89
1990	53.59	95.36	35.40	32.12	56.73	21.41

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	60.18	106.85	39.63	33.98	59.47	22.75
1992	67.05	118.64	44.20	35.06	60.41	23.83
1993	75.08	132.32	49.36	34.26	58.48	23.39
1994	84.04	147.61	54.82	31.08	52.28	21.36
1995	93.94	164.15	60.91	29.72	49.56	20.39
1996	103.92	182.48	66.69	30.79	51.68	20.88
1997	115.51	203.20	73.04	32.96	55.39	22.10
1998	128.58	226.18	79.89	36.68	61.66	24.22
1999	142.01	248.60	86.54	40.99	68.38	26.74
2000	156.14	270.40	93.96	45.19	74.60	29.18
2001	171.22	290.68	102.55	48.68	79.17	31.16
2002	186.77	310.90	111.73	53.36	85.10	34.16
2003	203.17	331.12	122.07	57.02	89.30	36.59
2004	222.29	355.43	133.42	60.08	92.79	38.27
2005	243.59	379.64	146.44	64.84	97.55	41.50
2006	268.15	410.33	164.33	70.06	103.68	45.51
2007	296.38	448.34	182.96	73.48	107.79	47.85
2008	326.42	486.72	202.27	74.45	108.45	48.14
2009	363.33	534.24	223.99	82.19	118.63	52.52
2010	403.78	583.78	246.85	87.73	124.95	55.31
2011	428.25	607.03	271.20	87.49	122.80	56.53
2012	454.25	629.04	297.21	90.99	124.52	60.91
2013	479.72	648.04	324.42	92.91	124.18	64.05
2014	518.76	689.16	354.28	98.66	129.47	68.85

Chapter 38   Human Capital for Xinjiang

38.1 Total human capital

Table XJ-1.1 presents the results of nominal and real total human capital and real physical capital for Xinjiang. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively. Column 5 is the real physical capital of Xinjiang.

Table XJ-1.1 Real Physical Capital, Nominal and Real Human Capital for Xinjiang

| Year | Nominal Human Capital (Billions of Yuan) | | Real Human Capital (Billions of 1985 Yuan) | | Real Physical Capital (Billions of 1985 Yuan) |
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	462	462	462	462	26
1986	553	554	516	516	29
1987	658	659	574	574	32
1988	768	769	583	584	35
1989	890	891	582	583	38
1990	1031	1033	641	642	43
1991	1194	1197	683	684	48
1992	1384	1388	728	730	55
1993	1605	1610	750	752	64
1994	1842	1849	677	680	75
1995	2093	2101	642	644	86
1996	2362	2376	655	659	95
1997	2676	2697	716	721	103
1998	2995	3021	799	806	114

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1999	3300	3331	903	912	124
2000	3624	3671	1000	1013	136
2001	4303	4398	1139	1164	149
2002	4741	4835	1261	1285	165
2003	5224	5327	1384	1410	186
2004	5737	5843	1477	1504	209
2005	6258	6370	1599	1627	233
2006	7026	7144	1772	1801	260
2007	7815	7938	1869	1898	293
2008	8639	8772	1914	1943	330
2009	9495	9644	2090	2122	365
2010	10326	10490	2180	2216	416
2011	11431	11612	2280	2317	474
2012	12481	12671	2400	2437	560
2013	13524	13718	2500	2536	670
2014	14531	14730	2652	2688	797

38.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. Table XJ-2.1 presents human capital per capita for Xinjiang by region. From 1985 to 2014, the nominal human capital per capita increases from 36,260 Yuan to 670,290 Yuan, an increase of more than 17 times; and the real human capital per capita increases from 36,260 Yuan to 122,350 Yuan, an increase of approximately 2 times.

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Figure XJ-2.1 illustrates the trends of human capital per capita by gender for Xinjiang. The real human capital per capita of male is similar to that of female for Xinjiang. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
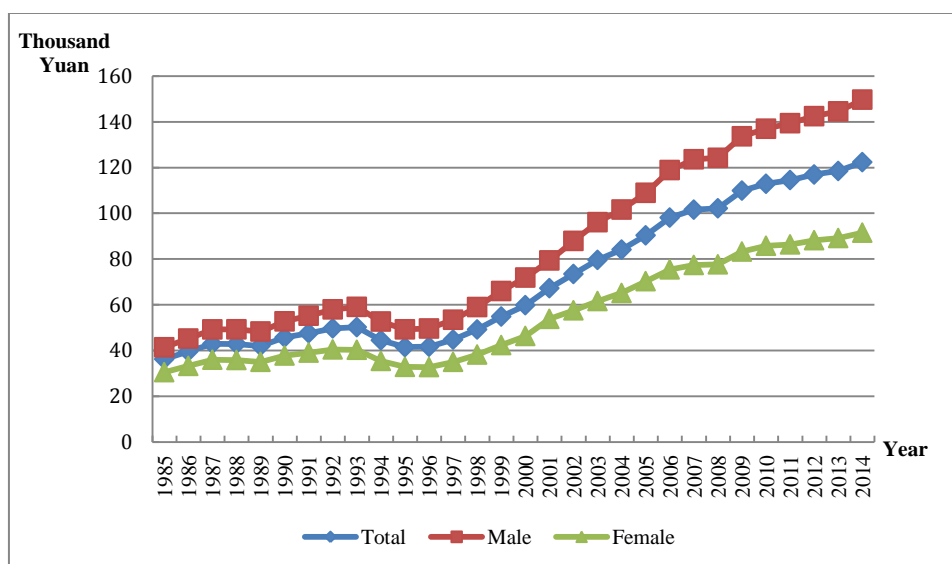
Figure XJ-2.1 Human Capital Per Capita by Gender for Xinjiang, 1985-2014

Table XJ-2.1 Nominal and Real Human Capital Per Capita by Region for Xinjiang

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	36.26	64.51	24.19	36.26	64.51	24.19
1986	42.41	76.89	27.19	39.56	71.46	25.45
1987	49.24	90.30	30.54	42.92	77.07	27.37
1988	56.47	104.34	34.14	42.90	76.11	27.41
1989	64.30	119.58	38.01	42.03	76.18	25.80
1990	73.51	137.34	42.51	45.71	83.73	27.24

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	83.29	157.32	47.22	47.61	87.75	28.05
1992	94.53	180.51	52.47	49.70	92.11	28.96
1993	107.51	207.44	58.46	50.22	93.18	29.12
1994	121.05	235.13	64.82	44.53	82.71	25.71
1995	135.41	263.65	71.87	41.52	78.33	23.27
1996	150.29	295.41	78.14	41.68	79.50	22.88
1997	167.45	333.08	84.89	44.78	86.60	23.92
1998	184.55	369.62	91.89	49.21	96.20	25.69
1999	200.45	401.73	99.22	54.87	107.02	28.65
2000	216.94	434.34	107.02	59.84	115.59	31.67
2001	254.00	516.84	117.44	67.26	132.25	33.48
2002	276.20	552.68	128.71	73.47	143.00	36.36
2003	300.58	592.62	141.07	79.63	152.57	39.77
2004	326.71	634.96	154.66	84.13	160.11	41.73
2005	353.69	675.70	169.75	90.36	169.36	45.26
2006	389.16	724.48	186.47	98.12	179.79	48.74
2007	424.77	771.03	203.74	101.58	182.93	49.68
2008	461.17	817.13	222.33	102.17	180.68	49.51
2009	499.30	863.61	243.54	109.90	190.65	53.17
2010	534.69	900.74	266.27	112.89	191.94	54.94
2011	574.16	948.06	289.45	114.52	191.49	55.92
2012	608.20	980.22	314.82	116.93	191.52	58.10
2013	640.92	1007.36	342.42	118.47	189.44	60.70
2014	670.29	1026.12	371.78	122.35	192.33	63.58

Figure XJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2014, the real human capital per capita in urban area remains larger than that in rural area. Since 1997, the growths of human

capital for rural and urban both accelerated, and the growth rate is significantly higher in urban area than in rural area. Therefore the gap between urban and rural expanded rapidly.
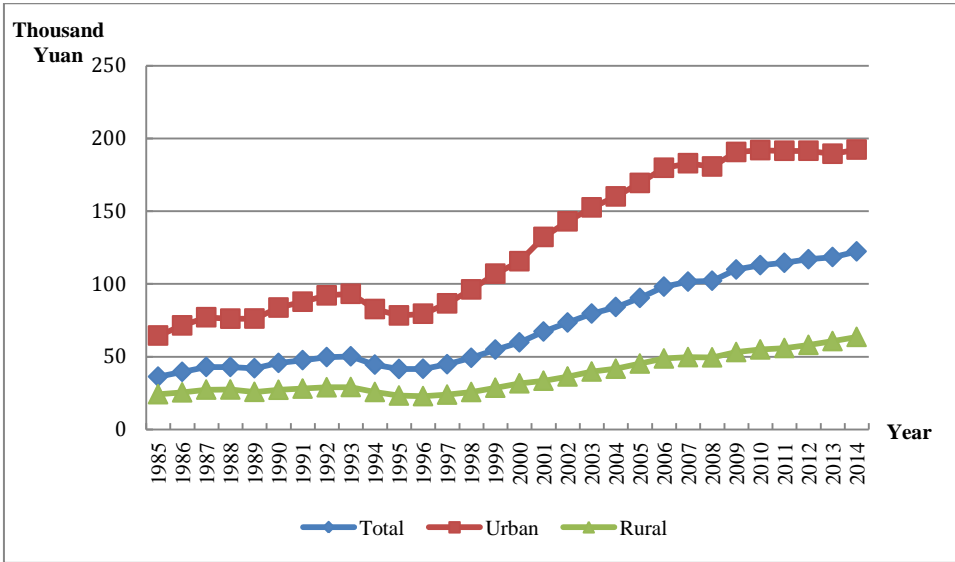
Figure XJ-2.2 Real Human Capital Per Capita by Region for Xinjiang, 1985-2014

38.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

38.3.1 Total labor force human capital

The total labor force human capital for Xinjiang is reported in Table XJ-3.1 From 1985 to 2014, the nominal labor force human capital increases from 164 billion Yuan to 6,290 billion Yuan, an increase of more than 37 times; and the real labor force human capital increases from 164 billion Yuan to 1,140 billion Yuan, an increase of approximately 6 times.

Table XJ-3.1 Nominal and Real Labor Force Human Capital for Xinjiang

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	164	164	164	164
1986	199	199	186	185
1987	246	246	215	215
1988	301	301	228	228
1989	370	369	241	241
1990	449	449	279	279
1991	533	533	304	304
1992	618	618	325	325
1993	720	720	336	336
1994	828	828	305	305
1995	943	943	289	289
1996	1057	1058	294	294
1997	1179	1181	316	316
1998	1322	1325	353	354
1999	1473	1476	404	405
2000	1642	1636	454	453
2001	1806	1806	481	481
2002	1981	1985	530	531
2003	2183	2189	582	584
2004	2391	2414	619	625
2005	2635	2661	677	683
2006	2934	2963	743	751
2007	3272	3305	785	792
2008	3662	3699	812	820
2009	4122	4166	906	916
2010	4616	4667	972	983

Year	Nominal Labor Force Human Capital (Billions of Yuan)		Real Labor Force Human Capital (Billions of 1985 Yuan)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2011	5008	5065	996	1007
2012	5379	5439	1029	1041
2013	5767	5830	1061	1073
2014	6290	6353	1140	1152

38.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. Tables XJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2014, the nominal average labor force human capital increases from 25,590 Yuan to 422,040 Yuan, an increase of more than 15 times; and the real average labor force human capital increases from 25,590 Yuan to 76,500 Yuan, an increase of approximately 2 times.

Table XJ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Xinjiang

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	25.59	39.98	18.21	25.59	39.98	18.21
1986	29.97	48.00	20.47	27.94	44.61	19.17
1987	35.45	57.91	23.13	30.89	49.42	20.73
1988	41.20	67.77	26.06	31.27	49.43	20.92
1989	47.96	79.71	29.27	31.31	50.78	19.87
1990	56.27	93.80	33.10	34.95	57.18	21.21
1991	63.66	107.52	37.02	36.34	59.97	21.99

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1992	71.32	121.90	41.22	37.46	62.20	22.75
1993	80.43	139.35	45.97	37.55	62.60	22.90
1994	89.87	156.94	51.08	33.06	55.21	20.26
1995	100.12	175.75	56.76	30.71	52.21	18.38
1996	109.72	194.32	61.76	30.45	52.29	18.08
1997	120.17	214.23	67.10	32.18	55.70	18.91
1998	131.22	234.65	72.96	35.06	61.07	20.39
1999	142.30	254.69	78.83	39.04	67.85	22.76
2000	154.34	276.54	85.31	42.70	73.60	25.24
2001	166.60	296.47	93.64	44.38	75.86	26.69
2002	179.63	317.55	102.33	48.03	82.16	28.91
2003	193.32	338.24	112.43	51.54	87.08	31.70
2004	207.63	358.99	123.52	53.76	90.52	33.33
2005	225.31	381.48	136.47	57.84	95.62	36.38
2006	244.36	404.77	150.61	61.89	100.45	39.36
2007	265.37	432.24	165.24	63.62	102.55	40.29
2008	289.22	462.57	180.31	64.12	102.28	40.15
2009	316.78	496.64	196.89	69.63	109.64	42.98
2010	345.99	529.11	213.91	72.87	112.75	44.14
2011	364.40	543.89	230.99	72.45	109.85	44.63
2012	381.46	553.63	249.09	72.99	108.17	45.97
2013	398.93	563.80	268.25	73.41	106.03	47.55
2014	422.04	584.00	288.51	76.50	109.46	49.34

Chapter 39   Human Capital for Hong Kong

39.1 Total human capital

Table HK-1.1 presents the results of nominal and real total human capital and real physical capital for Hongkong. Columns 1 is nominal human capital in five-education category. Columns 3 is real human capital in five-education category.

Table HK-1.1 Real Physical Capital, Nominal and Real Human Capital for Hong Kong

Year	Nominal Human Capital (Billions of HKD)		Real Human Capital (Billions of 1985 HKD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	4031		4031	
1986	4453		4302	
1987	4845		4435	
1988	5262		4460	
1989	5723		4402	
1990	6131		4280	
1991	6657		4174	
1992	7264		4157	
1993	8013		4217	
1994	8745		4230	
1995	9516		4220	
1996	10440		4356	
1997	11470		4521	
1998	12350		4732	
1999	13250		5291	
2000	14450		5989	

Year	Nominal Human Capital (Billions of HKD)		Real Human Capital (Billions of 1985 HKD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2001	15700		6618	
2002	16430		7145	
2003	17610		7851	
2004	18950		8487	
2005	20190		8963	
2006	21830		9491	
2007	23290		9933	
2008	25190		10300	
2009	26700		10850	
2010	28700		11400	
2011	31010		11700	
2012	33170		12030	
2013	35820		12450	
2014	38080		12670	

39.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. The data of Hong Kong presents human capital per capita for Hongkong by region. From 1985 to 2014, the nominal human capital per capita increases from 826,090 HKD to 6,328,400 HKD, an increase of more than 6 times; and the real human capital per capita increases from 826,090 HKD to 2,105,590 HKD, an increase of approximately 1.5 times.

Figure HK-2.1 illustrates the trends of human capital per capita by

gender for Hongkong. The real human capital per capita of male is similar to that of female for Hongkong. Both of them kept increasing from 1985 to 2014, and the growths of human capital for male and female both accelerated, with male's growth rate significantly higher than female's. As a result the gender gap has been expanding, especially from 1997.
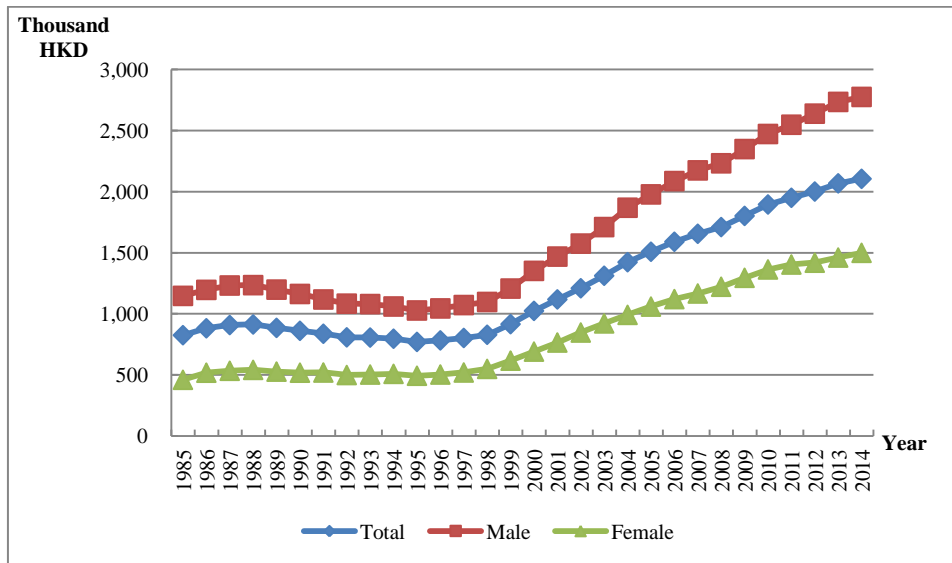
Figure HK-2.1 Human Capital Per Capita by Gender for Hong Kong, 1985-2014

39.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

39.3.1 Total labor force human capital

The total labor force human capital for Hongkong is reported in Table HK-3.1 From 1985 to 2014, the nominal labor force human capital increases from 2,092 billion HKD to 27,650 billion HKD, an increase of more than 12

times; and the real labor force human capital increases from 2,092 billion HKD to 9,202 billion HKD, an increase of approximately 3 times.

Table HK-3.1 Nominal and Real Labor Force Human Capital for Hong Kong

Year	Nominal Labor Force Human Capital (Billions of HKD)		Real Labor Force Human Capital (Billions of 1985 HKD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	2092		2092	
1986	2328		2249	
1987	2574		2356	
1988	2819		2389	
1989	3136		2412	
1990	3470		2422	
1991	3843		2409	
1992	4283		2451	
1993	4713		2480	
1994	5200		2515	
1995	5822		2582	
1996	6524		2721	
1997	7151		2818	
1998	7723		2959	
1999	8342		3330	
2000	9268		3841	
2001	10270		4328	
2002	10780		4688	
2003	11670		5203	
2004	12640		5660	
2005	13590		6035	
2006	14960		6503	
2007	16060		6848	

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Year	Nominal Labor Force Human Capital (Billions of HKD)		Real Labor Force Human Capital (Billions of 1985 HKD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2008	17500		7159	
2009	18580		7552	
2010	20170		8012	
2011	22450		8470	
2012	24010		8708	
2013	26020		9042	
2014	27650		9202	

39.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. From 1985 to 2014, the nominal average labor force human capital increases from 686,630 HKD to 5,783,040 HKD, an increase of more than 7 times; and the real average labor force human capital increases from 686,630 HKD to 1,924,610 HKD, an increase of approximately 2 times.

Chapter 40   Human Capital for Taiwan

40.1 Total human capital

Table TW-1.1 presents the results of nominal and real total human capital and real physical capital for Taiwan. Columns 1 and 2 are nominal human capital in five- and six- education categories respectively. Columns 3 and 4 are real human capital in five- and six- education categories respectively.

Table TW-1.1 Real Physical Capital, Nominal and Real Human Capital for Taiwan

Year	Nominal Human Capital (Billions of NTD)		Real Human Capital (Billions of 1985 NTD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	58540	58100	58540	58100
1986	61380	61070	60960	60650
1987	66630	66350	65830	65550
1988	75960	75720	74090	73870
1989	87640	87510	81870	81750
1990	102200	102200	91670	91670
1991	114200	114200	98840	98840
1992	127200	127200	105400	105400
1993	140600	140600	113200	113200
1994	149900	149900	115900	115900
1995	160700	160500	119900	119700
1996	165100	164700	119500	119200
1997	173800	174100	124700	124900
1998	176400	177400	124400	125100

Year	Nominal Human Capital (Billions of NTD)		Real Human Capital (Billions of 1985 NTD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1999	183600	184700	129300	130100
2000	183700	184900	127700	128600
2001	178300	178400	124000	124100
2002	174400	174400	121500	121500
2003	180000	176000	125800	123000
2004	179100	176600	123200	121400
2005	178200	178300	119800	119900
2006	178000	179900	119000	120200
2007	179900	183900	118100	120700
2008	180300	185600	114300	117700
2009	176800	184300	113100	117900
2010	178600	185900	113200	117800
2011	179900	186400	112400	116400
2012	179200	186400	109800	114200
2013	170300	182200	103600	110800
2014	169200	181700	100700	108100

40.2 Human capital per capita

To obtain further information on the dynamics of human capital, we calculate human capital per capita, defined as the ratio of human capital to non-retired population. The data of Taiwan presents human capital per capita for Taiwan by region. From 1985 to 2014, the nominal human capital per capita increases from 3,301,080 NTD to 8,822,760 NTD, an increase of more than 1.5 times; and the real human capital per capita increases from 3,301,080 NTD to 5,250,900 NTD, an increase of approximately 0.6 times.

Figure TW-2.1 illustrates the trends of human capital per capita by gender for Taiwan.The trend of real human capital per capita for male is similar to that for female inTaiwan. Both of them kept increasing from 1985 to 2000, and the growths of human capital for male and female both accelerated. But from 2000 to 2014, the real human capital per capita of male and female tend to be flat or even declining.
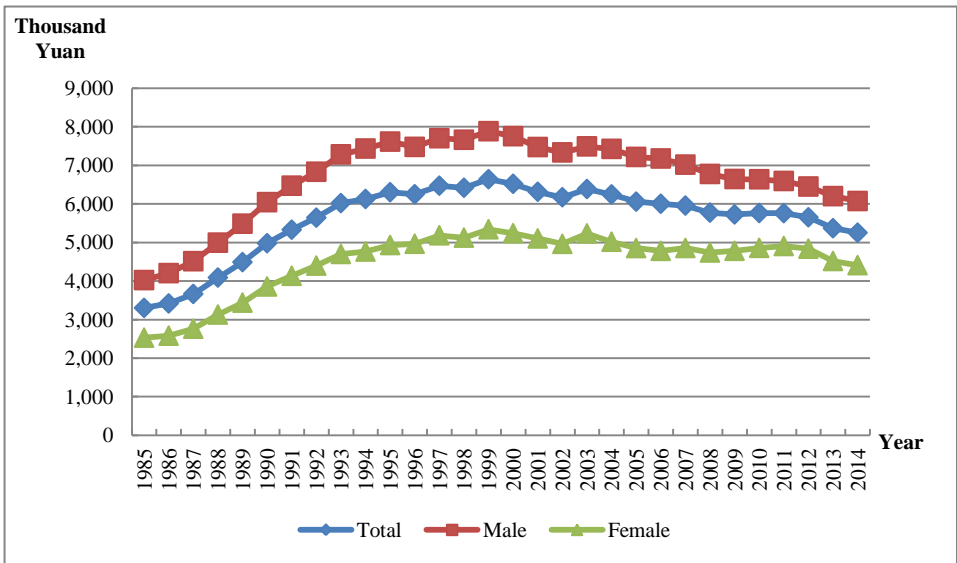
Figure TW-2.1 Human Capital Per Capita by Gender for Taiwan, 1985-2014

40.3 Labor force human capital

We also use the J-F method to estimate the labor force human capital. The labor force refers to the population that is over 16 years old, non-retired and out of school.

40.3.1 Total labor force human capital

The total labor force human capital for Taiwan is reported in Table

TW-3.1 From 1985 to 2014, the nominal labor force human capital increases from 32,020 billion NTD to 104,500 billion NTD, an increase of more than 2 times; and the real labor force human capital increases from 32,020 billion NTD to 62,190 billion NTD, an increase of approximately 0.9 times.

Table TW-3.1 Nominal and Real Labor Force Human Capital for Taiwan

Year	Nominal Labor Force Human Capital (Billions of NTD)		Real Labor Force Human Capital (Billions of 1985 NTD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
1985	32020	31930	32020	31930
1986	34120	34080	33890	33850
1987	37110	37080	36670	36630
1988	42730	42720	41680	41670
1989	49840	49860	46560	46580
1990	58130	58200	52160	52210
1991	66490	66560	57570	57630
1992	73490	73590	60920	61000
1993	80600	80700	64900	64970
1994	86730	86840	67080	67160
1995	93620	93680	69850	69890
1996	96150	96140	69590	69580
1997	101400	101300	72740	72690
1998	101300	101200	71460	71410
1999	105400	105300	74240	74180
2000	106600	106400	74120	74020
2001	104100	103800	72420	72170
2002	103600	103400	72230	72040
2003	110100	108600	76950	75890
2004	110300	109400	75830	75270
2005	110000	110400	73960	74200

Year	Nominal Labor Force Human Capital (Billions of NTD)		Real Labor Force Human Capital (Billions of 1985 NTD)	
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)
2006	109000	110300	72830	73730
2007	110500	113100	72560	74250
2008	110400	114200	70030	72400
2009	108000	113300	69090	72490
2010	108600	114800	68830	72710
2011	109100	115600	68190	72190
2012	109400	116700	67050	71540
2013	104700	115700	63690	70330
2014	104500	116500	62190	69290

40.3.2 Average labor force human capital

The average labor force human capital is the ratio of the labor force human capital and the labor force population. From 1985 to 2014, the nominal average labor force human capital increases from 2,984,020 NTD to 7,590,600 NTD, an increase of more than 1.5 times; and the real average labor force human capital increases from 2,984,020 NTD to 4,517,350 NTD, an increase of approximately 0.5 times.

Appendix A   Population Imputation

1. Data collection

When estimating population by age, gender and education in urban and rural areas, we use the following data sources:

Table1. 1 Data Sources of Normal Provinces

Data	Sources	Notes
National, urban and rural population aged 6 years and over, by age, sex and education level: 1982,1987, 1990,1995, 2000,2005, 2010	• 1982,*China Demographic Statistics Yearbook* 1988 edited by Department of Demographic Statistics of National Bureau of Statistics • 1987,*China 1987 1% Demographic Sampling* Survey edited by Department of Demographic Statistics of National Bureau of Statistics • 1990,*China 1990 Census* edited by Census Office of State Council, and Department of Demographic Statistics of National Bureau of Statistics • 1995,*China Demographic Statistics Yearbook.*1998 edited by Department of Demographic and Employment Statistics of National Bureau of Statistics • 2000,http://www.stats.gov.cn/tjsj/ndsj/ren koupucha /2000pucha/pucha.htm • 2005,http://www.stats.gov.cn/tjsj/ndsj/ren kou/2005 /renkou.htm • 2010,*China 2010 Census*	

Data	Sources	Notes
National, urban and rural population aged 0-5 years, by age and sex: 1982,1987, 1990,1995, 2000,2005, 2010	• 1982,*China 1982 Census* edited by State Department Census Office, Department of Demographic Statistics of National Bureau of Statistics • 1987,*China Demographic Statistics Yearbook.1989* edited by Department of Demographic Statistics of National Bureau of Statistics • 1990,*China 1990 Census* edited by State Department Census Office, Department of Demographic Statistics of National Bureau of Statistics • 1995,*China Demographic Statistics Yearbook.1996* edited by Department of Demographic and Employment Statistics of National Bureau of Statistics • 2000,http://www.stats.gov.cn/tjsj/ndsj/ren koupucha /2000pucha /pucha.htm • 2005,http://www.stats.gov.cn/tjsj/ndsj/ren kou/2005 /renkou.htm • 2010,*China 2010 Census and China Demographic Statistics Yearbook* 2012	We assume that the population aged 0-4years receive no schooling
National, urban and rural population by age and sex: 1982-2010	• *China Demographic Statistics Yearbook.1988-1993* edited by Department of Demographic Statistics of National Bureau of Statistics • *China Demographic Statistics Yearbook.1994-1998*,2006 edited by Department of Demographic and Employment Statistics of National Bureau of Statistics	

Data	Sources	Notes
	• *China Demographic Statistics Yearbook.1999-2005* edited by Department of Demographic and Social Science Statistics of National Bureau of Statistics • *China Demographic and Employment Statistics Yearbook 2007-2010* edited by Department of Demographic and Employment Statistics of National Bureau of Statistics	
Mortality rate by age and sex: 1986,1989-1990, 1994-2010	• *China Demographic Statistics Yearbook：1988-2011*	In the yearbooks of 1988 and 1989, only the mortality rate for 1986 is available. In the yearbooks of 1992 and 1993, the mortality rate is not separated by age and sex.
Enrollment by education level: 1980-2014	• *Educational Statistics yearbook of China.1987* edited by the Plan and Finance Bureau of National Educational Committee • *Educational Statistics yearbook of China.1989-1992* edited by the Plan and Development Department of National Educational Committee • *Educational Statistics yearbook of China 1993-1996* edited by the Plan and Development Department of National	*Part of Educational Statistics Yearbook of China.* are downloaded fromhttp://www.cnki.net/.

Data	Sources	Notes
	Educational Committee • *Educational Statistics yearbook of China 1997* edited by the Plan and Development Department of National Educational Ministry • *Educational Statistics yearbook of China.1998-2013*edited by the Plan and Development Department of National Educational Ministry	
National, urban and rural population and birth rate for each year	• *China Statistics Yearbook 2011.* • *Statistics Summary for 55 years in China.* China Statistics Press	
Students by age, grade of primary and junior school: 2003-2013	• *Educational Statistics yearbook of China.2003-2013*edited by the Plan and Development Department of National Educational Ministry	

Table HK.A.2.1 Data Sources of Hong Kong

Data	Sources	Notes
Population by age, sex and education level	• 1981, Hong Kong 1981 Population Census Main Tables • 1986, Hong Kong 1986 Population By-Census Main Tables • 1991, Hong Kong 1991 Population Census Main Tables • 1996,Hong Kong 1996 Population	

Data	Sources	Notes
	By-Census Main Tables • 2001, Hong Kong 2001 Population Census Thematic Report • 2006 Hong Kong 2006 Population By-Census Thematic Report • 2011,Hong Kong 2011 Population Census Thematic Report • 1985-2014 Census and Statistics Department of Hong Kong	
Total population	• 1980-2014,Hong Kong *Statistics Yearbook*	It is the resident population.
Enrollment by education level	• 1985-2014,Hong Kong Education Bureau	
Mortality rate by age and sex	• Hong Kong Mortality Table	
Birth by sex	• 1985-2014, Hong Kong *Statistics Yearbook*	
Employment rate by age, sex and education level	• 1985-2014, Hong Kong Census and Statistics Department	
Consumer Price Index (CPI)	• 1981-2014, Hong Kong *Statistics Yearbook*	
Enrollment rate	• Hong Kong Education Bureau	
Nominal GDP by industry	• Hong Kong *Statistics Yearbook*	
Real GDP Index by Industry	• Hong Kong *Statistics Yearbook*	
Employed population by Industry	• Hong Kong *Statistics Yearbook*	

Data	Sources	Notes
Average discount rate （based on the basic loan interest of Central Bank）	• Monetary Policy Bureau of PBC • http://www.pbc.gov.cn/publish/zhengce huobisi/631/2012/20120706181352694 274852/20120706181352694274852_.h tml	The data is not available for some years.
10-year treasury bond rate	• *China Financial Statistics Yearbook* • *China Financial Statistics Yearbook(English Version)*	The data is not available for 2009, 2005 and 1994.

Table TW.A.2.1 Data Sources of Taiwan

Data	Sources	Notes
Population age, sex and education level	• Department of Household Registration, M.O.I • Taiwan Population *Statistics Yearbook*	
Population aged 6 years and over, by age and sex gender	• Department of Household Registration, M.O.I	
Total Population	• Directorate-General of Budget, Accounting and Statistics, Executive Yuan	
Enrollment by education level	• Not available.	
Mortality rate by age and sex	• Department of Household Registration, M.O.I	Data is based on dateof occurrence

Data	Sources	Notes
Birth by sex	• Department of Household Registration, M.O.I	Data is based on the date of occurrence, which is before the end of May in the following year.
Employment rate by age, sex and education level	• Directorate-General of Budget, Accounting and Statistics, Executive Yuan: Human Capital Survey	Before 1999 (included), "College" includes graduates
Consumer Price Index (CPI)	• Directorate-General of Budget, Accounting and Statistics, Executive Yuan	
Enrollment rate	• Taiwan Education Bureau	From 1988, Taiwan started to record enrollment rate of graduates from middle level professional school, so the table includes data from 1988.
Nominal GDP by industry	• Directorate-General of Budget, Accounting and Statistics, Executive Yuan	
Real GDP by industry	• Directorate-General of Budget, Accounting and Statistics, Executive Yuan	
Employed population by industry	• Directorate-General of Budget, Accounting and Statistics, Executive Yuan: Human Capital Survey	Before 1998, based on "Standard industrial Classification (the sixth edition)"; In 1999-2000, based on "standard industrial classification (the seventh edition)";

Data	Sources	Notes
		In 2001-2011, based on "Standard industrial Classification (the eighth edition)"; In 2012-2014, based on "Standard industrial Classification (the ninth edition)".

2. Data processing

2.1 Basic population data

2.1.1 Census data

Due to direct registration and computer aggregation, the census data do not take into account the left-out population.[1] The total populations from the 1982, 1990, 2000 and 2010 census data published at that time are slightly different from the population released in *China Statistics Yearbook 2011*. Thus, some adjustments need to be made to the population data by age, sex and educational attainment. The adjustment is implemented by the following method. The adjusted urban population by age, sex and educational attainment equals the urban population by age, sex and educational attainment from the census data times the ratio of total urban population released in *China Statistics Yearbook 2010* to the total urban population in the census data. A similar formula is applied to the rural population.

[1] See Zhang, Weimin and Hongyan Cui (2003),"The estimation accuracy of China Census 2000", *Population Research*, Vol.27, No.4 (July), pp.25-35.

2.1.2 1%-Sample data

We adjust the sample data to match the total rural and urban data. Urban population by age, sex and educational attainment is divided by urban sampling ratio, which is the ratio of urban sample population to urban total population released in *China Statistics Yearbook 2008*. The same method is applied to the rural data.

2.2 New enrollment

2.2.1 Educational category in China

There are six education levels in China: no schooling, primary school, junior middle school (including regular junior middle school and vocational junior middle school), senior middle school (including regular senior middle school, regular specialized middle school and vocational high school), college, and university and above. "College" and "university and above" were combined as "college and above" before 2000.

2.2.2 National enrollment data

The new enrollments by gender of primary school from 1985 to 1990 are not available, so it is assumed that the share of females in the new enrollments equals that in Grade 1.

From 1980 to 1983, we have no information about the share of females in the new enrollments, so we use female share in new enrollment of the closest year.

From 1983 to 2003, we only have the total new enrollment of college and university and the total females in college and university. To get the female enrollments in college and university, we assume that the proportion of female is the same as in college and university enrollments.

From 2004 to 2013, the female enrollment data for university and college is available in the statistic yearbooks.

2.2.3 New enrollment data of urban and rural areas

The new enrollments by gender in urban and rural areas in each educational level are not available. We assume that the proportions of female enrollment in urban and rural areas equal the corresponding proportions at the national level.

The new enrollments of specialized middle school are not separated by urban and rural. So we assume that the ratio of urban to rural new enrollments in specialized middle school is the same as that of regular senior middle school.

From 2003 to 2013, the new enrollments of vocational high school are not separated by urban and rural, thus the same processing method is applied as above.

3. Imputation method

We use the perpetual inventory method to impute the population data.

3.1 Perpetual inventory method

The perpetual inventory formula is:

$$L(y,e,a,s) = L(y-1,e,a,s) \cdot (1-\delta(y,a,s)) + IF(y,e,a,s)$$
$$-OF(y,e,a,s) + EX(e,a,s)$$

where $L(y,e,a,s)$ is the population in year y with education level e, age a and sex s. $\delta(y,a,s)$ is the mortality rate. $IF(y,e,a,s)$ is the inflow of population of age a, sex s and education level e in year y. $OF(y,e,a,s)$

represents the outflow of population of age a and sex s and education level e in year y. $EX(e,a,s)$ is a residual term.

$$IF(y,e,a,s) = \lambda(y,e,a,s) \cdot ERS(y,e,s)$$

$$OF(y,e,a,s) = \lambda(y,e+1,a,s) \cdot ERS(y,e+1,s)$$

ERS is the new enrollment of different education levels, λ is the age distribution of new enrollment of different education levels and

$$\sum_a \lambda(y,e,a,s) = 1$$

3.2 Estimate the age distribution λ

We use the data from the *China Educational Statistical Yearbook: 2003-2013* to estimate the age distribution (1982-2014) of new enrollments.

We have the data of new enrollment of primary school by age, region and sex, and the data of new enrollment of junior middle school by age, region, sex and grade from 2003 to 2013.

3.2.1 Estimate the age distribution λ: 2003-2013

For primary school, we assume that the sex ratio of enrollment equals to the sex ratio of entrants. We use rural_2003 as an example; Table A.1 is the raw data. First, we use total enrollments (second column) and total female enrollments (third column) to obtain the sex ratio. Next, we use this ratio to separate total entrants (first column). Finally, we calculate the age distribution in rural area in 2003 (Table A.2).

For junior middle school, we assume that the sex ratio of enrollment equals to the sex ratio in each grade, and we assume that the age distribution of Grade 1 students is the same as that of new enrollments. We use

rural_2003 as an example; Table A.3 is the raw data. First, we use total enrollments (first column) and total female enrollments (second column) to obtain the sex ratio. Next, we use this ratio to separate Grade 1 (third column). Finally, we calculate the age distribution in rural area in 2003 (Table A.4).

For senior middle school, we assume that students in Grade 3 and Grade 4 in junior middle school have the same age distribution as those of new entrants to senior middle school in the same year. For example, in 2003, the age distribution of new entrants to senior middle school is the same as that of Grade 3 and 4 students in junior middle school in 2003 (Table A.5).

For university, we assume that the age distribution of new entrants to university is the same as that of Grade 1 students in senior middle school three years ago. For example, in 2006, the age distribution of new entrants to university is the same as that of Grade 1 students of senior middle school in 2003.

Using the method above, we can get the age distribution of enrollment of each educational level. Table A.6 is the age distribution in rural areas in 2003, Table A.7 is the age distribution in urban areas in 2003 (keep three decimal fraction because of the space limitation).

3.2.1 Estimate the age distribution λ: before 2003

We use the data from China Educational Statistical Yearbook: 2003 instead.

3.2.2.1 for primary school

1995: use the age distribution of Grade 3 in junior school instead. (Table A.3 Grade 3)

1996: use the age distribution of Grade 2 in junior school instead. (Table A.3 Grade 2)

1997: use the age distribution of Grade 1 in junior school instead. (Table A.3 Grade 1)

1998: use the age distribution of Grade 6 in primary school instead. (Table A.1 Grade 6)

1999: use the age distribution of Grade 5 in primary school instead. (Table A.1 Grade 5)

2000: use the age distribution of Grade 4 in primary school instead. (Table A.1 Grade 4)

2001: use the age distribution of Grade 3 in primary school instead. (Table A.1 Grade 3)

2002: use the age distribution of Grade 2 in primary school instead. (Table A.1 Grade 2)

Before 1995: use the age distribution in 1995 instead.

3.2.2.2 for junior middle school

2002: use the age distribution of Grade 2 in junior middle school instead. (Table A.3 Grade 2)

2001: use the age distribution of Grade 3 in junior middle school instead. (Table A.3 Grade 3)

Before 2001: use the age distribution in 2001 instead.

3.2.2.3 for senior middle school

The age distribution of new entrants to senior is the same as that of junior middle school three years ago.

3.2.2.4 for university

The age distribution of new entrants to university is the same as that of senior middle school three years ago.

3.3 Method of imputing population data: 1985-2014

When adopting the perpetual inventory method to estimate the urban and rural population, we ignore migrants between urban and rural China. To take these migrants into account, we make the following adjustments. For example, from 1982 to 1990, we get the estimated 1990 population data by gender, education and age using the perpetual inventory method. The actual 1990 population by gender, education and age subtracted the estimated 1990 population by gender, education and age gives the net migrants between urban and rural China in these eight years. We assume that the number of immigrants in each year is the same, and then we add the average difference to the estimated population data.

4. Some specific problems

4.1 National, rural and urban population at age zero: 1985-2014

4.1.1 National population at age zero

The total population at the end of the year and the birth rates for each year are obtained from Table 3-1 'Population and Its Composition' and Table 3-2 'Birth Rate, Death Rate and Natural Growth Rate of Population' in *China Statistic Yearbook 2011*. We assume that the population at the beginning of a given year equals that at the end of the previous year. Thus, the average of the population at the end of the given year and the previous year is the average population of the given year. The product of the average population and the corresponding birth rate gives the new-born population. Multiplying the new-born population by the survival rate of those aged zero at the corresponding year gives the population at age zero at the end of the year.

(Definition: birth rate, also called gross birth rate, refers to the ratio of

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the new-born population in a given region during a given period, usually one year, and the average population of the same period. The birth rate here is yearly birth rate, which is calculated from the following equation: Birth rate = (new-born population/average population)* 1000‰, where new-born population is the number of the new-born babies who are alive when they are detached from the mothers no matter how long they have been in their mother's body. Average population is the average of the populations at the beginning and at the end of the year, or the population at the middle of the year.)

4.1.2 Rural and urban population at age zero

The data used include total national population for each year from 1983 to 2014, birth rate for each year from 1983 to 2014, national, rural and urban population by age and gender from the population sampling surveys for 1987 and each year from 1989 to 2014.

The share of urban population at age zero in the national population at age zero can be calculated from these sampling data, and this share is assumed to be the true share. In other words, multiplying it with the national population at age zero produces the urban population at age zero. Further, the gender ratio from the sampling data is also assumed to be true, thus we can divide the urban population at age zero into the two genders. Similar steps are used for the rural population at age zero.

Since there is no population sampling data for 1983-1986 and 1988, we assume the numbers of those aged 1, 3, 4, 5, 6 in 1989 equals the new-born population for 1988, 1986, 1985, 1984 and 1983 respectively with the sampling weights adjusted. Migration between urban and rural regions is neglected here.

4.2 The death rate of those aged 65 and over

When imputing the population by age, gender and education level with perpetual inventory method, the number of those aged 65 and over should be multiplied by the death rate. The death rate is calculated in the following way. With the population and the death rate, both by age and gender, from the population sampling data for each year, the number of deaths of those aged 65 and over for each year can be calculated, and dividing it by the corresponding total population gives the death rate of those aged 65 and over. Since there is no population sampling data for 1983-1986 , 1988 and 1991-1993, the death rate of the closest year is used.

4.3 Application of the age distributions of every education level for each year

The age distributions are obtained from the macro- and micro-level data, and the enrollment numbers for each year are used with adjustments. They change over time, but do not vary between urban and rural regions.

Tables and figures of appendix A

Table A.1 Number on School-age Population in Primary School, Rural, 2003, China Education Statistical Yearbook

	Total	**Of which: new entrant**	**Of which: female**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**
				Enrollment					
Age	76891519	11924477	36322339	12159626	12862008	12985923	13295122	13951495	11637345
5	308950	297013	144660	302758	6052	125	8	6	1
6	5046575	4754352	2372386	4782290	257461	6647	165	10	2
7	11010378	6350637	5180829	6444175	4321918	237121	6945	204	15
8	11864959	410669	5605866	492215	7338813	3813008	213075	7553	295
9	12221282	74134	5796024	91262	711394	7682374	3514009	213151	9092
10	12995292	22398	6170350	27731	155006	927169	8067444	3604354	213588
11	13084959	8630	6211805	10868	43937	221535	1082185	8423636	3302798
12	8410789	4293	3979851	5476	17127	65676	295215	1234989	6792306
13	1468214	1616	654151	1948	7153	22371	84281	351020	1001441
14	368378	534	159283	630	2292	7181	23368	89514	245393
15	111743	201	47134	273	855	2716	8427	27058	72414

Table A.2 Age Distribution in Primary School, Rural, 2003

Age	Male	Female
5	0.025	0.025
6	0.399	0.398
7	0.532	0.533
8	0.034	0.035
9	0.006	0.006
10	0.002	0.002
11	0.001	0.001
12	0.000	0.000
13	0.000	0.000
14	0.000	0.000
15	0.000	0.000
Sum	1	1

Table A.3 Number of School – age Population and Enrollment in Junior Middle School, Rural, 2003, China Education Statistical Yearbook

Rural	Enrollment					
	Total	Of which: female	Grade 1	Grade 2	Grade 3	Grade 4
10	31217107	15243521	10846398	9888047	10008568	474094
11	14636	6715	14222	407	7	0
12	388359	182837	365232	22427	700	0
13	4523447	2172333	4000135	490469	32745	98
14	9974932	4777600	5128966	4317657	524854	3455
15	10015544	4776361	1063487	4758148	4119319	74590
16	5810306	2731587	225263	994786	4272665	317592
17	1169589	507334	38929	182266	883709	64685
18	198706	77478	7742	26440	152300	12224

Table A.4 Age Distribution of New Entrants in Junior Middle School, Rural, 2003

Age	Male	Female
10	0.001	0.001
11	0.034	0.033
12	0.368	0.370
13	0.472	0.473

Age	Male	Female
14	0.098	0.098
15	0.021	0.020
16	0.004	0.003
17	0.001	0.001
18	0.000	0.000
Sum	1	1

Table A.5 Age Distribution of New Entrants in Senior Middle School, Rural, 2003

Age	Male	Female
11	0.000	0.000
12	0.000	0.000
13	0.003	0.003
14	0.050	0.051
15	0.394	0.407
16	0.437	0.439
17	0.096	0.084
18	0.018	0.013
19	0.003	0.002
Sum	1	1

Table A.6 Age Distribution of New Enrollments by Educational Level, Rural,2003

Age	Illiterate to primary school		Primary school to junior middle school		Junior middle school to senior middle school		Senior middle school to college		Senior middle school to university	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
5	0.025	0.025								
6	0.399	0.398								
7	0.532	0.533								
8	0.034	0.035								
9	0.006	0.006								
10	0.003	0.003								
11			0.036	0.034						
12			0.368	0.370						
13			0.472	0.473						
14			0.098	0.098	0.053	0.055				
15			0.021	0.020	0.394	0.407				
16			0.005	0.004	0.437	0.439				
17					0.096	0.084	0.055	0.057	0.055	0.057
18					0.018	0.013	0.405	0.419	0.405	0.419
19					0.003	0.002	0.426	0.428	0.426	0.428
20							0.094	0.082	0.094	0.082
21							0.017	0.013	0.017	0.013
22							0.003	0.002	0.003	0.002

Table A.7 Age Distribution of New Enrollments by Educational Level, Urban, 2003

Age	Illiterate to primary school		Primary school to junior middle school		Junior middle school to senior middle school		Senior middle school to college		Senior middle school to university	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
5	0.025	0.029								
6	0.561	0.564								
7	0.388	0.382								
8	0.021	0.021								
9	0.003	0.003								
10	0.001	0.001								
11			0.048	0.050						
12			0.370	0.373						
13			0.477	0.475						
14			0.087	0.086	0.066	0.069				
15			0.015	0.014	0.392	0.406				
16			0.003	0.002	0.440	0.441				
17					0.087	0.074	0.070	0.073	0.070	0.073
18					0.013	0.009	0.401	0.414	0.401	0.414
19					0.002	0.001	0.432	0.432	0.432	0.432
20							0.084	0.071	0.084	0.071
21							0.012	0.008	0.012	0.008
22							0.002	0.001	0.002	0.001

Appendix B   Mincer Parameters

Main Equation:

$$\ln(inc) = \alpha + \beta \cdot Sch + \gamma \cdot Exp + \delta \cdot Exp^2 + u$$

where *inc* is income; *Sch* is years of schooling; *exp* is years of work experience; α, β, γ, δ are corresponding parameters; u is an error term.

1. Samples and methods

1.1 Surveys

(1) The annual Urban Household Survey (UHS);

(2) Chinese Health and Nutrition Survey (CHNS);

(3) Chinese Household Income Project (CHIP);

(4) China Household Finance Survey (CHFS);

(5) China Family Panel Studies (CFPS)

1.2 Components of income

(1) Main job and Secondary job salaries;

(2) Other cash income from work;

(3) Pension;

(4) Estimated market value of received items;

(5) Various subsidies;

(6) Individual's share of household income according to working-hour share.

1.3 Work experience

$Exp = \text{Age}-16$, if $Sch <10$

$Exp = \text{Age}-Sch-6$, if $Sch >9$

$Exp = 0$, if $Exp <0$

1.4 Selection of sample

(1) 16-60 years old for males, and 16-55 years old for females;

(2) Must have information on income and educational attainment;

(3) Students, retirees, people who are unemployed but looking for a job, the disabled, people who are waiting to enter school and housekeepers are excluded.

1.5 Imputation method

(1) To make all parameters comparable, we first use UHS, CHIP, CHNS, CHFS and CFPS to obtain all urban and rural parameters by gender and then compute the annual results by weighting the sample sizes of the available data sets for that year. When both UHS and CHNS are available for a given year, we drop CHNS estimates due to the relatively low quality of income measures.

(2) We use UHS to obtain urban parameters for 1986-1997.

(3) We use CHIP to obtain urban and rural parameters for 1988, 1995, 2002 and 2007, and urban parameters for 1999.

(4) [1]We use CHNS to obtain urban parameters for 2000, 2004, 2006, and rural parameters for 1989, 1991, 1993, 1997, 2000, 2004, 2006.

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[1] We have urban datasets of UHS for 1989, 1991, 1993 and 1997, so we do not use the CHNS datasets of those years for urban parameter estimation.

(5) We use CHFS to obtain urban and rural parameters for 2010.

(6) We use CFPS to obtain urban and rural parameters for 2009 and 2011..

As an example, for the intercept term, we can obtain the urban intercept $\alpha^u 88$ (UHS), assuming the sample size is $n^u 88$ (UHS).

We estimate the urban intercept $\alpha^u 88$ (UHS) using UHS 1988, with the sample size of $n^u 88$ (UHS). We also could obtain the urban and rural intercepts $\alpha^u 88$ (CHIP), $\alpha^r 88$ (CHIP), with the sample size of $n^u 88$(CHIP), $n^r 88$(CHIP) respectively. The annual urban and rural intercepts are:

$$\alpha^u 88 = \frac{\alpha^u 88(UHS) \times n^u 88(UHS)}{n^u 88(UHS) + n^u 88(CHIP)} + \frac{\alpha^u 88(CHIP) \times n^u 88(CHIP)}{n^u 88(UHS) + n^u 88(CHIP)}$$

$$\alpha^r 88 = \alpha^r 88(CHIP)$$

The same principle is applied to estimate other parameters for urban and rural areas.

1.6 Parameter α

$$\ln(inc) = \alpha + \beta \cdot Sch + \gamma \cdot Exp + \delta \cdot Exp^2$$

$\hat{y} = \alpha \times e^{\hat{\ln y}}$, where α is an adjustment factor. We estimate it as follows:

(1) Obtain $\hat{\ln} y$ from the regression of $\ln(y_i)$ on all right-hand-side variables.

(2) Obtain $\hat{m}_i = e^{\hat{\ln y}}$.

(3) Regress y_i on $\hat{m}_i$ without the intercept: $\hat{y} = \alpha \times \hat{m}_i$ and keep α.

(4) For given values *Sch*, *Exp*, *Exp^2*, obtain $\hat{\ln} y$.

(5) $\hat{y} = \alpha \times e^{\hat{\ln y}}$.

2. Data

We use four well-known household surveys in China. The first one is the annual Urban Household Survey (UHS) conducted by the National Statistical Bureau of China from 1986 to 1997. It records household information about income and consumption expenditure, demographic characteristics, work and employment, accommodation and other details. UHS covers 103 cities and 80 counties.

The second one is the China Health and Nutrition Survey (CHNS), which covers nine provinces-Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shandong. Four counties are sampled in each province. In addition, the provincial capital and a lower-income city are selected when feasible. CHNS is conducted in 1988, 1991, 1993, 1997, 2000, 2004, 2006, and 2009. Numbers of households participating in the first five waves are 3,795, 3,616, 3,441, 3,875, and 4,403 respectively.

The CHIP (Chinese Household Income Project) data include 9,009 urban households and 10,258 rural households. Basic information is collected for the sample households and their members, focusing on income, wage, sources of income and household expenditure. For rural households, information on assets, debts, sales and consumption of products and purchase of production means are also collected. The rural survey covers 28 provinces, excluding Xinjiang and Tibet; and the urban survey covers 10 provinces (Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Guangdong, Yunnan and Gansu). The years surveyed include 1988, 1995, 2002, and 2007.

China Household Finance Survey (CHFS) is a national survey administered by the China Household Finance Survey and Research center

of Southwestern University of Finance and Economics, its main purpose is to collect information concerning household finance on microcosmic level, including information on household income, consumption and production, etc. in the year of 2010. This dataset consists of both urban and rural households, covering 22 provinces. Among the samples provinces, only rural households are sampled in Guangxi, Guizhou and Shanxi; there exist only urban samples for Beijing, Tianjin and Qinghai. There are 5194 urban households with 16755 individuals; and 3244 rural households with 12569 individuals.

China Family Panel Studies (CFPS) is a nationally representative, annual longitudinal survey of Chinese communities, families, and individuals launched in 2010 by the Institute of Social Science Survey (ISSS) of Peking University, China. The CFPS is designed to collect individual, family, and community-level longitudinal data in contemporary China. The CFPS collects information biennially and focuses on the economic, as well as the non-economic, wellbeing of Chinese children and adults. A range of domains are covered including economic activities, education outcomes, family dynamics and relationships, migration, and health. In the 2010 baseline survey, CFPS interviewed around 15,000 families and over 40,000 individuals within these families. During the follow up survey in 2012, 85% of the families are interviewed with an individual level follow up rate of 82%.

Table B.1 shows the distribution of the four datasets across years.

3. Key variables

3.1. UHS

3.1.1 Definition of income

1) Salaries from working in the state-owned, collective or other institutions;

2) Other income from working units;

3) Private employment income;

4) Income from re-employment after retirement;

5) Other employment income;

6) Other working income;

7) Pension;

8) Price subsidies;

9) Household avocation production income.

3.1.2 Years of schooling

(1)1986-1991

LEVEL	Sch
College	16
Professional school	11
Senior middle school	12
Junior middle school	9
Primary school	6
Others	0

(2)1992-1997

LEVEL	Sch
College	16

LEVEL	Sch
Community college	15
Professional school	11
Senior middle school	12
Junior middle school	9
Primary school	6
Others	0

3.1.3 Selection of samples

(1) Include male individuals from 16 to 60 years old and female individuals from 16 to 55 years old;

(2) Discard individuals whose value of regular wage is missing, and individuals who did not to report education information;

(3) Discard individuals who are self-employed, short term contract workers, the retired, job seekers, the disabled, homemakers, students in school, workers waiting for job assignment, students waiting to enter school, etc.

3.2 CHIP

3.2.1 Definition of income

Urban income definitions:

In 1988 it includes: employment salary and subsidies, other income from work units, pension;

In 1995 it includes: employment salary and subsidies, other income from work units, other goods from work units, pension;

The same principle is applied in CHIP 2002 and CHIP 2007.

Rural income definitions:

Sum of individual income and household income;

In 1988, individual income includes: regular income, pension, other cash income and other goods from work units; household income is net household income from agriculture.

In 1995, individual income includes: regular income (such as salary, bonus, and subsidies), pension, other cash income and received goods from work units; household income is net household income from agriculture.

In 1999, the data set does not include rural information.

In 2002, individual income includes: wages, pensions, subsidies, received goods from work units; household income is net household income from agriculture.

In 2007, it only has the total household income, including both non-rural income and rural income.

3.2.2 Years of schooling

(1)1988

LEVEL	Sch
College and above	16
Professional school	15
Middle level professional, technical or vocational school	11
Upper middle school	12
Lower middle school	9
Junior middle school	6
4 or more years of elementary school	4
1-3 years of elementary school	2
Illiterate or semi-illiterate	0

(2)1995

LEVEL	Sch
College and above	16
Professional school	15
Middle level professional school	11
Upper middle school	12
Lower middle school	9
Elementary school	6
Illiterate or semi-illiterate	0

(3)1999

LEVEL	Sch
College and above	16
Professional school	15
Middle level professional school	11
Upper middle school	12
Lower middle school	9
Elementary school	6
Illiterate or semi-illiterate	0

(4)2002

LEVEL	Sch
College and above	16
Professional school	15
Middle level professional, technical or vocational school	11
Upper middle school	12
Lower middle school	9
Elementary school	6
Illiterate or semi-illiterate	0

(5)2007

LEVEL	Sch
Graduate school	18
College and above	16
Professional school	15

LEVEL	Sch
Middle level professional, technical or vocational school	11
Upper middle school	12
Lower middle school	9
Elementary school	6
Illiterate or semi-illiterate	0

3.2.3 Selection of samples

(1) Include male individuals from 16 to 60 years old and female individuals from 16 to 55 years old;

(2) Discard individuals whose value of years of schooling is missing, individuals who failed to report education level information;

(3) Keep individuals whose current status is working or employed, or re-employed after retirement;

(4) Discard individuals who are self-employed, private enterprise owners or managers;

(5) Discard individuals whose reported income is 0 or below.

3.3 CHNS

3.3.1 Income variables

Income includes wages, subsidies, other job-related income and household agricultural income. For CHNS, we use the sum of INDINC (Total net individual income, nominal), INDSUB (Individual subsidies) and individual share of HHSUB (Household subsidies) to generate the variable of final individual income.

3.3.1.1 Total net individual income, nominal (INDINC)

Variable: INDINC - Total net individual income, nominal

Data files: INDBUSN - business income

    INDFARM - farming income

    INDFISH - fishing income

    INDGARD - gardening income

    INDLVST - livestock income

    INDRETIRE - retirement income

    INDWAGE - non-retirement wages

a) Non-Retirement Wages

Variable: INDWAGE - Total individual income from all non-retirement wages earned by individuals. Annual wage is calculated for each job record in the wage file.

  Generally, annual wage income is Months Worked times Average Monthly non-Retirement Wage, plus Bonuses and Other Cash or In-Kind Income. For 1989, annualized income from piece work is calculated.

Source:

    C3, months worked last year (job level), 1991 - 2011

    C8, average monthly wages (job level), 1991 - 2011

    C6, wages per piece of completed work, 1989

    C7, average number of pieces completed/work, 1989

    I19, value of bonuses received last year (job level), 1989-2011

    I101, other cash income (job level), 2006-2011

    I103, value of other non-cash income (job level), 2006-2011

B2, B3B, B4, B5, B9, B10, filter questions (person level)

b) Retirement Income

Variable: INDRET - Total Individual Retirement Income

Source:

J5, retirement pensions/salaries (individual), 1989 - 2000

B2D, retirement wage from this job (job level), 2004 – 2011

c) Business Income

Variable: INDBUS - Total individual net income from all businesses operated by household that the individual participate in.

Source:

Individual proportion of net income from household businesses:

H6, Months worked in household business last year

H7, Days per week worked in household business last year

H8, Hours per day worked in household business last year

Total household net income from all household businesses:

H2, Business type

H3, Revenue from this business

H4, Expenses

d) Farming Income

Variable: INDFARM - Total individual net income from farming.

Source:

Individual proportion of net income from household farming:

E4A, months worked on farm last year

E4B, days worked on farm per week last year

E4C, hours worked on farm per day last year

E2A, worked on HH farm/orchard last year (from 2004 on)

E4, 12-month average hours worked on farm per week (1989 only)

Total household net income from farming:

E7, cash for collective farming (individual level), 1989 - 2011

E9, in-kind for collective farming (individual level), 1989 - 2011

E13B, expenses to raise crop (crop level), 1989

E15B, receipts from sale of crop (crop level), 1989

E17B, receipts if crop kept had been sold (crop level), 1989

E19B, receipts if crop given away had been sold (crop level), 1989

E13, kg of crop grown (crop level), 1991-1997

E14, kg of crop sold to government (crop level), 1991-1997

E15, government price for crop (crop level), 1991-1997

E16, kg of crop sold to free market (crop level), 1991-1997

E17, free-market price for crop (crop level), 1991-1997

E12, expenses to raise all crops (household level), 1991-2011

E14A, receipts from sale of all crops (household level), 1991-2011

E16A, value of all crops consumed (household level), 1991-2011

e) **Fishing Income**

Variable: INDFISH - Individual income from fishing.

Source:

Individual proportion of net income from household farming:

G4A, months worked on fishing last year

G4B, days worked on fishing per week last year

G4C, hours worked on fishing per day last year

G2, filter: worked on fishing last year (from 2004 on)

G4, 12-month average hours worked on fishing per week (1989 only)

Total household net income from farming:

G7, wages received from collective fishing (individual)

G9, market value of fish received in-kind from the collective (individual)

G11, revenue from fish sales (household)

G13, value of fish consumed at home (household)

G15, value of fish given as gift (household)

G16, expenses of fishing business (household)

f)   Gardening Income

Variable: INDGARD - Total individual net income from gardening

Source:

Individual proportion of net income from household gardening:

D3A, months worked on gardening last year

D3B, days worked on gardening per week last year

D3C, hours worked on gardening per day last year

D2A, worked in HH garden last year (from 2004 on)

D3, 12-month average hours worked on gardening per week (1989 only)

Total household net income from household garden or orchard

D5, revenue from sale of home garden produce, 1989 - 2011

D6, market value of consumed produce, 1989 - 2011

D7, expenses to grow produce, 1991-2011

g) Livestock Income

Variable: INDLVST - Total individual net income from raising livestock.

Source:

Individual proportion of net HH income (HHLVST) from household livestock business:

> F4A, months worked on raising livestock last year
>
> F4B, days worked on raising livestock per week last year
>
> F4C, hours worked on raising livestock per day last year
>
> F2A, raising livestock last year (from 2004 on)
>
> F4, 12-month average hours worked on raising livestock per week (1989 only)

Total household net income from all livestock activities:

> F7, wages received from collective animal husbandry (individual)
>
> F9, market value of livestock received in-kind from collective (individual)
>
> F14, expenses to raise livestock (livestock level)
>
> F15, expenses from using home-grown feed (livestock level)
>
> F17, revenue from sale of livestock products (livestock level)
>
> F19, value of livestock products consumed at home (livestock level)
>
> F21, value of livestock products given as gifts (livestock level)

3.3.1.2 Subsidies

The subsidies include INDSUB (Individual subsidies) and individual share of HHSUB (Household subsidies). We allocate household subsidies equally among household individuals; the household subsidies are divided by the number of members in a household.

INDSUB=(I9+I11+I12+I13+I13A+I14+I14A+I14B)*12

HHSUB=I10A+I15A+I16A+I17A+I21+K47

Source:

ANNUAL subsidies for the following items, at the Household level:

I10A, one-child subsidy, 1991 - 2011

I15A, gas subsidy, 1993 - 2011

I16A, coal subsidy, 1993 - 2011

I17A, electricity subsidy, 1993 - 2011

I21, food/gift/discounts from work unit, 1989 - 2011

K47, childcare subsidy, 1989 - 2011

MONTHLY subsidies for the following items, at the Individual level:

I9, food subsidy, 1989 - 1997

I11, health subsidy, 1989 - 1997

I12, bath/haircut subsidy, 1989 - 1997

I13, book/newspaper subsidy, 1989 - 1997

I13A, housing subsidy, 1989 - 1997

I14, other subsidy, 1989 - 1997

I14A, average monthly subsidy from job 1, 2000 - 2011

I14B, average monthly subsidy from job 2, 2004 – 2011

3.3.2 Imputing individual share of household income

Agricultural income includes incomes from five sources: gardening, farming, livestock raising, fishing, and small handicraft and commercial household businesses. These incomes come from either collective or household businesses or both.

We assume each individual's contribution to the household income is proportional to his or her share of time allocated to five activities: gardening, farming, raising livestock, fishing and small handicraft and commercial household business. First, we add up all working hours of all family members in each of these activities. Second, we calculate the working hour share of each member in the family's total hours. Third, we multiply the household income by the share to approximate individual income for each category. Finally, we add up individual income from the four categories for each family member.

3.3.3 Years of schooling

Level	Sch
None	0
Completed primary school	6
Junior middle school degree	9
Senior middle school degree	12
Middle technical, professional , or vocational degree	11
3- or 4- year college degree	16
Master's degree or above	18

3.3.4 Selection of sample

(1) Males from 16 to 60 years of age and females from 16 to 55 years of age;

(2) Exclude individuals who fail to provide information on wage and educational attainment, those who are self-employed or business owners;

3.4 CHFS

3.4.1 Definition of income

(1) The income divides into urban income and rural incomes. Urban income mainly includes wage income and social security income; rural income mainly includes wage income, household income from agriculture and social security income.

(2) Wage income mainly includes three components: wages, bonuses and allowances. Social Security income mainly includes three components: social endowment insurance, retirement and pensions.

3.4.2 Personal income distribution of agricultural production

In rural income, wage income and social security income are personal income, but the income of agricultural production is household income. Therefore, it is necessary to determine how the household income is allocated to individuals, and thus calculate the total personal income.

(1) Allocation method

Step 1: Statistics for each family on farming and agricultural production should be recorded as working as the family labor.

Step 2: Calculation of family practitioners produced income, and

apportioned to individual farming, sharing: Family net income of agricultural production / Labor force engaged in agricultural household production.

3.4.3 Years of schooling

2010

Level	Sch
No school	0
Primary school	6
Junior middle school	9
Senior middle school	12
Middle professional degree	11
Post-secondary professional degree	15
College	16
Master's degree	18
PhD degree	22

3.4.4 Selection of samples

(1) Include male individuals from 16 to 60 years old and female individuals from 16 to 55 years old.

(2) Discard individuals whose value of year of schooling is missing, individuals who did not report education level information.

(3) Keep individuals whose current status is working or employed, or re-employed after retirement.

(4) First Occupation:

In urban samples, we discard individuals, who work for businesses or private companies; self-employed individuals farmers at home, and other samples, and we delete samples without income data sample. In rural

sample, we delete the samples without income data.

(5) Second Occupation: Urban and rural samples without income data are deleted from the sample.

(6) Family agricultural production and management: Rural sample households engaged in agricultural production but we delete samples without income data.

(7) Social Security Income: Rural and urban samples were deleted with the relevant guaranteed income but without income data.

3.5 CFPS

3.5.1 Definition of income

(1) The income divides into urban income and rural incomes. Urban income mainly includes wage income and social security income; rural income mainly includes wage income, household income from agriculture and social security income.

(2) Wage income mainly includes three components: wages, bonuses and allowances. Social Security income mainly includes three components: social endowment insurance, retirement and pensions.

(3) Agriculture income refers to the net income from farming, gardening, livestock, fishing and side-line occupation.

3.5.2 Personal income distribution of agricultural production

In rural income, wage income and social security income are personal income, but the income of agricultural production is household income. Therefore, it is necessary to determine how the household income is

allocated to individuals, and thus calculate the total personal income.

(1) Allocation method

Step 1: statistics for each family on farming and agricultural production should be recorded as working as the family labor.

Step 2: Calculation of family practitioners produced income, and apportioned to individual farming, sharing: Family net income of agricultural production / Labor force engaged in agricultural household production.

3.5.3 Years of schooling

2009

Level	Sch
No school	0
Primary school	6
Junior middle school	9
Senior middle school/ Middle professional degree	12
College /Post-secondary professional degree	15
university	16
Master's degree	18
PhD degree	22

3.5.4 Selection of samples

(1) Include male individuals from 16 to 60 years old and female individuals from 16 to 55 years old.

(2) Discard individuals whose value of year of schooling is missing, individuals who did not report education level information.

(3) Keep individuals whose current status is working or employed, or

re-employed after retirement.

(4) First Occupation:

In urban samples, we discard individuals, who work for businesses or private companies; self-employed individuals farmers at home, and other samples, and we delete samples without income data. In rural sample, we delete the samples without income data.

(5) Second Occupation: Urban and rural samples without income data were deleted from the sample.

(6) Family agricultural production and management: Rural sample households engaged in agricultural production but we delete samples without income data.

(7) Social Security Income: Rural and urban samples were deleted with the relevant guaranteed income but without income data.

4. Imputing parameters

4.1. Imputation method of urban parameters

4.1.1 Parameter estimates based on UHS, CHIP, CHNS, CHFS

We use UHS, CHIP, CHNS, CHFS, CFPS data to estimate the earnings equation by gender and year. Table B.1.1-B.1.4 contain means and standard deviations of each variable for UHS, CHIP, CHNS,CHFS, CFPS.

4.1.2 General idea about imputation

We use UHS, CHIP, CHNS, CHFS and CFPS to estimate parameters of the basic Mincer equation, and obtain the fitted values for the intercept,

return to education, and experience related terms. They are weighted by respective sample size if more than one sample is available. Then we use the parameter estimates to fit a time trend model, and then obtain the fitted values of each parameter by gender for the years 1985-2012. These fitted values are the final urban imputed parameters.

4.1.3 Specifications

We treat $\alpha, \beta, \gamma, \delta$ separately and use the parameters for each group as the dependent variable and use time (i.e., year) as the independent variable.

For α, β, γ and δ, we use the linear time trend model. The regression equation is: $Y = a0 + a1 * time + u$.

For α, β, γ and δ, we assume that they increase or decrease at a constant rate each year. Taking the α_male as an example, we assume that the intercept increases at the growth rate of a1 per year.

Figure B.1- Figure B.8 show the parameter estimates for each group and the sample regression lines of the time trend models. The fitted values of the time trend models are the values of our imputed parameters for the period 1985 to 2014.

Tables and figures of appendix B

Table B.1 Micro Datasets

Year	UHS	CHIP	CHNS	CHFS	CFPS
1985					
1986	U				
1987	U				
1988	U	U/R			
1989	U		U/R		
1990	U				
1991	U		U/R		
1992	U				
1993	U		U/R		
1994	U				
1995	U	U/R			
1996	U				
1997	U		U/R		
1998					
1999		U			
2000			U/R		
2001					
2002		U/R			
2003					
2004			U/R		
2005					
2006			U/R		
2007		U/R			
2008					
2009			U/R		U/R
2010				U/R	
2011			U/R		U/R

Note: CHIP: Chinese Household Income Project

UHS: Urban Household Survey

CHNS: China Health and Nutrition Survey

CHFS: China Household Finance Survey

CFPS: China Family Panel Studies

Table B.1.1 Summary Statistics: UHS Samples

Year	Variables	Male		Female	
		Mean	S.D.	Mean	S.D.
1986	inc	1487.11	547.41	1246.17	494.54
	Sch	10.48	2.92	9.77	2.79
	Exp	20.48	11.06	17.80	9.50
1987	inc	1544.74	610.85	1295.42	493.51
	Sch	10.61	2.91	9.84	2.71
	Exp	21.04	10.89	18.43	9.46
1988	inc	1989.18	847.47	1654.96	702.95
	Sch	10.77	2.93	9.94	2.76
	Exp	20.73	10.87	18.06	9.32
1989	inc	2275.37	1008.66	1903.28	860.15
	Sch	10.93	2.97	10.11	2.69
	Exp	20.89	10.91	18.35	9.31
1990	inc	2500.75	1083.87	2102.95	919.32
	Sch	11.09	2.93	10.29	2.70
	Exp	21.23	10.78	18.56	9.29
1991	inc	2744.15	1165.96	2336.65	1004.29
	Sch	11.26	2.95	10.50	2.65
	Exp	20.73	10.51	18.26	9.00
1992	inc	3226.99	1682.19	2715.65	1298.94
	Sch	11.41	2.76	10.72	2.56
	Exp	21.05	10.55	18.69	8.99

1993	inc	3903.39	2465.01	3275.06	1962.45
	Sch	11.39	2.72	10.75	2.55
	Exp	21.42	10.54	19.12	9.07
1994	inc	5453.19	3613.04	4492.67	2948.99
	Sch	11.51	2.77	10.93	2.49
	Exp	21.26	10.53	18.96	9.07
1995	inc	6690.14	4181.73	5578.44	3474.39
	Sch	11.61	2.72	10.97	2.48
	Exp	21.49	10.26	19.23	8.94
1996	inc	7381.06	5035.56	6172.46	4422.4
	Sch	11.64	2.69	11.07	2.43
	Exp	21.81	10.27	19.58	8.96
1997	inc	8554.39	6037.77	7109.18	5311.87
	Sch	11.64	2.69	11.12	2.42
	Exp	22.03	10.10	19.75	8.96

Table B.1.2 Summary Statistics: CHNS samples

		Urban				Rural			
		Male		Female		Male		Female	
Year	Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1989	inc	1821.89	2352.58	1558.57	1890.17	1458.29	1564.62	1212.34	1210.87
	Sch	8.97	4.01	8.53	4.00	6.34	4.07	4.65	4.35
	Exp	18.88	11.30	16.21	9.47	18.64	11.15	16.59	10.14
1991	inc	2016.98	1149.17	1686.68	1091.83	1507.35	1473.11	1242.69	1149.65
	Sch	9.06	4.02	8.44	4.06	6.70	3.93	4.90	4.32
	Exp	20.44	11.60	17.55	9.97	19.54	11.37	17.32	10.25
1993	inc	3054.41	2712.17	2640.49	2348.93	2103.83	2131.13	1762.66	1726.74
	Sch	9.52	3.65	8.91	3.72	7.08	3.73	5.28	4.28
	Exp	21.21	11.05	18.53	9.51	20.16	11.31	18.25	10.20

1997	inc	6837.96	5541.94	5615.48	4398.42	4527.28	4214.83	3538.05	3064.85
	Sch	10.22	3.31	9.72	3.44	7.34	3.54	5.58	4.18
	Exp	21.67	10.70	18.96	9.38	21.33	11.52	19.68	10.49
2000	inc	9667.85	10014.40	7855.31	6970.71	5380.34	5185.53	4165.87	3858.31
	Sch	10.87	3.25	10.59	3.40	7.97	3.26	6.43	4.12
	Exp	22.65	10.64	20.10	9.64	22.24	11.60	20.94	10.42
2004	inc	12895.8	10894.26	10864.46	9460.47	7114.96	7101.20	5666.85	6073.03
	Sch	11.12	3.02	10.76	3.08	8.30	3.20	6.79	4.04
	Exp	25.25	10.34	23.12	9.67	25.83	10.95	23.52	9.57
2006	inc	17884.6	22813.30	13650.74	14686.72	10613.91	10315.53	7623.12	7714.77
	Sch	11.35	3.22	11.03	3.43	8.42	3.63	6.98	4.33
	Exp	26.09	9.90	23.85	9.48	26.38	10.66	24.13	9.36
2009	inc	26194.3	31517.67	18863.03	17689.16	15277.57	13962.31	12256.10	11460.02
	Sch	11.14	3.23	11.11	3.36	8.27	3.40	7.30	4.13
	Exp	27.09	10.24	23.95	9.83	26.77	10.78	24.19	9.54
2011	inc	31323.4	30058.43	27317.37	29738.03	21657.82	18512.27	17234.62	14404.66
	Sch	11.61	3.69	11.84	3.85	9.25	3.81	8.31	4.32
	Exp	25.87	11.46	22.34	10.42	27.56	10.65	25.01	9.28

Table B.1.3 Summary Statistics: CHIP samples

		Urban				Rural			
		Male		Female		Male		Female	
Year	Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1988	inc	1935.97	944.34	1642.17	942.41	967.08	965.16	862.57	810.87
	Sch	10.71	2.92	10.00	2.74	7.16	3.28	5.02	3.88
	Exp	20.96	10.97	18.24	9.42	18.35	12.40	15.40	10.87
1995	inc	6674.31	3702.17	5531.86	3041.36	4665.49	4391.55	4529.42	3982.85
	Sch	11.72	2.74	11.04	2.55	7.90	2.83	6.22	3.41
	Exp	22.53	10.75	20.69	9.61	21.43	11.95	20.19	11.17
1999	inc	9480.364	5543.09	7829.67	4894.07				
	Sch	11.98	2.77	11.51	2.64				

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
	Exp	23.60	10.34	22.15	9.61				
2002	inc	12439.48	7984.14	9978.52	6863.79	5346.66	5395.65	3765.75	4009.96
	Sch	12.10	2.82	11.66	2.72	8.52	2.76	6.88	3.68
	Exp	24.41	10.28	22.84	9.72	21.88	12.04	19.89	11.03
2007	inc	34387.14	31291.01	24596.92	24984.14	14316.64	11105.48	10808.08	10300.37
	Sch	12.49	2.97	12.20	2.91	8.21	2.39	7.55	2.52
	Exp	22.66	11.49	20.83	10.93	22.40	12.78	19.42	11.35

Table B.1.4 Summary Statistics: CFPS samples

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2009	inc	31585.16	31995.62	23674.02	20277.27	12169.88	13515.9	7545.162	9241.36
	Sch	11.12	3.79	11.38	3.97	6.76	4.16	4.95	4.45
	Exp	20.66	11.43	16.85	10.02	25.00	11.29	23.06	9.74
2011	inc	33212.53	33183.41	24231.74	23406.54	18577.2	18179.38	10825.1	12066.82
	Sch	10.58	3.69	10.82	3.90	7.99	3.70	6.24	4.42
	Exp	22.53	11.60	19.42	10.18	24.76	11.79	23.05	10.05

Table B.1.5 Summary Statistics: CHFS samples

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2010	inc	37107.02	37757.82	30719.60	29662.54	16813.38	20499.11	13063.95	17374.53
	Sch	11.83	3.48	11.98	3.56	8.49	2.98	7.37	3.62
	Exp	21.70	10.22	18.38	8.91	27.81	9.83	25.19	8.88

Figures B.1-B.4 Parameter Estimates Against Time: Urban sample

urban male intercept

$y = 0.1257x - 243.57$

urban male return to education

$y = -0.0001x^2 + 0.5862x - 587.76$

$$y = 0.1194x - 231.17$$

urban female intercept

$$y = -0.0001x^2 + 0.5722x - 573.74$$

urban female return to education

415
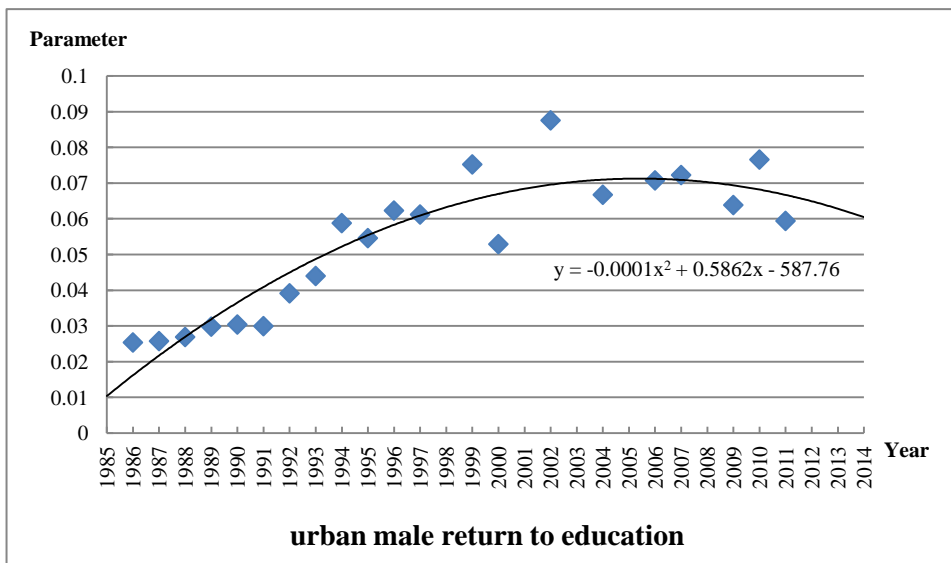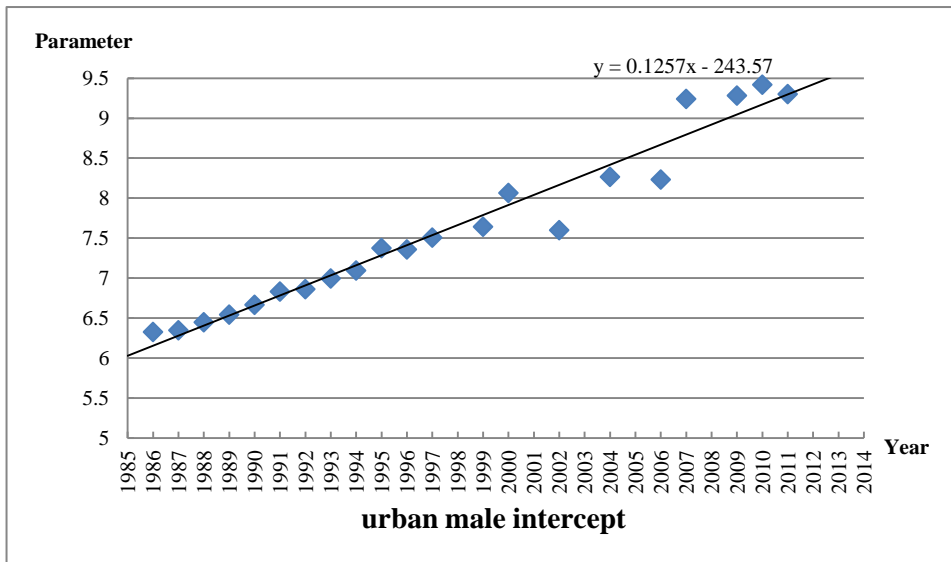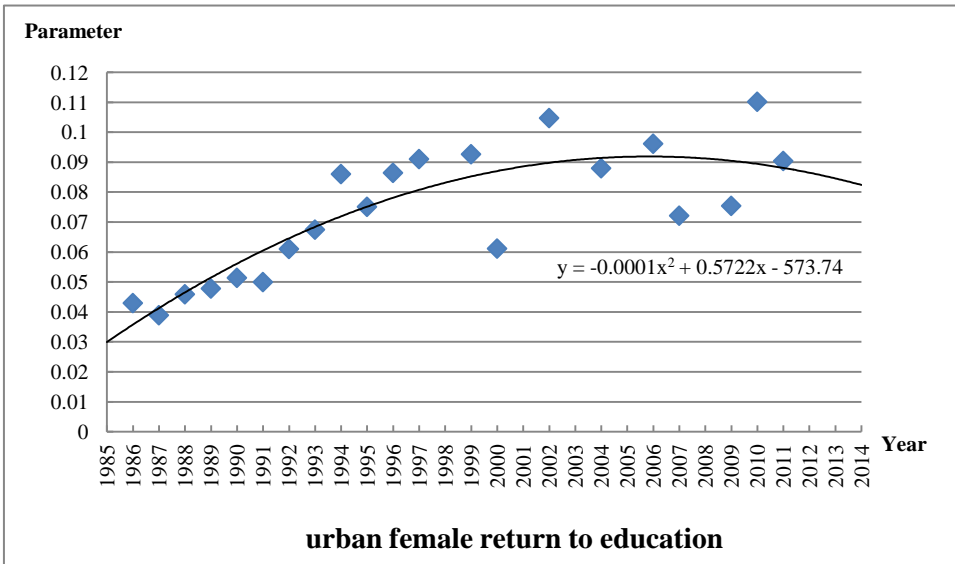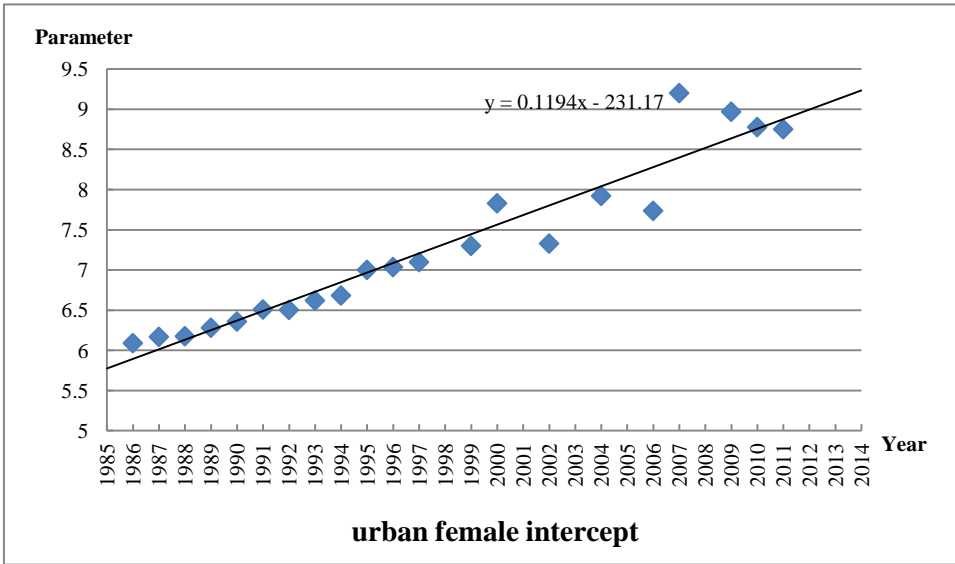
Figures B.5-B.8 Parameter Estimates Against Time: Rural Samples

rural male intercept

$y = 0.141x - 274.52$

rural male return to education

$y = -9E-05x^2 + 0.3421x - 342.84$

416

Parameter

y = 0.1336x - 259.83

rural female intercept

Parameter

y = 1E-05x² - 0.0446x + 43.481

rural female return to education
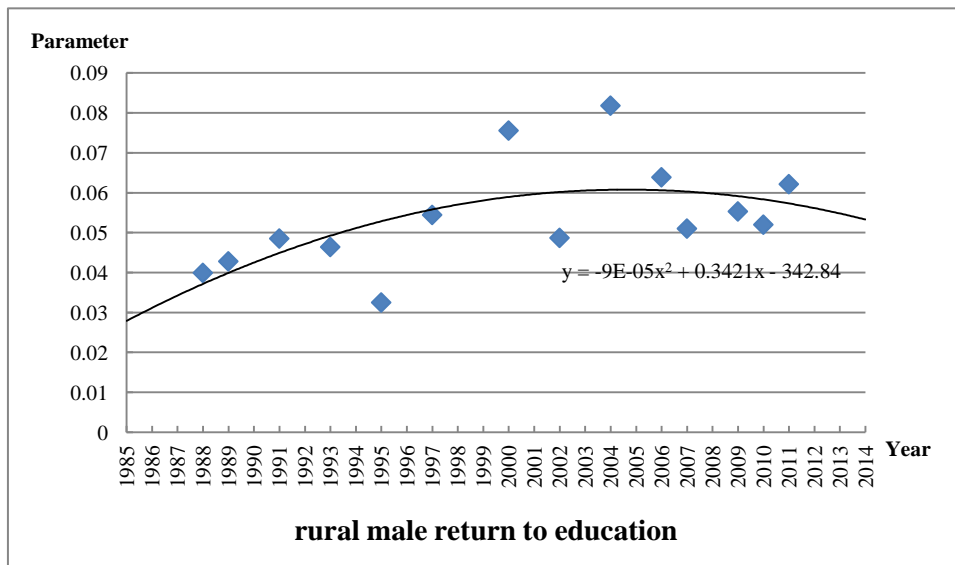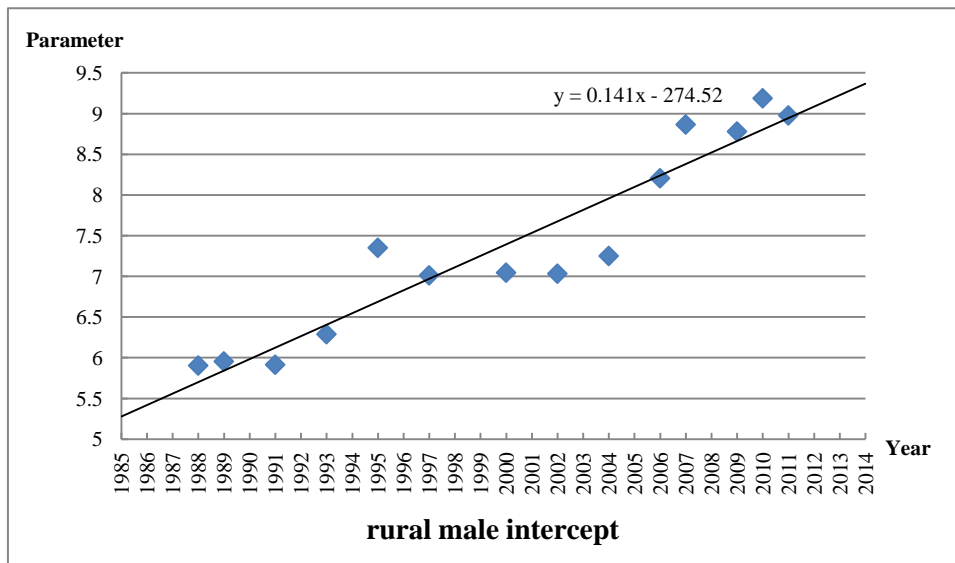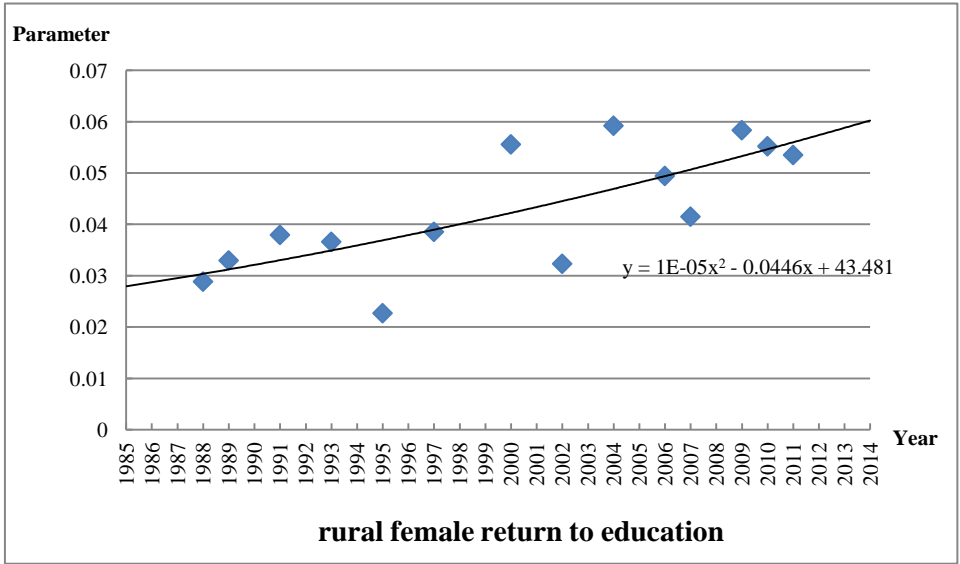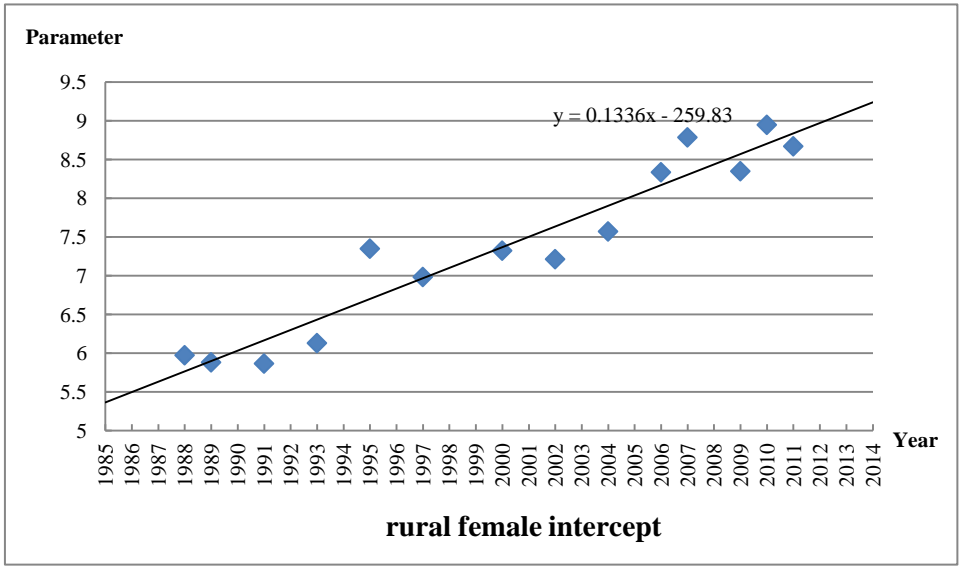
Appendix C Human Capital Stock Calculation

This section summarizes the basic methods and procedures for estimating China's human capital stock from 1985 to 2014 based on the J-F approach. In particular, it explains estimations for necessary data of the J-F approach based on China's data. We use the following notations:

y indicates calendar years from 1980 to 2014. s indicates sex equaling to one and two for males and females, respectively. a indicates age from 0 to 60. e indicates the levels of education classified into five categories for years 1985-2014 including no schooling(ns), primary school(pri), junior middle school(jm), senior middle school(sm), and college(col). For years 2000-2014, the levels of education (e) are classified into six categories including no schooling(ns), primary school(pri), junior middle school(jm), senior middle school(sm), college(col) and university(uni).

Variables used for measuring the human capital stock:

whrs(y,s,a,e): annual market hours worked per employed person in year y with sex s, age a , and education level e;

empr(y,s,a,e): employment rate in year y for persons with sex s, age a, and education level e;

mhrs(y,s,a,e): market labor time per capita in year y for persons with sex s, age a, and education level e;

com(y,s,a,e): hourly compensation net of taxes on labor income for persons with sex s, age a, and education level e;

yinc(y,s,a,e): annual income of the employed in year y with sex s, age a, and education level e;

ymi(y,s,a,e): annual market income per capita net of tax on labor compensation in year y for persons with sex s, age a , and education level e;

sr(y,s,a): survival rate in year y for persons with sex s and age a;

employed(y,s,a,e): population employed in year y with sex s, age a, and education level e;

pop(y,s,a,e): population in year y with sex s, age a, and education level e;

newEnroll(y,s,a,e): population enrolled in education level e in year y, with sex s and age a;

pop_inschool(y,s,a,e-n): number of people in school in year y with sex s, age a, education level e, and grade n+1;

senr(y,s,a,e+1,e-n): share of people enrolled in the next education level e+1 and in school in year y with sex s, age a , education level e, and grade n+1;

mi(y,s,a,e): human capital of the population not in school in year y with sex s, age a , and education level e;

R = (1+real growth rate of income)/(1+discount rate);

pop_inschool(y,s,a,e): number of people in school in year y with sex s, age a, and education level e;

pop_nischool(y,s,a,e): number of people not in school in year y with sex s, age a, and education level e;

Le(y): total population with education level e in year y;

Ls(y): total population with sex s;

Mi(s): human capital for both sexes (nominal income);

v_e ：share of the present value of human capital for the population with education level e;

$\overline{v}_e$ ：average share of the present value of human capital for the population with education level e;

$\overline{v}_s$: average share of the present value of human capital for the population with sex s;

ΔlnK: growth rate of the aggregate human capital stock;

Poplog(y,s): logarithmic growth rate of the population for sex s in year y;

Mitg (y): cumulated growth rate of the aggregate human capital stock;

MiQ(y): total human capital in year y measured in the base year's prices.

1. Schooling and work status by age for calculating human capital using the J-F approach

no school or work	0-4
school only	5-16
work and school	16-a
work only	a-59
Retirement	male：60+；female：55+

(1) When calculate human capital using the J-F approach, the retirement age is 60 for males and 55 for females. The legal retirement ages were set by the second meeting of the fifth NPC Standing Committee on May 24, 1978. Detailed regulations are described in "The Temporary Method of Settling the Old, Weak, Ill, and Disabled Cadre by the State Council" and "The Temporary Method of Settling the Retired Workers by the State Council "(1978, No.104). In general, the legal retirement age is 60 for males, 50 for female workers and 55 for female cadres. However, for workers who work in high temperature, high elevation, highly exhausting conditions, and harmful conditions, the legal retirement age is 55 for males and 45 for females. For people who become disabled due to illness and other reasons, the legal retirement age is 50 for males and 45 for females.

(2) *a* in the table is the upper bound of "work and school", and the lower bound of "work only". This age is determined according to the calculation of the lower bound of people in school in each year. The method of calculating people in school is discussed in section 3.2.

2．Estimation of annual market income ymi(y,s,a,e)

2.1 Estimation of annual income of the employed

2.1.1 Estimation of annual income of the employed using Mincer equation

Using data from CHIP (Chinese Household Income Project), CHNS (China Health and Nutrition Survey), UHS (Urban Household Survey), CHFS(China Household Finance Survey) and CFPS(Chinese Family Panel Studies), we regress the logarithm of annual income *ln yinc* on years of schooling *s*, work experience *exp* and work experience squared *exp²* by OLS.

$$\ln yinc = \alpha + \beta s + \gamma \exp + \delta \exp^2 + u$$

We use the fitted value of ln yinc from the equation above to obtain $m_i = e^{\ln yinc}$. We regress the annual income observed in the survey data on m_i by OLS (without the intercept) to obtain the coefficient on m_i, α[1]. Finally, we estimate the annual income of the employed as yinc$= \alpha \times e^{\ln yinc}$.

---

[1] Jeffrey M. Wooldridge (2005), Introductory Econometrics: A Modern Approach, 3rd edition.

Note that the annual income used for estimating the Mincer equation is in real terms with 1985 as the based year.

2.1.2 Coding of schooling and work experience in the Mincer equation

(1) Coding of years of schooling:

	No schooling	Primary school	Junior middle school	Senior middle school	College	University
1985-1999	0	6	9	12	15	
2000-2014	0	6	9	12	15	16

(2) Coding of work experience:

For people younger than 16, working experience is: *exp*=0;

For people older than 16, if s<10, working experience is: *exp=age*-6;

For people older than 16, if s≥10, working experience is: *exp=age-sch*-6.

2.2 Estimation of annual market income

When estimate the annual income of the employed using the Mincer equation, we obtain $yinc_{y,s,a,e} = whrs_{y,s,a,e} \times com_{y,s,a,e}$.

According to

$$mhrs_{y,s,a,e} = whrs_{y,s,a,e} \times empr_{y,s,a,e} \ , \quad ymi_{y,s,a,e} = whrs_{y,s,a,e} \times empr_{y,s,a,e} \times com_{y,s,a,e}$$

The annual market income is given by:

$$ymi_{y,s,a,e} = yinc_{y,s,a,e} \times empr_{y,s,a,e} .$$

2.2.1 Calculation of employment rate empr(y,s,a,e)

To calculate employment rate empr(y,s,a,e) by age, sex and education level for people older than 16, we use the average of the employment rates in 1995 and 2000. We assume the employment rate for college is the same as that for university.

The formula used to calculate the employment rate is:

empr(y,s,a,e)=[employed(y,s, a, e)]/pop(y,s, a, e)

The data sources of employment rates are listed in the table below:

Data	Sources
The employed by age, sex and education Level in 1987	"China Population Census 1987"
Population by age, sex and education level in 1987	"China Population Census 1987"
The employed by age, sex and education level in 1995	"China Population Census 1995"
Population by age, sex and education level in 1995	"China Population Census 1995"
The employed by age, sex and education level in 2000	"China Population Census 2000"
Population by age, sex and education level in 2000	"China Population Census 2000"

Note: The 1% sample population in 1995 is converted to the total population by the actual sampling percentage of 1.04%.

The employed in "China Population Census 2000" for each province, autonomous region and municipality is aggregated to get the total population employed by the actual sampling percentage of 10%.

3. Calculation of enrollment rate

Enrollment rate is the share of people with education level *e* enrolled in a higher level of education *e*+1.

3.1 Calculation of enrollment by sex, age and education level

Based on the age distribution of the enrollment number for a certain education level and sex, the enrollment number of each year by sex, age and education level is given by:

$$\text{NewEnroll}(y,s,a,e) = \text{NewEnroll}(y,s,e)*\lambda(y,s,a,e)$$

$$\sum_a \lambda(y,s,a,e) = 1$$

Note that λ(y,s,a,e) refers to the age distribution of the enrollment number for each education level and sex.

There is no college or university in rural areas, so the enrollment number of college and university in rural areas is assumed to be 0.

3.2 In-school population of each education level and each grade

The in-school population of age *a*, sex *s*, education level *e*, and grade *n*+1 in year *y* is the enrolled population of age a-n, sex s , and education level e in year y-n:

$$\text{pop\_inschool}(y,s,a,e-n) = \text{NewEnroll}(y-n,s,a-n,e)$$

3.3 Enrollment rate of each education level and each grade

The probability of advancing to the next higher level of education is estimated by the average ratio of the sum of all students of any age in a year initially enrolled to the sum of all students of any age initially enrolled in

the next higher level of education *X* years later, where *X* is the number of years it takes to complete an education level.

3.3.1 Enrollment rate from no schooling to primary school

The formula from no schooling to primary school is:

senr(y,s,a,pri-ns) = Newenroll(y+1,s, pri)/ pop(y,s,ns)

The upper(lower) bound of people out of school in year y and enrolled into primary school in year y+1 is determined by the upper(lower) bound of the age distribution for enrollment of primary school in year y+1. For example, the age distribution for enrollment of primary school in year y+1 is from 5 to 10. The upper(lower) bound of people who have no schooling in year y and enrolled into primary school in year y+1 is 9(4). The upper bound of people out of school in 2007 and enrolled into primary school in 2008 is the same as in 2006.

3.3.2 Enrollment rate from primary school to junior middle school

The steps of calculating this enrollment rate by sex and age in year y are as follows:

(1) The enrollment rate of the first grade of primary school in year y by age and sex is the average enrollment rate that the group in this grade can be enrolled in the first grade of junior middle school six years later, and the formula is:

senr(y,s,a,jm-pri) = newEnroll (y+6, s, jm)/ newEnroll (y, s, pri)

(2) The population of the second grade of primary school in year y by age and sex is the enrolled population of primary school in year y-1 by age and sex. The probability that the group in this grade can be enrolled in junior middle school 5 years later is the average enrollment rate that the

group in this grade can be enrolled in the first grade of junior middle school five years later, and the formula is:

senr(y,s,a,jm-pri-1) = newEnroll (y+5,s,jm)/ newEnroll (y-1,s,pri)

(3) The population of the third grade of primary school in year y by age and sex is the enrolled population of primary school in year y-2 by age and sex. The probability that the group in this grade can be enrolled in junior middle school 4 years later is the average enrollment rate that the group in this grade can be enrolled in the first grade of junior middle school four years later, and the formula is:

senr(y,s,a,jm-pri-2) = newEnroll (y+4,s,jm)/ newEnroll (y-2,s,pri)

(4) Similarly, we can calculate the probability of the group of each grade in primary school being enrolled in junior middle school in year y.

3.3.3 Enrollment rate from junior middle school to senior middle school

The steps of calculating this enrollment rate by sex and age in year *y* are as follows:

(1) The enrollment rate of the first grade of junior middle school in year y by age is the average enrollment rate that the group in this grade can be enrolled in the first grade of senior middle school three years later, and the formula is:

senr(y,s,a,sm-jm) = newEnroll (y+3,s,sm)/ newEnroll (y,s,jm)

(2) The population of the second grade of junior middle school in year y by age and sex is the enrolled population of junior school in year y-1 by age and sex. The probability that the group in this grade can be enrolled in senior middle school two years later is the average enrollment rate that the group in this grade can be enrolled in the first grade of senior middle school two years later, and the formula is:

senr(y,s,a,sm-jm-1) = newEnroll (y+2,s,sm)/ newEnroll (y-1,s,jm)

(3) Similarly, we can calculate the probability of the group of each grade in junior middle school being enrolled in senior middle school in year y.

3.3.4 Enrollment rate from senior middle school to college or university

The steps of calculating the enrollment rate from senior middle school to college by sex and age in year *y* are as follows:

(1) The enrollment rate of the first grade of senior middle school in year *y* by age is the average enrollment rate that the group in this grade can be enrolled in the first grade of college three years later, and the formula is:

senr(y,s,a,col-sm) = newEnroll (y+3,s,col)/ newEnroll (y,s,sm)

(2) The population of the second grade of senior middle school in year y by age and sex is the enrolled population of senior school in year y-1 by age and sex. The probability that the group in this grade can be enrolled in college two years later is the average enrollment rate that individuals in this grade can be enrolled in the first grade of college two years later, and the formula is:

senr(y,s,a,col-sm-1) = newEnroll (y+2,s,col)/ newEnroll (y-1,s,sm)

(3) Similarly, we can calculate the probability of the group of each grade in senior middle school being enrolled in college in year *y*.

The steps of calculating the enrollment rate from senior middle school to university by sex and age in year *y* are as follows:

(1) The enrollment rate of the first grade of senior middle school in year y by age is the average enrollment rate that the group in this grade can be enrolled in the first grade of university three years later, and the formula is:

senr(y,s,a,col-uni) =newEnroll (y+3,s,uni)/ newEnroll (y,s,sm)

(2) The population of the second grade of senior middle school in year y by age and sex is the enrolled population of senior school in year y-1 by

age and sex. The probability that the group in this grade can be enrolled in university two years later is the average enrollment rate that the group in this grade can be enrolled in the first grade of university two years later, and the formula is:

senr(y,s,a,uni -sm-1) = newEnroll (y+2,s,uni)/ newEnroll (y-1,s,sm)

(3) Similarly, we can calculate the probability of the group of each grade in senior middle school being enrolled in university in year *y*.

Two points worth noting are as follows:

(1) By using the enrolled population in different years for calculating enrollment rates, an adjustment has already been made for the survival rate. Therefore, the survival rate is not included in the formula. We also assume that no one drops out, skips a grade, repeats a grade, or takes leaves for a year or more within a certain education category.

(2) We could only calculate the enrollment rate of primary school till 2007 for lack of data. We use 2007 enrollment rates for years after 2007. Likewise, for enrollment rates of junior middle school and high school, we fix the enrollment rates for 2012 and 2013 at the 2011 levels.

4．Growth rate of real wage

The datum used to calculate rural growth rate are rural CPI and average pure income of rural residents. Calculation method: rural real income is equal to average pure income of rural residents divided by rural CPI. Rural growth rate in T-1 period is equal to the income gap between rural real income in T and T-1 period divided by rural real income in T-1 period. The datum used to calculate urban growth rate are urban CPI and average wage of urban employees. Calculation method: urban real wage is equal to

average wage of urban employees divided by urban CPI. Urban growth rate in T-1 period is equal to the income gap between urban real wage in T and T-1 period divided by urban real wage in T-1 period. The result shows that, for the 30-year period, 1985-2014, growth rate on average is 6.10% and 8.50% annually in the rural and urban sectors, respectively.

5．Discount rate

The discount rate we use is 4.58%, following Jorgenson and Yun (1990) and Jorgenson and Fraumeni (1992a). It is based on the rate of return on long-term investments in the private sector of the U.S. economy and also adopted by the OECD consortium (OECD 2010).

6．Calculation of human capital

6.1 Human capital of in-school population

The number of years discounted until they accumulate the higher level of human capital depends on the number of years it takes to complete the starting grade level and the current grade of enrollment within the starting grade level.

6.1.1 Human capital of population in primary school by age and sex

(1) If an individual in the first grade of primary school can advance to the next higher level of education, he could get human capital equal to that of someone who is currently six years older and whose educational attainment is junior middle school. We discount that income by 6 years to reflect the fact that it takes 6 years for him to reach junior middle school: senr(y,s,a,jm-pri)*mi(y,s,a+6,jm)*R^6

(2) If an individual in the second grade of primary school can advance to the next higher level of education, his human capital is calculated as: senr(y,s,a,jm-pri-1)*mi(y,s,a+5,jm)*R^5，discounted by 5 years as it takes him 5 years to reach junior middle school.

(3) Similarly, we can calculate the human capital of the group in each grade of primary school.

6.1.2 Human capital of the group in junior middle school and above by age and sex

Take junior middle school as an example.

(1) If an individual in the first grade of junior middle school can advance to the next higher level of education, he could get human capital equal to that of someone who is currently three years older and whose educational attainment is senior middle school. We discount that income by 3 years as it takes 3 years for him to reach senior middle school: senr(y,s,a,sm-jm)*mi(y,s,a+3,sm)*R^3

(2) If an individual in the second grade of junior middle school can advance to the next higher level of education, his human capital is calculated as:

senr(y,s,a,sm-jm-1)*mi(y,s,a+2,sm)*R^2, discounted by 2 years as it takes 2 years for him to reach senior middle school.

(3) Similarly, we can calculate the human capital of the group in each grade of junior middle school.

For the years that we do not separate enrollments for university and college (there are five categories for education level, and the last level is college and above), we get the human capital of the group in the first grade of senior middle school as:

senr(y,s,a,col-sm)*mi(y,s,a+3,col)*R^3

For grade 2 and 3 students, the human capital is given by:

$$senr(y,s,a,col\text{-}sm\text{-}1)*mi(y,s,a+2,col)*R^2$$

and

$$senr(y,s,a,col\text{-}sm\text{-}1)*mi(y,s,a+2,col)*R,$$

respectively.

For the years that separate university and college enrollments are available (there are six categories for education level, and the last level is university and above), we should use the human capital equation:

$$senr(y,s,a,col\text{-}sm)*mi(y,s,a+3,col)*R^3+senr(y,s,a,uni\text{-}sm)*mi(y,s,a+3,uni)*R^3,$$

as for senior middle school students, they can go to college or university after their graduation.

For grade 2 students, the human capital is calculated as:

$$senr(y,s,a,col\text{-}sm\text{-}1)*mi(y,s,\ a+2,col)*R^2+senr(y,s,a,uni\text{-}sm\text{-}1)*mi(y,s,a+2,uni)*R^2\ .$$

Similarly, we can calculate the human capital of the group in each grade of senior middle school.

Note that by using the average ratio of the sum of all students of any age in a year initially enrolled to the sum of all students of any age initially enrolled in the next higher education level X years later, an adjustment has already been made for age-specific survival rates. Accordingly, the survival rate does not appear in the formula.

6.2 Human capital of -out-of-school population

6.2.1 Calculation of out-of-school population

In-school population of age a, sex s, and education level e in year y, pop_inschool(y,s,a,e), is the sum of population of each grade:

$$pop\_inschool(y,s,a,e) = \sum_{n=0}^{y(e)} pop\_inschool(y,s,a,e)$$

where y(e) is the number of years to achieve education level e. The formula for calculating out-of-school population of age a, sex s, and education level e in year y is:

pop_noschool(y,s,a,e) = pop(y, s, a,e) - pop_inschool(y,s,a,e)

Note that following adjustment is made for negative values in out-of-school population.

(1) Reset negative out-of-school population for certain gender, age and education level to 0. The negative out-of-school population mainly appears in primary school for students aged 5-10.

(2) Add the weighted negative out-of-school population for certain gender, age and education level to the in-school population by grades, where the weights are the proportion of population in each grade by gender, age, and education level.

6.2.2 Human capital of -out-of-school population

The out-of-school population consists of people who are working. For people below the age of 60, the formula for human capital is:

mi(y,s,a,e) = ymi(y,s,a,e) + sr(y,s)*mi((y,s,a+1,e)*R

For those who are over 60, human capital is zero, i.e. ymi = 0.

# 7．Human capital stock in China: 1985-2014

The income estimated by the Mincer equation is the real yearly income (using 1985 as the based). We use CPI and real income to obtain the nominal yearly income.

Tables C.1- C.4 reports the real human capital in China with 1985 as the baseline year. Table C.5-C.8 show the labor force human capital.

In table C.2、C.4、C.6、C.8, we report the results based on six education categories from 1985-2014. Due to data reasons we separate data available before 2000 is China Population Census 1990. China Population Census 1990 recorded the population of university by age, sex and region. So it's

convenient for us to use China Population Census 1990 and 2000 to separate "university and above" from "college and above" before 2000. We use data from the China Educational Statistical Yearbook before 2000 to calculate the national university share in college and university enrollment. Then we assume that the ratio of university to college enrollment is the same to each other in every province. We also assume that the ratio of university to college enrollment is the same between female and male.
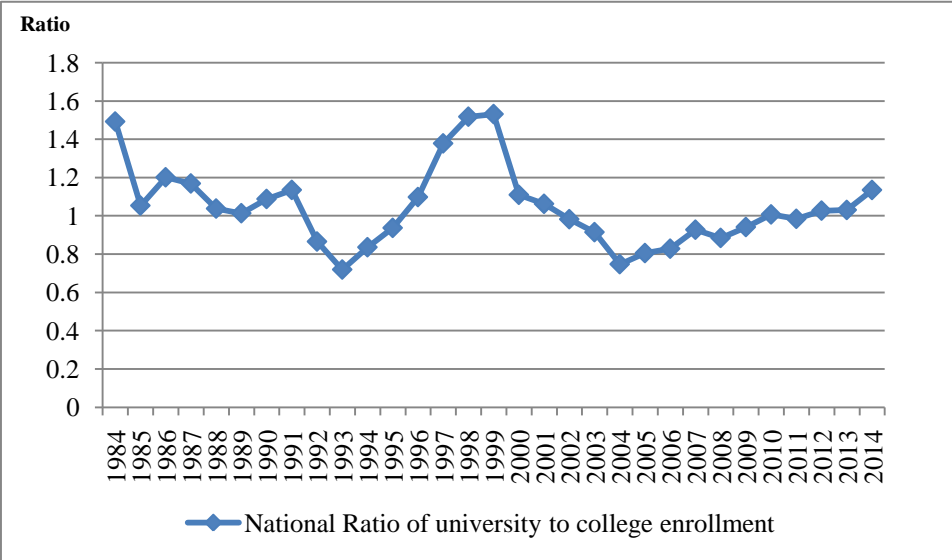
Figure C.7.1 National Ratio of university to college enrollment, 1984-2014

Tables and figures of appendix C

Table C.1 Real Human Capital by Region and Gender, 1985-2014

<div align="right">Unit: Billion Yuan</div>

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	10600	6208	13780	10150
1986	12020	6968	14740	10540
1987	13350	7712	15800	11000
1988	13460	7725	15360	10460
1989	13900	7921	14620	9773
1990	16430	9329	15920	10390
1991	18260	10370	17500	11160
1992	19720	11100	18770	11660
1993	19870	11080	18630	11260
1994	18340	10090	16890	9950
1995	17850	9783	15990	9279
1996	20050	10890	15970	9035
1997	23450	12680	16740	9265
1998	28150	15110	18130	9782
1999	33780	18210	19660	10370
2000	38920	20930	21050	10890
2001	44930	24380	22450	11560
2002	52470	28350	24090	12280
2003	59560	32120	25300	12760
2004	64940	35420	25730	12920
2005	70980	39120	26630	13480
2006	81820	44070	28960	14510
2007	90020	48650	29950	15010
2008	96830	52390	30520	15360
2009	110900	59470	33500	16770
2010	120300	64490	35100	17610
2011	129000	70200	35620	17960
2012	140600	76330	37150	18830

| 2013 | 155200 | 83980 | 38530 | 19670 |
| 2014 | 167100 | 89710 | 40480 | 20780 |

Note: The results are based on five education categories.

Table C.2 Real Human Capital by Region and Gender, 1985-2014

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	10600	6210	13810	10170
1986	12020	6971	14780	10570
1987	13360	7719	15840	11030
1988	13470	7738	15390	10480
1989	13920	7937	14650	9797
1990	16460	9353	15960	10410
1991	18300	10400	17540	11190
1992	19780	11140	18820	11690
1993	19950	11130	18680	11290
1994	18420	10140	16940	9980
1995	17940	9841	16040	9308
1996	20190	10990	16020	9061
1997	23660	12810	16790	9291
1998	28450	15300	18190	9810
1999	34200	18510	19720	10400
2000	39580	21460	21100	10920
2001	45760	25030	22510	11590
2002	53600	29140	24150	12310
2003	60950	33040	25360	12790
2004	66510	36480	25790	12940
2005	72650	40310	26690	13510
2006	83810	45450	29010	14540
2007	92290	50250	30000	15040
2008	99270	54240	30580	15390

2009	113800	61690	33560	16790
2010	123600	67010	35170	17640
2011	132500	72960	35690	17990
2012	144300	79370	37220	18870
2013	159300	87330	38600	19700
2014	171300	93230	40540	20820

Note: The results are based on six education categories.

Table C.3 Per Capita Real Human Capital by Region and Gender, 1985-2014

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	92.80	61.82	35.92	29.45
1986	101.65	66.53	38.43	30.55
1987	109.36	70.80	41.20	31.80
1988	103.99	67.90	39.69	30.00
1989	101.79	66.82	37.44	27.83
1990	114.43	75.83	40.38	29.38
1991	124.55	81.29	44.22	31.40
1992	131.50	84.37	47.28	32.67
1993	130.35	81.71	46.84	31.41
1994	118.24	72.46	42.37	27.67
1995	113.41	68.37	40.08	25.72
1996	118.62	71.02	40.76	25.62
1997	130.11	77.35	43.55	26.85
1998	146.92	87.00	48.10	29.02
1999	166.42	99.48	53.13	31.50
2000	181.33	108.93	58.02	33.90
2001	200.78	120.55	63.61	36.85
2002	225.35	133.93	70.27	40.17

Year	Urban Male	Urban Female	Rural Male	Rural Female
2003	247.27	145.56	76.08	42.90
2004	261.07	155.10	79.94	44.73
2005	277.39	166.00	85.62	48.14
2006	307.10	181.27	94.30	52.87
2007	326.15	193.59	98.91	55.94
2008	338.94	203.16	102.20	58.47
2009	375.84	225.93	113.85	65.24
2010	394.93	239.42	120.85	69.92
2011	412.31	252.94	124.88	72.88
2012	437.85	268.88	133.03	78.27
2013	472.14	289.52	140.82	83.48
2014	496.38	301.75	151.14	89.75

Note: The results are based on five education categories.

Table C.4 Per Capita Real Human Capital by Region and Gender, 1985-2014

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	92.72	61.85	36.00	29.52
1986	101.62	66.58	38.52	30.62
1987	109.37	70.88	41.30	31.88
1988	104.06	68.02	39.79	30.07
1989	101.91	66.96	37.53	27.90
1990	114.63	76.03	40.49	29.45
1991	124.82	81.55	44.34	31.48
1992	131.86	84.71	47.41	32.75

1993	130.81	82.10	46.97	31.50
1994	118.75	72.86	42.51	27.76
1995	113.97	68.79	40.21	25.80
1996	119.43	71.64	40.88	25.70
1997	131.24	78.20	43.68	26.93
1998	148.42	88.13	48.24	29.10
1999	168.45	101.13	53.28	31.59
2000	184.69	111.49	58.17	33.98
2001	204.71	123.66	63.77	36.93
2002	230.29	137.61	70.43	40.26
2003	252.94	149.77	76.26	43.00
2004	267.42	159.74	80.13	44.83
2005	283.89	171.05	85.81	48.24
2006	314.55	186.94	94.46	52.95
2007	334.40	199.97	99.07	56.03
2008	347.51	210.32	102.38	58.56
2009	385.73	234.37	114.06	65.35
2010	405.63	248.78	121.09	70.05
2011	423.22	262.90	125.13	73.02
2012	449.44	279.60	133.27	78.41
2013	484.46	301.06	141.07	83.64
2014	508.99	313.60	151.40	89.92

Note: The results are based on six education categories.

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Table C.5 Real Labor Force Human Capital by Region and Gender, 1985-2014

<div align="right">Unit: Billion Yuan</div>

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	4064	2268	5837	4151
1986	4593	2548	6362	4391
1987	5170	2833	6925	4645
1988	5382	2931	6950	4554
1989	5732	3107	6771	4352
1990	7043	3756	7463	4696
1991	7697	4145	8336	5155
1992	7959	4311	9008	5476
1993	7756	4202	8916	5307
1994	7030	3799	8036	4696
1995	6833	3686	7589	4369
1996	7492	3959	7632	4271
1997	8688	4525	8108	4419
1998	10570	5412	8927	4732
1999	12970	6525	9743	5030
2000	15660	7649	10470	5266
2001	17130	8474	11000	5528
2002	19090	9467	11810	5918
2003	20960	10540	12480	6263
2004	22800	11470	12570	6313
2005	25520	12880	12950	6535
2006	28830	14140	14600	7228
2007	31250	15430	15610	7682
2008	34150	16680	16240	7989
2009	41580	19760	18030	8814
2010	47630	22510	18990	9299
2011	48340	23330	19400	9523
2012	50740	24390	20400	10060

Year	Urban Male	Urban Female	Rural Male	Rural Female
2013	54730	26090	21330	10590
2014	59160	27950	22420	11230

Note: The results are based on five education categories.

Table C.6 Real Labor Force Human Capital by Region and Gender, 1985-2014

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	4056	2266	5837	4151
1986	4584	2545	6362	4391
1987	5159	2829	6925	4645
1988	5368	2931	6950	4554
1989	5720	3104	6771	4352
1990	7023	3751	7463	4696
1991	7675	4142	8336	5155
1992	7946	4309	9008	5476
1993	7745	4199	8916	5307
1994	7020	3797	8036	4696
1995	6828	3685	7590	4369
1996	7488	3964	7632	4271
1997	8700	4527	8109	4420
1998	10590	5411	8928	4732
1999	13000	6533	9744	5031
2000	15410	7603	10470	5266
2001	16960	8452	11000	5529
2002	19010	9465	11810	5919
2003	20970	10530	12490	6264
2004	23030	11600	12580	6315
2005	25790	13030	12950	6537

2006	29170	14340	14610	7231
2007	31660	15670	15620	7687
2008	34630	16970	16260	7997
2009	42210	20160	18060	8826
2010	48410	23010	19030	9315
2011	49180	23870	19430	9541
2012	51680	25000	20440	10080
2013	55770	26780	21370	10620
2014	60280	28710	22460	11250

Note: The results are based on six education categories.

Table C.7 Per Capita Real Labor Force Human Capital by Region and Gender, 1985-2014

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	56.88	35.89	26.63	21.11
1986	62.15	38.46	28.64	21.97
1987	67.10	40.60	30.82	22.92
1988	64.08	39.22	29.84	21.78
1989	63.15	39.18	28.22	20.31
1990	72.02	44.86	30.49	21.55
1991	76.97	47.42	33.36	23.06
1992	78.89	47.96	35.44	23.97
1993	76.26	45.47	34.79	22.92
1994	68.26	39.97	31.24	20.10
1995	65.15	37.57	29.45	18.58
1996	67.01	38.17	29.98	18.49
1997	72.88	41.10	32.14	19.40
1998	82.71	46.01	35.63	21.02
1999	93.63	51.56	39.25	22.75

Year	Urban Male	Urban Female	Rural Male	Rural Female
2000	104.23	56.31	42.78	24.33
2001	111.28	60.02	46.35	26.10
2002	120.65	64.56	50.79	28.28
2003	129.13	69.35	54.62	30.20
2004	135.72	72.62	56.67	31.15
2005	145.55	77.91	60.44	33.17
2006	159.55	84.45	68.06	37.06
2007	168.14	90.39	72.56	39.79
2008	176.37	95.43	75.74	41.96
2009	203.20	109.20	84.66	47.07
2010	220.48	119.33	90.05	50.58
2011	223.98	123.09	93.42	52.81
2012	232.93	128.12	100.03	56.92
2013	247.77	135.80	106.41	60.91
2014	262.35	142.34	114.04	65.31

Note: The results are based on five education categories.

Table C.8 Per Capita Real Labor Force Human Capital by Region and Gender,

1985-2014

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	56.85	35.89	26.63	21.11
1986	62.12	38.45	28.64	21.97
1987	67.07	40.59	30.82	22.92
1988	64.04	39.25	29.84	21.78
1989	63.13	39.18	28.23	20.31
1990	71.96	44.84	30.49	21.55
1991	76.91	47.44	33.36	23.06

1992	78.89	47.98	35.44	23.97
1993	76.27	45.49	34.79	22.92
1994	68.28	39.99	31.24	20.10
1995	65.21	37.60	29.46	18.58
1996	67.09	38.25	29.98	18.49
1997	77.28	42.51	32.18	19.42
1998	87.77	47.65	35.68	21.04
1999	99.54	53.58	39.31	22.78
2000	103.18	56.02	42.79	24.33
2001	110.70	59.93	46.36	26.10
2002	120.64	64.69	50.81	28.28
2003	129.62	69.49	54.64	30.21
2004	137.12	73.44	56.69	31.16
2005	147.10	78.86	60.47	33.18
2006	161.44	85.64	68.11	37.07
2007	170.33	91.81	72.63	39.81
2008	178.86	97.13	75.83	42.00
2009	206.30	111.40	84.79	47.14
2010	224.09	121.97	90.22	50.67
2011	227.89	125.96	93.60	52.91
2012	237.23	131.35	100.22	57.03
2013	252.48	139.38	106.61	61.03
2014	267.32	146.19	114.25	65.46

Note: The results are based on six education categories.

Appendix D   Physical Capital Estimation

1. Two measurements of physical capital

For each province, we calculate variations on two measures of physical capital stock:

(1) Wealth capital stock (or: net capital stock): measures the monetary value of the physical capital stock. To be used, for example, in comparisons of the value of physical to human capital.

(2) Productive capital stock: measures the volume (or productive capacity) of physical capital. To be used, for example, in productivity analysis.

In productivity analysis, what are of interest are the services rendered in a particular period by capital as an input to the production process. It is assumed that the services rendered by the productive capital stock in a particular period are in fixed proportion to the productive capital stock. In calculating aggregate growth of productive physical capital we therefore also refer to growth in capital services. (In productivity analysis, an analogue of capital services is labor services, with the services rendered by labor in the production of a particular volume of output in a particular period being assumed to be in constant proportion to the number of laborers or number of laborer-hours worked in that period.)

Our capital measures closely follow the OECD Manual (2009) on *Measuring Capital* and the physical capital chapter in the OECD Manual (2001) on *Measuring Productivity*. For the case of a hyperbolic

age-efficiency function, the methods used by the U.S. Bureau of Labor Statistics and the Australian Bureau of Statistics are consulted.

We calculate the two measures of physical capital stock in five variations:

(1) Wealth capital stock at the end of the year in (mid-year) 1985 prices, based on a geometric age-price profile.

(2) Wealth capital stock at the end of the year in current prices, based on a geometric age-price profile.

(3) An index of real growth in end-year wealth capital stock, based on a geometric age-price profile and with the 1985 value set equal to one.

(4) An index of real growth in capital services, based on a geometric age-efficiency profile and with the 1985 value set equal to one.

(5) An index of real growth in capital services, based on a hyperbolic age-efficiency profile and with the 1985 value set equal to one.

The first four variations of capital stock (and services) measures are derived using a modification of an OECD-provided model spreadsheet. The fifth variation follows from more elaborate, own calculations. (Own calculations for the first four variations confirm the results obtained via the modified OECD-provided spreadsheet.)

2. Data and data sources

For each province, the following data are needed:

(1) Investment values in form of gross fixed capital formation, with a breakdown by type of asset adopted from the investment statistics;

(2) Investment in fixed assets price index, with a breakdown by type of

asset;

(3) CPI;

(4) Aggregate income accounts with a breakdown into labor remuneration, operating surplus, depreciation, and net taxes on production.

The source of the data for the most recent years is the statistical database on the NBS website. Historical data are obtained from *GDP 1952-1995* and *Sixty Years*. Occasionally the *China Statistical Yearbook* and provincial statistical yearbooks are consulted. All constant-price values are in 1985 prices, and real growth indices use 1985 as base year (with value one).

Provincial values of gross fixed capital formation (GFCF) are obtained from the NBS website and *Sixty Years*. These are the most up-to-date values that incorporate all benchmark revisions, up to and including the benchmark revision following the 2013 economic census. GFCF values do not come with a breakdown by type of asset.

The investment statistics provide a breakdown of total investment by type of asset: structures, equipment, and "others." These province- and year-specific proportions of structures, equipment, and "others" in total investment are applied to the provincial annual GFCF values. Investment data by type of asset are available since 2003 (NBS website). For each province, values for 1951-2002 are estimated by establishing the 1950 proportions, and then connecting these 1950 proportions linearly to the average 2003-2005 proportions. Approximate 1950 proportions of the three types of assets in total economy-wide (national) investment is uniformly used for all provinces (structures 75%, equipment 20%, and "others" 5%).

Data on the investment in fixed assets price index are available for the

years since 1991, including by type of asset (NBS website). For earlier years, price changes are obtained from nominal GFCF values together with GFCF real growth rates, both published in *GDP 1952-1995*. This GFCF deflator is applied equally to all three types of assets (structures, equipment, "others"). In the case of provinces (or years) with missing nominal GFCF values and/or missing GFCF real growth rates, the deflator of industry value-added is used as proxy (with values from *Sixty Years*).

CPI data are obtained from the NBS website.

Income accounts data are obtained in two steps in order to address statistical breaks and to ensure that income accounts data and aggregate expenditure data (including GFCF) are consistent. First, the share of each income component in aggregate income is calculated. The underlying income data for the years since 1993 are from the NBS website and for the years 1978 through 1992 from *GDP 1952-1995*. Shares for the years 1950-1977 are set equal to the average 1978-1982 shares. In a second step, absolute values are obtained by multiplying the share values by aggregate expenditures (using data from the same sources as reported above for GFCF, one of the components of aggregate expenditures).

Missing data are addressed through appropriate approximations. For example, (early) Chongqing GFCF data are constructed as

$$\text{Chongqing GFCF} = \frac{Sichuan\ GFCF}{\text{Sichuan GCF}} * Chongqing\ GCF \tag{1}$$

With the data taken from *Sixty Years* (and GCF denoting gross capital formation, i.e., GFCF plus inventory investment). A very occasional unreasonably extreme data point may be replaced by the mean of the previous and following years' values. A list of all special adjustments has

been compiled.

3. Initial capital stock

The initial year of our capital stock series is 1952. The (province-specific) capital stock value W_{1952} is obtained equally for all our measures of capital as

$$W_{1952} = \frac{GFCF_{1953}}{\delta + \theta} - GFCF_{1953} \qquad (2)$$

$GFCF_{1953}$ is GFCF of the year 1953, θ is the asset-specific average annual (geometric) real growth rate of GFCF between 1953 and 1957, and δ is the asset-specific depreciation rate (using the double-declining balance method). For some but not all provinces, GFCF value would have been available for 1950-1952, and a judgment was made that the first somewhat reliable (non-erratic) post-war GFCF value is probably the value of 1953.

4. Methodology

We follow the method outlined in the OECD Manual (2009) on *Measuring Capital* and the physical capital chapter in the OECD Manual (2001) on *Measuring Productivity*. Following other countries' experiences as reported in the first manual, and our evaluation of the circumstances in China, average service lives of physical assets are taken to be 40 years for structures, 16 years for equipment, and 25 years for "others."

The procedure comprises two stages. First, constant-price GFCF of a particular type of asset is subjected to a survival function and age-efficiency

profile to obtain productive capital stock, or to a survival function and age-price profile to obtain wealth capital stock.

Second, to obtain the growth rate of aggregate capital services, the growth rates of different types of productive capital stock (structures, equipment, "others") are combined using a Tornqvist index with user costs as weights. Aggregate (nominal or constant-price) wealth capital stock is obtained by summing the asset-specific wealth capital stock, while the real growth rate of the aggregate wealth capital stock is obtained by combining the real growth rates of asset-specific wealth capital using a Tornqvist index, with current-price wealth capital values used in constructing the weights.

4.1 Geometric age-efficiency profile, single type of asset

We follow common practice in the case of a geometric age-efficiency profile, of not separately including a survival function in deriving asset-specific productive or wealth capital stock. With a geometric age-efficiency profile, age-efficiency and age-price profile are identical, and thereby asset-specific productive capital stock and wealth capital stock are identical. The formula for geometric age-efficiency is

$$g_n = (1 - \delta)^n \tag{3}$$

Where n denotes age and δ denotes the rate of efficiency decline or the depreciation rate. The rate of efficiency decline / depreciation rate is obtained using the double-declining balance method, as 2 divided by the average service life. Starting at twice the average service life, efficiency (as well as the price) is set equal to zero.

4.2 Hyperbolic age-efficiency profile, singly type of asset

The survival function is 1 minus the asset-specific cumulative normal distribution, with asset-specific average service lives given above, and a standard deviation equal to one-quarter of the average service life.

The age-efficiency profile is described by the hyperbolic function

$$g_n = \frac{(T-n)}{(T-b*n)} \tag{4}$$

With n denoting age, T is twice the average service life, and b is a shape parameter that takes the value 0.75 in the case of structures, and 0.5 otherwise.

In the case of a non-geometric age-efficiency profile, the age-price profile is not identical to the age-efficiency profile. But the two are connected: following the asset market equilibrium condition, the current year's price of an asset equals the discounted stream of future rental income from the asset, where each future period's rental income depends on the productive capacity (efficiency) of the asset at that point in time, and the current year's price of the asset thereby on the age-efficiency profile of the asset. A series of current year prices constitutes the age-price profile of an asset. Following the procedures employed by the Bureau of Labor Statistics in the U.S. and by the Australian Bureau of Statistics, a discount rate of 4% as a long-run average rate of return is assumed in deriving the age-price profile from the age-efficiency profile.

4.3 Aggregate capital values and growth rates

To obtain the real growth rate of aggregate productive capital stock or of capital services (assumed to be a fixed proportion of the productive

capital stock), the growth rates of the different types of assets—structures, equipment, and "others"—at a particular point in time t are aggregated using the Tornqvist index T:

$$T_t = \prod_{i=1}^{3} Z_{it}^{(Share_{it}+Share_{it-1})/2} \tag{5}$$

Where Z denotes the growth rate of constant-price productive capital stock K.

The asset-specific weight in the Tornqvist index is the arithmetic mean of a previous-year and a current-year value denoting the share of this asset's user cost U_i in aggregate user costs U:

$$Share_{it} = U_{it} / \sum_{i=1}^{3} U_{it} \tag{6}$$

The user cost of a particular type of asset (type of productive capital) is defined as the rental rate times the current-price productive capital stock (q*K), with the rental rate covering depreciation and a rate of return, less appreciation of the asset during the period:

$$U_{it} = \left(\delta_{it} + r_t - \frac{q_{it}-q_{it-1}}{q_{it}} \right) * q_{it} K_{it}^P \tag{7}$$

The rate of depreciation follows from the age-price profile, and the rate of appreciation is obtained from the investment in fixed assets price index. The rate of return is unknown and the asset-specific user costs, thus, are unknown.

To solve equation (7), the rate of return is assumed to be identical across all types of assets. An economy-wide (province-specific) value of user costs is obtained from the income accounts data as the sum of operating surplus, depreciation and a proportion of net taxes on production. The proportion of net taxes to include is "operating surplus plus depreciation" as a share of "operating surplus plus depreciation plus labor remuneration;" i.e.,

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total income is attributed to labor (labor remuneration) and capital (operating surplus plus depreciation), and the final income component of net taxes on production is split proportionally between labor and capital. This economy-wide value of user costs equals the sum of the user costs of the three types of assets, which allows one to solve for the rate of return r_t in:

$$U_t = \sum_{i=1}^{3} U_{it} = \sum_{i=1}^{3} \left(\delta_{it} + r_t - \frac{q_{it} - q_{it-1}}{q_{it}} \right) * q_{it} K_{it}^P \tag{8}$$

Once r_t is known, the asset-specific user costs (7) can be calculated, providing the shares (6) used in the Tornqvist index to obtain the real growth rate of capital services (5).

One shortcoming of this procedure is that in the first step, the age-price profile is derived using an assumed long-run rate of return, only to obtain a depreciation rate which then allows one to, in equation (8) solve for the current-year rate of return. Alternatively, one could not calculate an age-price profile and assume a depreciation rate in equations (7) and (8), thereby abandoning the consistency between age-efficiency and age-price profile. The advantage of this procedure is that one is not limited to the use of a rather unrealistic geometric age-efficiency profile.

The absolute value of the aggregate wealth capital stock, in constant or current prices, is simply the sum of the asset-specific wealth capital stock. To obtain a real growth rate for aggregate wealth capital stock, asset-specific constant-price wealth capital stock is aggregated using the Tornqvist index, with current-price asset values used to calculate the shares that enter the weights.

Tables of appendix D

Table D.1 Wealth Capital Stock at Constant Prices, 1985-2014（hyperbolic）

Unit: 100 millions of 1985 Yuan

Province	1985	1990	1995	2000	2005	2014
Beijing	52	117	244	460	901	2452
Tianjin	38	68	164	332	663	3346
Hebei	97	149	256	497	895	3276
Shanxi	54	81	111	166	304	1233
Inner Mongolia	31	50	98	160	419	2846
Liaoning	104	166	255	347	594	2326
Jilin	40	64	105	161	292	1734
Heilongjiang	69	107	152	233	364	1238
Shanghai	72	134	256	492	825	1878
Jiangsu	100	223	507	976	1952	6929
Zhejiang	15	31	157	441	1075	3365
Anhui	46	81	113	171	277	988
Fujian	32	51	94	190	347	1397
Jiangxi	45	66	109	183	374	1374
Shandong	123	216	355	603	1197	4323
Henan	100	164	263	472	873	4412
Hubei	71	107	182	359	625	2299
Hunan	49	74	106	165	282	1145
Guangdong	97	166	394	805	1575	5337
Guangxi	45	57	83	129	224	1221
Hainan	8	16	44	68	106	371
Chongqing	39	58	93	169	362	1334
Sichuan	74	111	163	282	513	1755
Guizhou	29	41	54	86	162	576
Yunnan	76	91	138	215	340	1301
Tibet	6	9	18	32	85	426
Shaanxi	41	71	101	148	253	1077

Province	1985	1990	1995	2000	2005	2014
Gansu	38	53	67	95	168	545
Qinghai	14	20	36	78	175	806
Ningxia	14	19	25	35	67	301
Xinjiang	32	53	104	168	287	961
National	**2109**	**3277**	**5378**	**8715**	**15215**	**48360**

Table D.2 Wealth Capital Stock at Constant Prices, 1985-2014（geometric）

Unit: 100 millions of 1985 Yuan

Province	1985	1990	1995	2000	2005	2014
Beijing	44	102	211	391	769	2048
Tianjin	33	57	143	285	567	2915
Hebei	79	122	215	422	759	2796
Shanxi	45	66	90	137	258	1060
Inner Mongolia	26	42	83	134	370	2486
Liaoning	83	137	212	284	501	1989
Jilin	33	53	88	133	248	1491
Heilongjiang	58	88	124	192	301	1057
Shanghai	61	113	219	417	691	1540
Jiangsu	86	193	440	833	1672	5871
Zhejiang	13	27	144	390	941	2833
Anhui	39	68	93	141	231	846
Fujian	27	43	80	162	295	1198
Jiangxi	36	53	91	153	320	1162
Shandong	104	181	296	505	1022	3672
Henan	83	136	219	397	742	3818
Hubei	58	88	153	305	527	1975
Hunan	40	60	86	136	236	985
Guangdong	82	139	344	691	1348	4545
Guangxi	36	45	68	107	189	1062
Hainan	7	13	39	57	88	320
Chongqing	32	48	77	143	313	1142

Province	1985	1990	1995	2000	2005	2014
Sichuan	62	91	134	236	434	1491
Guizhou	24	33	43	71	137	496
Yunnan	58	71	114	179	285	1134
Tibet	5	7	15	27	75	372
Shaanxi	34	59	82	121	211	929
Gansu	29	43	53	77	141	465
Qinghai	11	16	30	67	151	708
Ningxia	11	15	20	29	57	261
Xinjiang	27	44	89ES	140	240	826
National	**1730**	**2693**	**4478**	**7245**	**12791**	**40981**

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