China Human Capital Report Series

Human Capital in China
2017

Principal Investigator
Haizheng Li

China Center for Human Capital and Labor Market Research
Central University of Finance and Economics
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and

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Research Team Members

Principal Investigator

Haizheng Li	Special-term Professor China Center for Human Capital and Labor Market Research (CHLR), Central University of Finance and Economics (CUFE) &Professor, Georgia Institute of Technology

Core Team Members

Belton Fleisher	Special-term Professor and Senior Fellow, CHLR (2008- present) Professor Emeritus of Economics, Ohio State University Advising Editor of *China Economic Review*
Barbara Fraumeni	Special-term Professor and Senior Fellow, CHLR (2008- present) Professor Emerita of Public Policy, University of Southern Maine
Carsten A. Holz	Special-term Professor, CHLR (2013- present) Professor of Social Science Hong Kong University of Science & Technology
Zhiqiang Liu	Special-term Professor, CHLR (2008- present) Associate Professor of Economics State University of New York at Buffalo
Xiaojun Wang	Special-term Professor, CHLR (2008- present) Associate Professor of Economics University of Hawaii at Manoa
Li Yu	Associate Professor, CHLR (2010- present)
Sophie Xuefei Wang	Assistant Professor, CHLR (2012- present)
Fanzheng Yang	Assistant Professor, CHLR (2013- present)
Ning Jia	Assistant Professor, CHLR (2015- present)
Nina Yin	Assistant Professor, CHLR (2015- present)
Shan Li	Assistant Professor, CHLR (2016- present)

Previous Faculty Team Members：

Ake Blomqvist	Special-term Professor, CHLR (2009-2011)
Kang-Hung Chang	Associate Professor, CHLR (2009-2015)
Chun-Wing Tse	Assistant Professor, CHLR (2012-2015)
Fang Xia	Assistant Professor, CHLR (2013-2016)

Doctoral and postdoctoral students participated in this project：

Xing Chen	Doctoral Student, CHLR (2015- present)
Yuzhe Ning	Doctoral Student, CHLR (2015- present)
Dazhi Guo	Doctoral Student, CHLR (2012-2017)
Junzi He	Doctoral Student, CHLR (2013-2017)
Yuefang Qiu	Doctoral Student, CHLR (2012-2017)
Yue Sun	Doctoral Student, CHLR (2013-2017)
Qinyi Liu	Doctoral Student, Hunan University (2011-2017)
Tang Tang	Doctoral Student, CHLR (2012-2016)
Bo Li	Doctoral Student, CHLR (2011-2014)
Na Jia	Doctoral Student, CHLR (2010-2013)
Xiaobei Zhang	Doctoral Student, Hunan University (2010-2013)
Yunling Liang	Doctoral Student, CHLR (2009-2012)
Zhiyong Liu	Post-doctoral fellow, CHLR (2011-2013)

Administrative Members at the CHLR

Jing Xiao	Graduate Coordinator, CHLR (2010- present)
Rong Huang	Project Coordinator, CHLR (2015- present)
Hongmei Chong	Executive Assistant to Director, CHLR (2017)
Beiwen Sun	Executive Assistant to Director, CHLR (2011-2016)
Hao Deng	Graduate Coordinator / Executive Assistant to Director, CHLR (2008-2011)
Ruiju Wang	Executive Assistant to Director, CHLR (2008-2010)

2017 Team

Project Management Committee

manager	Yue Sun
members	Youfang Gao, Yue Guo, Wenjun Mao, Hongbin Pan

Graduate Students, CHLR

2016 students	Ce Guo, Kerui Geng, Xiaowen Liang, Jiantao Ma, Kun Yi, Shuning Yuan, Ping Zhang,

2016 Team

Project Management Committee

manager	Liyuan Ma
members	Zhiying Bian, Miaomiao Mo, Bing Wang

Graduate Students, CHLR

2015 students	Hongchen Ba, Youfang Gao, Yue Guo, Wenjun Mao, Hongbin Pan, Yue Sun, Huiying Wang, Yi Yang, Kanran Yin, Yisi Zeng, Qiuyue Zhang,

2015 Team

Project Management Committee

manager	Xiang Zheng
members	Xing Chen, Qiang Gao, Liyuan Ma, Yuzhe Ning, Xibo Wan, Bing Yan, Yangyang Zheng,

Graduate Students, CHLR

2014 students	Bing Wang, Jiapeng Dong, Wang Li, Xiang Wang, Shuli Shen, Jingyi Zhang, Zhiying Bian, Miaomiao Mo, Ni Zeng

2014 Team

Project Management Committee

members	Yulong Chen, Hanqing You, Haibo Zhao, Xiang Zheng

Graduate Students, CHLR

2013 students	Xing Chen, Qiang Gao, Yiwei Gao, Qianqian He, Xiaowei Hou, Feifei Huang, Tian Jin, Guanqun Li, Sijia Li, Mengyang Liu, Yangyi Liu, Wenhua Ma, Liyuan Ma, Yuzhe Ning, Yujiao Shi, Zehao Shi, Yanxia Sun, Xibo Wan, Jie Wei, Xinran Xing, Bing Yan, Yueshan Zhang, Cheng Zhao, Yangyang Zheng, Ye Zhou

2013 Team

Project Management Committee

members Tingting Ding, Junzi He, Bo Li

Graduate Students, CHLR

2012 students Shuping Chen, Yinghua Chen, Yulong Chen, Xiaojiao He, Suyi Huang, Ping Ma, Yiwen Sun, Liyang Xie, Shan Ye, Hanqing You, Chao Zhang, Junwu Zhang, Haibo Zhao, Xiang Zheng

2012 Team

Project Management Committee

members Lu Feng, Yang He, Bo Li, Wenwei Li, Yan Li, Qinyi Liu

Graduate Students, CHLR

2011 students Tingting Ding, Junzi He, Junfeng Li, Tianjing Li, Shirui Wang, Wenbo Wu

2011 Team

Graduate Students, CHLR

2010 students Zhanwang Chang, Xiaotang Chen, Lu Feng, Yang He, Bo Hu, Angran Li, Li Li, Wenwei Li, Yan Li, Yanchao Li, Xiaoyang Liu, Liying Mu, Xianzhou Wu, Le Zhang, Linjun Zhu

Graduate Students, School of Economy and Trade, Hunan University

2010 students Biao Luo, Lina Zhai, Li Zhang

2010 Team

Graduate Students, CHLR

2009 students Jing Bai, Jing Fang, Chao Guo, XinGao, XiaoyanGan, Jun Li, Jin Li,Tianyi Liu, Dandan Wu, YuanyuanXin, Pengfei Xing, Yanqiu Yang, Chen Zhang, Linghua Zhang

Graduate Students, School of Economy and Trade, Hunan University

2009 students Lin Ding, Hongling Wang, Qiujie Wu, Xiaomin Yan

Graduate Student, Georgia Institute of Technology： Chongyu Lu, Yuxi Xiao

Assistant Professor, China Academy of Public Finance and Public Policy, CUFE: Song Gao

2009 Team

Graduate Students, CHLR

2008 students Huajuan Chen, Yuhua Dong, Mengxin Du, Jinquan Gong, Jingjing Jiang, Rui Jiang, Qian Li, Sen Li, Chen Qiu, Xinping Tian, Mo Yang

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. We are grateful to our advisory board, including Nobel Laureate the late Kenneth J. Arrow for their contributions to our program. Current members of the advisory board are Nobel Laureate James Heckman, and Professor Dale W. Jorgenson of Harvard University, 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 Europe, and some are senior professors at U.S. universities. Currently the Center has a "Changjiang Fellowship" Scholar, 6 full-time faculty members, 7 special-term professors, and 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. As of 2017, 1 post-doctoral student, 8 doctoral students and 91 master students have graduated. Currently, the Center has 32 students, with 29 master students and 3 doctoral students.

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

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

- "Physical Capital Estimates for China's Provinces, 1952-2015 and Beyond,"

Holz, A. Carsten and Yue Sun, *China Economic Review*, forthcoming 2017.

- "Human Capital Estimates in China: New Panel Data 1985-2010," Haizheng Li, Qinyi Liu, Bo Li, Barbara Fraumeni, and Xiaobei Zhang, *China Economic Review*, Volume 30, pp.397-418, 2014.
- "Regional Difference in perspective of the quality of labor force human capital," Haizheng Li, Tang Tang, *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," Haizheng Li, Bo Li, Yuefang Qiu, Dazhi Guo, Tang Tang, *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," Haizheng Li, Na Jia, Xiaobei Zhang, Barbara Fraumeni, *Economic Research Journal*, in Chinese, Issue 7, pp. 49-62, 2013.
- "Human Capital in China, 1985-2008," Haizheng Li, Yunling Liang, Barbara Fraumeni, Zhiqiang Liu and Xiaojun Wang, *Review of Income and Wealth*, Volume 59(2), pp. 212-234, 2013.
- "Human Capital Measurement and Index Construction in China," Haizheng Li, Yunling Liang, Barbara Fraumeni, Zhiqiang Liu, Xiaojun Wang, *Economic Research Journal*, Issue 8, 2010. (Reprinted in *China Social Science Digest*, 2010, No. 12.)
- "Regional Distribution and Dynamics of Human Capital in China 1985-2014: Education, Urbanization, and Aging of the Population," Haizheng Li, Junzi He, Qinyi Liu, Barbara Fraumeni, Xiang Zheng, National Bureau of Economic Research, Working Paper #22906, December 2016.
- "Human Capital Index in China," Haizheng Li, Barbara Fraumeni, Zhiqiang Liu, Xiaojun Wang, National Bureau of Economic Research, working paper (http://papers.nber.org/papers/w15500).

II. Books/Book Chapters published based on China Human Capital Report:

- "Senior Expert to Review the Results and Analysis of Human Capital Accounts," Report to the World Bank, Barbara Fraumeni, 2017.
- "Human Capital and Physical Capital Comparison of Beijing," Haizheng Li, Yue Sun, Yuefang Qiu, Dazhi Guo, in: Beijing Human Resources

Development Report 2015-2016, Beijing Human Recourses Bluebook Series, edited by Minhua Liu, Social Science Literature Press, Beijing, China, in Chinese, 2016.

- "Human Capital Comparison among Beijing, Tianjin and HebeiProvince," Haizheng Li, Dazhi Guo, Yuefang Qiu, in: Beijing Human Resources Development Report 2013-2014, Beijing Human Recourses Bluebook Series, edited by Miao Yu, Social Science Literature Press, Beijing, China, in Chinese, 2014.
- "The Rural-Urban Disparity of Human Capital in China," Haizheng Li, Xiaobei Zhang, Na Jia, Yunling Liang, Chinese Economists Society Presidential Forum, in: Economic Reform and Future Development Directions, edited by Yanling Yang and Kunwan Li, Nankai University Press, pp.209-227, 2012.
- "Human Capital In Beijing-A Measurement Based on the Jorgenson-Fraumeni Income Approach," Haizheng Li, Na Jia, Xiaobei Zhang, 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," Haizheng Li, Barbara Fraumeni, in: The Changing Wealth of Nations, Washington, DC: World Bank, Chapter 6, pp. 105-114, 2010.

III. Invited Speeches and Presentations:

- The 61st World Statistics Conference, "Regional Distribution and Dynamics of Human Capital in China 1985-2014: Education, Urbanization, and Aging of the Population," Marrakech, Morocco, July 18, 2017.
- The Eighth International Symposium on Human Capital, Plenary Session Presentation, "Measuring China's Human Capital-2016," Beijing, China, December 10, 2016.
- 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 Commonwealth 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.

IV. Related Funded Projects:

- The National Natural Science Foundation of China supported the human capital measurement project for the years 2010-2012 and 2013-2016 with two grants.
- 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

We thank all the invited discussants and participants at the international symposium series on human capital hosted by the China Center for Human Capital and Labor Market Research since 2009 for their valuable suggestions. We are grateful for the comments and suggestions from scholars at numerous international and domestic conferences, as well as from anonymous referees.

We are especially grateful to Nobel Laureate the late Professor Kenneth J. Arrow, and to the founder of the income-based method for measuring human capital, Professor Dale W. Jorgenson at Harvard University, for their support for this project.

This project and its related conferences have benefited tremendously from the supports of the administration at the Central University of Finance and Economics (CUFE). President Guangqian Wang and other university leaders provided strong support. Vice President Junsheng Li, Jianping Shi, and Lifen Zhao helped coordinate with various offices to ensure the success of the project. Many offices at the CUFE provided important administrative support that facilitated this research.

The School of Economics at Georgia Institute of Technology, especially the former Chair, Professor Patrick McCarthy, offered strong support for the project.

Revisions and Improvements in the 2017 Report

- Updated national and provincial human capital estimation for 1985-2015.
- Updated national and provincial physical capital stock calculation for 1985-2015.
- Improved and unified imputation method for 1982 and 1987 census data using new information.
- Re-calculated survival rates for both urban and rural area from 1985 to 2015.
- Updated population numbers of 2015 for some provinces based on new information.
- Added CHIP 2013 and CFPS 2014 data in estimating the Mincer equations.
- Adjusted the method in imputing the coefficients for experience variable in Mincer equations.
- Updated employment rate data of 2005 and 2010.
- Revised the method for calculating age distribution of school enrollments for Hong Kong and Taiwan.
- Updated the data on employment rate for Taiwan from 1985 to 2015.

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 females and age 0-60 for males
- Labor force human capital: age 16 or older and unretired individuals excluding students.

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. The J-F framework provides a comprehensive measurement of human capital compared to the partial measurements traditionally used, such as education.

Due to lack of data, the J-F approach needs to be modified to measure human capital in China. Following widely accepted methods based on the theory of human capital, we combine micro survey data with provincial level aggregate data and the Mincer model 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 those estimates to build various human capital indexes.

I. What is in the database?

In this report, we present our calculations of China's human capital stock at the national level and provincial level, including Hong Kong and Taiwan, from 1985 to 2015. The human capital measurement covers total human capital and human capital per capita, for rural and urban residents, male and female. We also present our calculation of traditional measures of human capital based education.

Additionally, in order to aid research, we also provide the related estimates of physical capital at the national level and provincial level for the same period, as well as living cost adjustment indexes (i.e., purchasing power parity index) for cross-province comparison of money values.

The provincial panel datasets containing human capital, physical capital and provincial living cost adjustment index, and many other useful provincial data (raw and processed), have been released for public use, and can be downloaded free at：

http://humancapital.cufe.edu.cn/rlzbzsxm.htm

II. The Main Findings of the 2017 Report

The main findings in the 2017 report are summarized below.

(All real values are based on 1985 prices unless otherwise specified.)

I) J-F based human capital measures

1. The top three provinces in terms of human capital stock in 2015 were Shandong, Guangdong, and Jiangsu.
2. The top three provinces ranked by per capita human capital stock in 2015 were Beijing, Tianjin and Shanghai.
3. China's total human capital reached RMB 1,747.1 trillion in 2015. Urban and rural human capital was RMB 1,468.1 and RMB 278.9 trillion, respectively, accounting for 84.03% and 15.97% of the total human capital.
4. Human capital per capita reached RMB 1.5 million in 2015, while urban and rural human capital per capita was RMB 2.3 million and 0.6 million, respectively. Human capital per capita for males and females was RMB 1.9 million and 1.2 million, respectively.
5. Total human capital in 2015 was 8.20 times its level in 1985. Total human capital and human capital per capita grew at an annual rate of 7.40% and 6.79% on average, respectively.
6. During 1985-2015, rural human capital grew at an average annual rate of

3.53%, while urban human capital grew at 9.31% annually. Growth rates of both urban and rural areas accelerated since 1997, to annual rates of 11.97% and 4.10%, respectively, for 1997-2015.

7. Urban human capital surpassed rural human capital in 1990, and has remained higher since then.
8. Rural human capital per capita grew at an average annual rate of 4.91% over the period 1985-2015, while per capita urban human capital grew at an annual rate of 5.63%, reflecting China's rising rural-urban economic gap.
9. 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.

II) Traditional Human Capital Measures

10. During 1985-2015, the average age of labor force at the national level increased from 31.9 to 35.9 years, from 31.7 to 36.7 years for the rural areas and 32.3 to 35.3 years for the urban areas.
11. During 1985-2015, the average years of schooling at the national level increased from 6.2 to 10.1, with 5.6 to 8.6 for the rural areas and 8.1 to 11.3 for the urban areas.
12. During 1985-2015，the proportion of workers with a high school education or more increased from 13.49% to 37.17%, with 8.04% to 13.90% for the rural areas and 29.77% to 54.13% for the urban areas.
13. The proportion of labor force with college education or above increased from 1.49% to 16.40%, with 0.22% to 2.94% for the rural areas and 5.28% to 26.20% for the urban areas.

III) Hong Kong and Taiwan

14. In Hong Kong, during 1985-2015, the average annual growth rate of human capital was 4.26%, and for human capital per capita was 3.42%.

15. In Taiwan, during 1985-2015, the average annual growth rate of human capital was 1.39%, and for human capital per capita was 1.11%.
16. During 1985-2015, in Hong Kong and Taiwan, average labor force age grew from 33.5 to 37.8 years and from 32.3 to 37.0 years, respectively.

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

[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, 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

[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 2015. 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 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 national estimates of human capital are reported in Chapter 6. Chapter 7 presents the cross-province comparison results. The disaggregated human capital results for 31 provinces, Hong Kong and Taiwan are presented in Chapter 8-40.

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 it 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

[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 wage 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 includes lifetime rearing costs including expenditures on food, shelter, health, schooling, and so on. The cost

[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.

of parental 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 the private education sector's plant and equipment and students' expenditures on supplies. Estimation of 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 outlays for radio, TV, records, books, periodicals, libraries, museums, and similar activities. 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 measured, 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, which is a double declining balance formula with a switch to a straight-line method.

Kendrick's 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 was 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 the 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, and develop other values and attitudes that will contribute to their earnings and well being as adults. The Human Capital Utilization Index is the endowment

[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.

measure divided 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 examining 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.

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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.

Specifically in this method, the logarithm of human capital per capita in a country at any time is computed using the following formula：

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

$$\omega_{e,a}=\frac{e^{\sum_{s}\left(\beta_s e+\gamma_s Exp+\delta_s Exp^2\right)\varphi_{s,a}}L_{e,a}}{\sum_{e}\sum_{a}e^{\sum_{s}\left(\beta_s e+\gamma_s Exp+\delta_s Exp^2\right)\varphi_{s,a}}L_{e,a}} \qquad (2)$$

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 of 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 which the proportions of different education groups 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 overall education increases, 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 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

[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 Conclusion

To sum up, taking into account data availability, 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 employment. Expected future wages and income are estimated from currently observed wages and income of a cross-section of 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] and modified to China with various needed assumptions about the method and parameters.

3.1 Estimate lifetime income by backward recursion

To apply the J-F income-based approach, we need actual data-or estimates of individual's annual market labor income per capita. Lifetime income is calculated according to whether an individual is in 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 and modified as needed to accommodate China data availability. The equations used for calculating the lifetime expected income are as follows.

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

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

[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.

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 is discounted and projected using according to that 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:

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

The second stage is for someone going to school but not working (5-15 years old). The equations for students varies depending with 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:

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

[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.

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:

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

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

$$mi(y,s,a,primary2)=[senr(y,s,a,primary2tojunior1)*mi(y,s,a+5,junior1)+notenr(y,s,a,primary2tojunior1)*mi(y,s,a+5,primary\ completed)]*[(1+G)/(1+R)]^5 \quad (5)$$

and:

$$notenr(y,s,a,primary2tojunior1)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*s$$

[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.

$r(y+3,s,a+4)*sr(y+4,s,a+5)-senr(y,s,a,primary2tojunior1)$

(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).

$$mi(y,s,a,junior1)=[senr(y,s,a,junior1tosenior1)*mi(y,s,a+3,senior1)+notenr(y,s,a,junior1tosenior1)*mi(y,s,a+3,juniorcompleted)]*[(1+G)/(1+R)]^3 \quad (7)$$

$$mi(y,s,a,junior2)=[senr(y,s,a,junior2tosenior1)*mi(y,s,a+2,senior1)+notenr(y,s,a,junior2tosenior1)*mi(y,s,a+2,juniorcompleted)]*[(1+G)/(1+R)]^2 \quad (8)$$

$$mi(y,s,a,junior3)=[senr(y,s,a,junior3tosenior1)*mi(y,s,a+1,senior1)+notenr(y,s,a,junior3tosenior1)*mi(y,s,a+1,junior\ completed)]*[(1+G)/(1+R)] \quad (9)$$

$$mi(y,s,a,senior1)=[senr(y,s,a,senior1tocollege1)*mi(y,s,a+3,college1)+notenr(y,s,a,senior1tocollege1)*mi(y,s,a+3,seniorcompleted)]*[(1+G)/(1+R)]^3 \quad (10)$$

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

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

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, and the age distribution of college and above are calculated by senior age distribution. For individuals who work:

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

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. We assume that anyone who begins the first year of college or university completes all years of that level if they survive.

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

where

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

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

[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, we assume that no students work.

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:

$$mi(y,s,a,higher2)=sr(y,s,a+1)*sr(y,s,a+2)*senr(y,s,a,higher2)* mi(y,s,a+2,highercompleted)*[(1+G)/(1+R)]^2 \quad (16)$$

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.

$$mi(y,s,a,university1)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)*sr(y+3,s,a+4)*mi(y,s,a+4,universitycompleted)*[(1+G)/(1+R)]^4 \quad (17)$$

$$mi(y,s,a,university2)=sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)* mi(y,s,a+3,universitycompleted)*[(1+G)/(1+R)]^3 \quad (18)$$

$$mi(y,s,a,university3)=sr(y,s,a+1)*sr(y+1,s,a+2)* mi(y,s,a+2,universitycompleted)*[(1+G)/(1+R)]^2 \quad (19)$$

$$mi(y,s,a,university4)=sr(y,s,a+1)*mi(y,s,a+1,university\ completed) *[(1+G)/(1+R)] \quad (20)$$

$$mi(y,s,a,college1) = sr(y,s,a+1)*sr(y+1,s,a+2)*sr(y+2,s,a+3)* mi(y,s,a+3,collegecompleted)*[(1+G)/(1+R)]^3 \quad (21)$$

$$mi(y,s,a,college2)=sr(y,s,a+1)*sr(y+1,s,a+2)*mi(y,s,a+2,college\ completed)*[(1+G)/(1+R)]^2 \quad (22)$$

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

Individuals in junior or senior level are assigned equations (7) to (12).

The fourth stage is individuals who are working but not in school (26-59 years old for males and 26-54 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):

$$mi_{y,s,a,e} = 0 \tag{24}$$

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:

$$MI(y) = \sum_{s}\sum_{a}\sum_{e} mi_{y,s,a,e} L_{y,s,a,e} \tag{25}$$

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:

$$LIFE(y) = \sum_{s}\sum_{a}\sum_{e} (mi_{y,s,a,e} + nmi_{y,s,a,e}) \cdot L_{y,s,a,e} \tag{26}$$

3.2 Estimate current income using Mincer models

A critical component of the income approach is the estimation of future potential earnings for all individuals in the population. To apply the J-F income-based approach, we first need real world data or their estimates for individual's annual market labor income per capita. We conduct estimation

[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.

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 2015.

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 is the Chinese Household Income Project (CHIP) for the year of 1988, 1995, 1999, 2002, 2007,2013. The fourth data set is the China Household Finance Survey (CHFS) for the year of 2010. The fifth data set is the Chinese Family Panel Studies (CFPS) for the year of 2010, 2012，2014. 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, 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.

The Chinese Household Income Project (CHIP) survey, reports income, consumption, job, production and other related information for the urban and rural populations. 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. Rural household income is mainly net agricultural income. As 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 workers 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 minus 6. We restrict the sample to males 16-60 years old and females16-55 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 is the total income in the recent year. 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 contains 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 the 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 of Taiwan. 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 the Hong Kong 1% Sample Population Census 1981, the Hong Kong 1% Sample Population By-Census 1986, the Hong Kong 5% Sample Population Census 1991, 2001 and 2011, and the 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.

3.2.1 Estimating 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 1985-2015. 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.

[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).

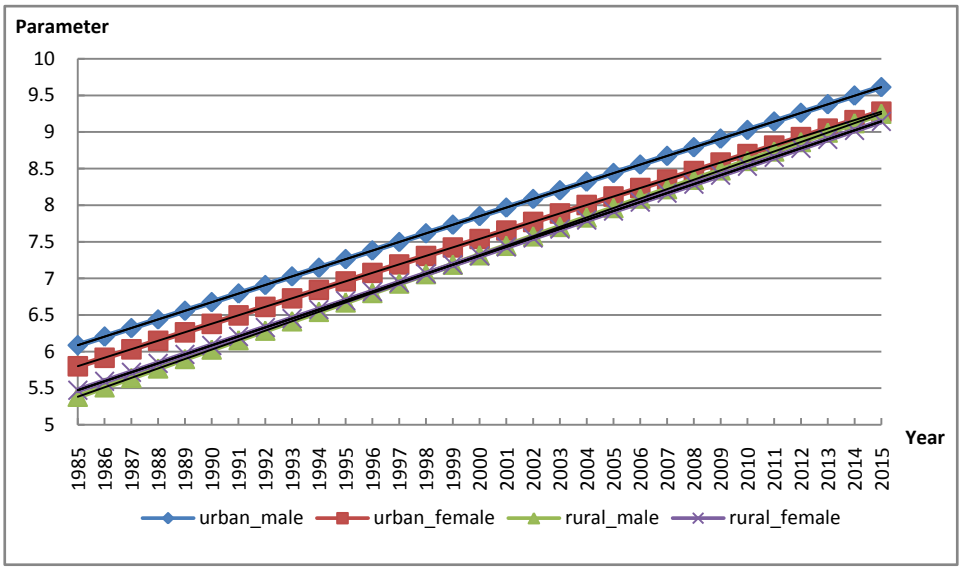


Figure 3.2.1 Mincer Intercepts by Gender and Location

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. the trends of returns to schooling are different in rural and urban. In urban area, it is positive and firstly increasing and then decreasing over the sample years, while in rural area, it continuously increases. Besides, we also find that the return rate to education for males was lower than that for female in urban areas, and the return rate to education for males is higher than that of females in rural areas. When the Soviet-type wage grid was replaced by market wages (Fleisher, Sabirianova, Wang 2005), increasing return rate to education has been a common phenomenon. But many studies recently show that return rate to education in urban areas 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 transitional economies.

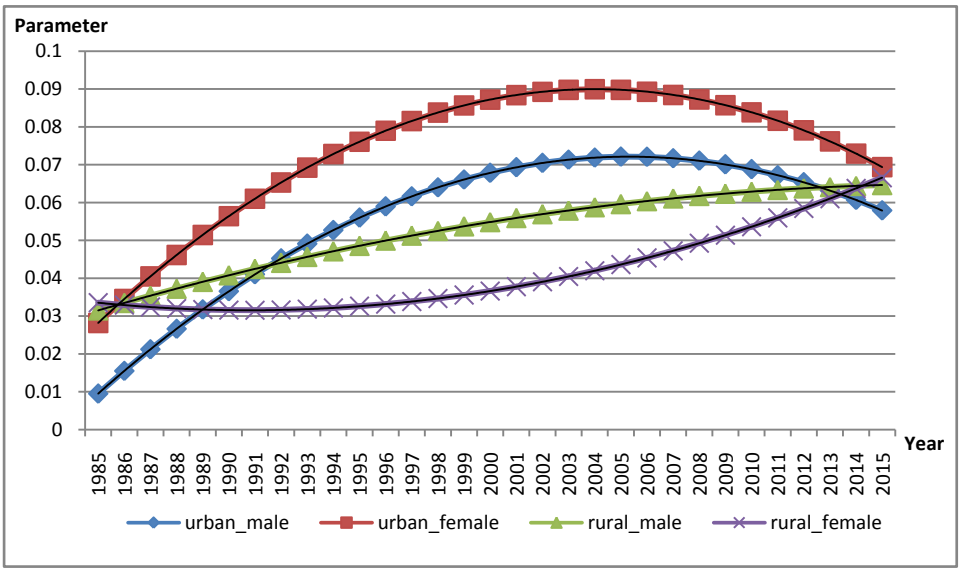


Figure 3.2.2 Rates of Return to Education by Gender and Location

We find that earnings increase with work experience but at a decreasing rate—a pattern found in most existing studies. Figures 3.2.3-3.2.6show the trends of return rate to experience by gender and region. If the curve shifts downward it means that the rate of return to experience is decreases over time. Most of the following figures shows such trends. In urban areas, return to experience for males is higher than that for females overall. In rural ares,the return to experience for males is higher than that for females in their middle years of age.

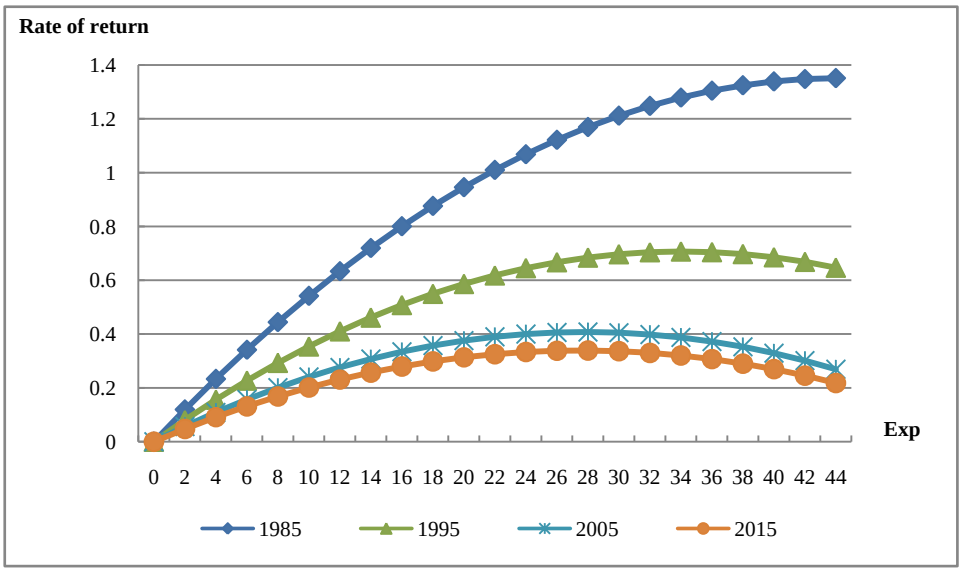


Figure 3.2.3 Return to Experience for Urban Males

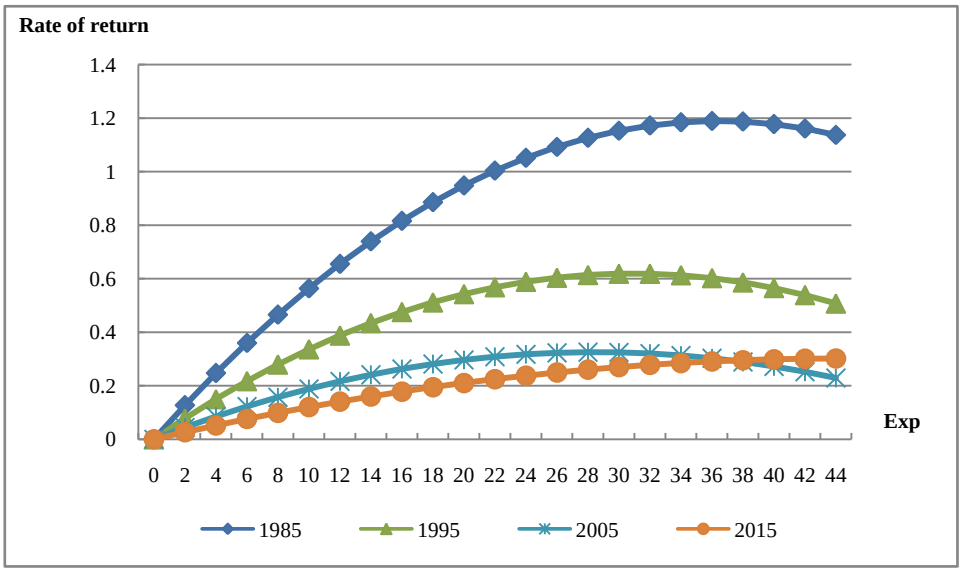


Figure 3.2.4 Return to Experience for Urban Females

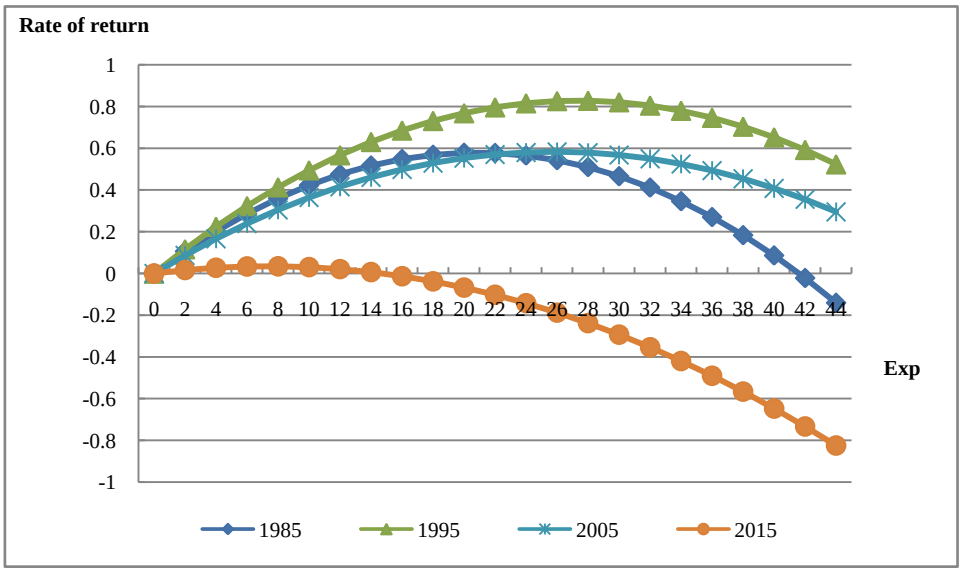


Figure 3.2.5 Return to Experience for Rural Males

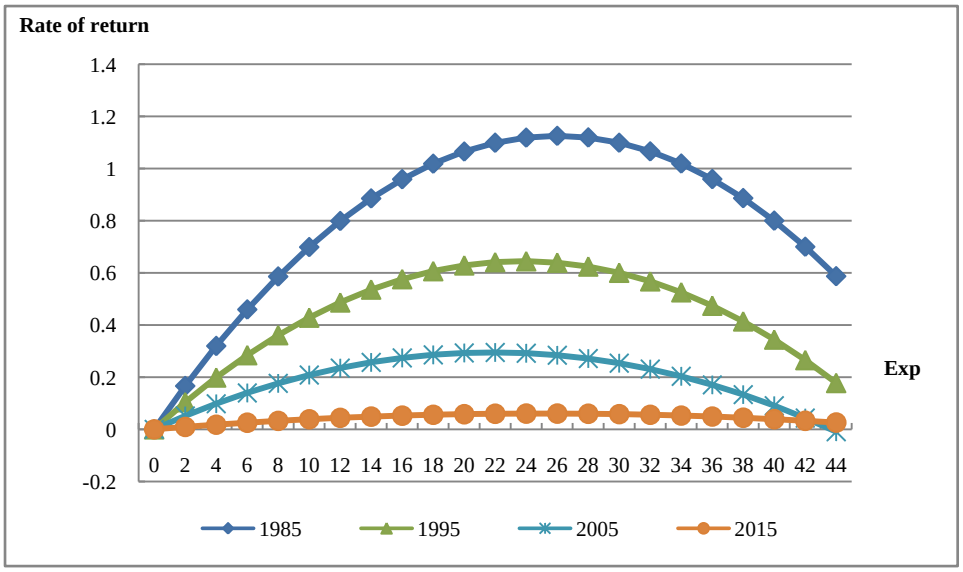


Figure 3.2.6 Return to Experience for Rural Females

3.2.2 Estimating 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:

$$\ln(inc) = \beta_0 + \beta_1 \cdot \ln(Avwage) + \beta_2 \cdot Sch + \beta_3 \cdot Sch \cdot \mathrm{A}vgdp + \beta_4 \cdot Sch \cdot Ratio + \beta_5 \cdot Exp + \beta_6 \cdot Exp^2 + \mu$$

（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 Exp^2 across all provinces; we use the same way in estimations for females.

As in the 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 more accurate. 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 2015. 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*, Exp^2 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 (1982-2015) 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.

For Hong Kong, we have data of the number of first grade students in school by age, sex, and education from 1990 to 2015. Thus, we could compute age distribution by using the number of students of first grade in school. The data before 1990 is replaced by the data in 1990.

For Taiwan, we have data of the number of first grade students in school by age, sex, and education from 1985 to 2015. Thus, we compute age distribution by using the number of students of first grade in school.

3.3.2 Survival rate

We obtain survival rates (1-death rate) by age, sex and region. 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.

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.

For Taiwan, the data sources of growth rate are Taiwan Life Tables. We obtain survival rates (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 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 devide 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. 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 and t are described in Appendix A.

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 example, 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 data from census years of 1987, 1995, 2000, 2005 and 2010 and replace middle years' employment rates by the average of these years.

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 education in 1987	"China Population Census 1987"
Population by age, sex and education in 1987	"China Population Census 1987"

Data	Sources
The employed by age, sex and education in 1995	"China Population Census 1995"
Population by age, sex and education in 1995	"China Population Census 1995"
The employed by age, sex and education in 2000	"China Population Census 2000"
Population by age, sex and education in 2000	"China Population Census 2000"
The employed by age group, sex and education in 2005	"China Population and Employment Statistics Yearbook 2006"
Population by age, sex and education in 2005	"China Population Census 2005"
The employed by age group, sex and education in 2010	"China Population and Employment Statistics Yearbook 2011"
Population by age, sex and education in 2010	"China Population Census 2010"

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

Employed individuals in China Population Census 2000 for each province, autonomous region and municipality directly under the central government are aggregated to the whole population by the actual sampling percentage of 9.5%. To divide the age group data in 2005 and 2010 we assume that the employment rate in each age in the same age group has the same increasing rate. For example , the employment rate of a 25-year-old individual in 2005 equals to the employment rate of a 25-year-old individual in 2000 times the growth rate of the employment rate of the individual's corresponding age group (25-29) between 2000 and 2005.

For Taiwan, employment rate $empr(y,s,a,e)$ includes data by age, sex and education for individuals older than 15 from 1985 to 2015. 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 Hong Kong, employment rate $empr(\mathrm{y}, \mathrm{s}, \mathrm{a}, \mathrm{e})$ includes data by age, sex and education for individuals older than 15 from 1990 to 2015.

The formula used to calculate the employment rate is:

$$\mathrm{empr}(\mathrm{y}, \mathrm{s}, \mathrm{a}, \mathrm{e}) = [\mathrm{employed}(\mathrm{y}, \mathrm{s}, \mathrm{a}, \mathrm{e})]/\mathrm{pop}(\mathrm{y}, \mathrm{s}, \mathrm{a}, \mathrm{e})$$

The data before 1990 is replaced by the data in 1990.

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. The 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.

Our calculations show that for the 30-year period from 1985 to 2015, the

[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.

growth rate is on average 6.14% and 8.57% annually in the rural and urban sectors, respectively. Those growth rates will be used in the J-F calculation.[9]

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	9.97%	Zhejiang	7.46%
Shanghai	9.59%	Fujian	7.29%
Tibet	9.18%	Henan	7.23%
Tianjin	9.09%	Shandong	6.86%
Anhui	9.04%	Hebei	6.81%
Zhejiang	8.97%	Jilin	6.79%
Inner Mongolia	8.87%	Jiangsu	6.76%
Shandong	8.78%	Heilongjiang	6.59%
Hainan	8.64%	Tianjin	6.59%
Hubei	8.63%	Jiangxi	6.58%
Sichuan	8.61%	Guangxi	6.55%
Guizhou	8.60%	Sichuan	6.48%
Chongqing	8.58%	Anhui	6.36%
Jiangsu	8.49%	Chongqing	6.36%
Fujian	8.37%	Inner Mongolia	6.21%
Hebei	8.33%	Guangdong	6.20%

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

Province	Urban	Province	Rural
Guangxi	8.30%	Shaanxi	6.09%
Jiangxi	8.27%	Liaoning	6.08%
Jilin	8.20%	Hubei	6.06%
Xinjiang	8.15%	Ningxia	6.01%
Liaoning	8.09%	Shanxi	5.88%
Henan	8.03%	Henan	5.56%
Ningxia	8.02%	Gansu	5.47%
Guangdong	8.02%	Hunan	5.44%
Shaanxi	8.01%	Yunnan	5.39%
Heilongjiang	7.98%	Guizhou	5.34%
Shanxi	7.80%	Beijing	5.11%
Yunnan	7.79%	Xinjiang	5.02%
Hunan	7.68%	Qinghai	4.91%
Gansu	7.17%	Tibet	4.40%
Qinghai	6.09%		

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 2.99% annually in Hong Kong.

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

Data	Sources
Consumer Price Index (1960-2015, 2010=100)	Taiwan Directorate General of Budget, Accounting and Statistics
Regular salary (1980-2015)	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 2.59% 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

[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.

years in China from 1996 to 2009, 5.51%[11], and the social discount rate based on the method from the World Bank, 8.14%.[12]

The 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), and we adopt it as well.

[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.

[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

To implement the estimation of human capital as outlined in Chapter 3, we need annual population data by age, sex, and educational attainment, we use the following procedures. 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. These sources contain disaggregated data for urban and rural populations categorized by age and gender. For all other years, 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:: 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 the 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.

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

$$L(y,e,a,s)=L(y-1,e,a,s)*(1-\delta(y,a,s))+IF(y,e,a,s)-OF(y,e,a,s)+EX(e,a,s) \quad (13)$$

$L(y, e, a, s)$ 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,

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

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

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

ERS is the matriculation at 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, 2003-2014). Details can be found in Appendix A.

4.2Trend 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). During our sample period, China's total population increased from 1.008 billion in 1982 to 1.383 billion in 2015. The urban population increased by 585 million, while the rural population decreased by183 million (Figure4.2.1).

[1] For example, the discrepancy can be caused by migration, but we do not have the data.

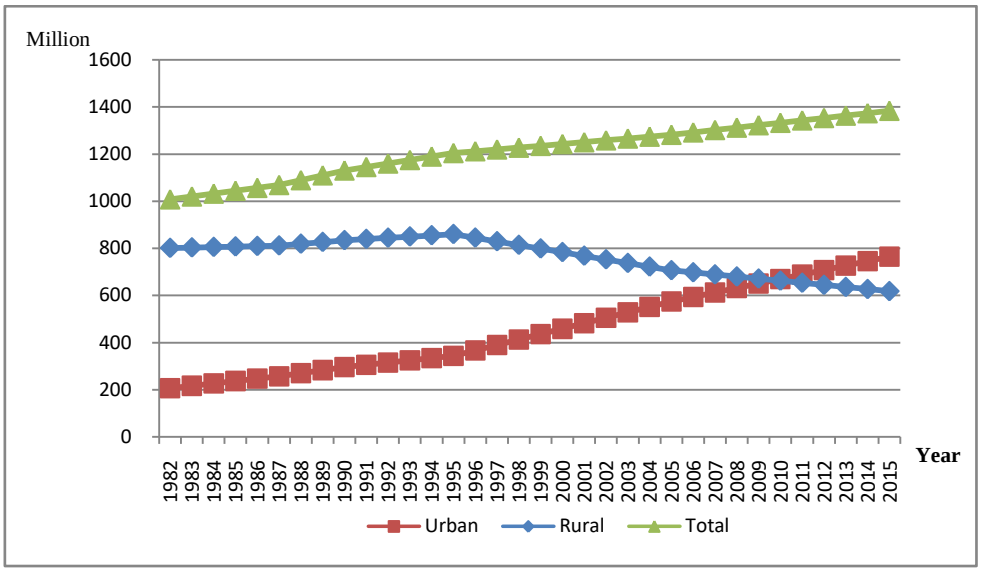


Figure 4.2.1 Population in China by Region 1982-2015

Figure 4.2.2-4.2.4 show the trend of national, urban and rural population classified by educational attainment from 1982 to 2015. The illiterate population fell by half from 406 million in 1982 to 196 million in 2000, but it was relatively stable from 2000 to 2015. The number of primary school graduates increased from 358 million in 1982 to the peak of 465 million in 1995, then declined gradually to 355 million in 2015. 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 grew most among all education levels, increasing from 167 million in 1982 to 502 million in 2015. Senior middle school graduates increased from 66 million in 1982 to 203 million in 2015, while college and above increased from only 6 million in 1982 to 147 million in 2015.. The numbers of these two education levels have remained a 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 population, the increased population in these 16 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.

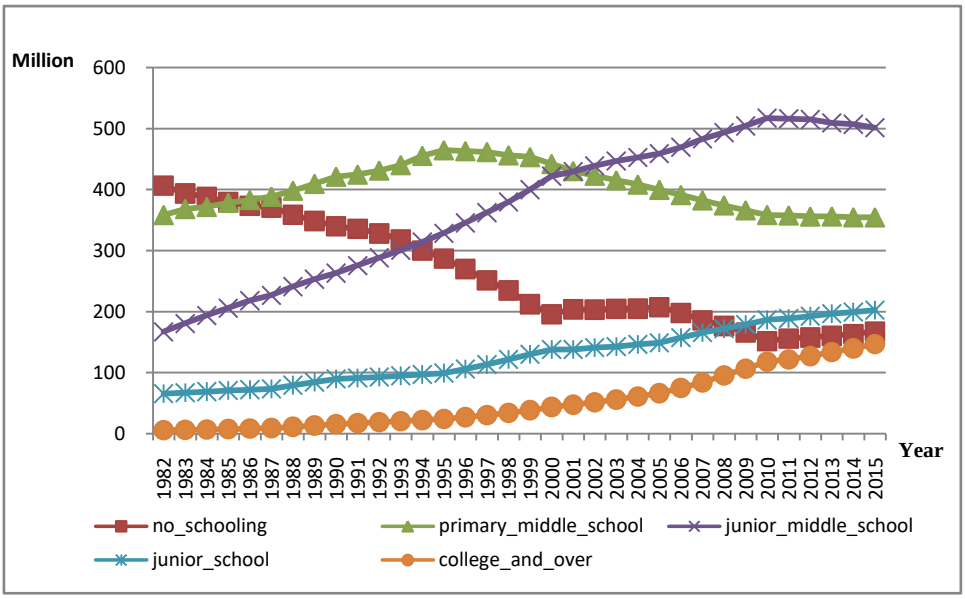


Figure 4.2.2 Population by Education Attainment in China 1982-2015

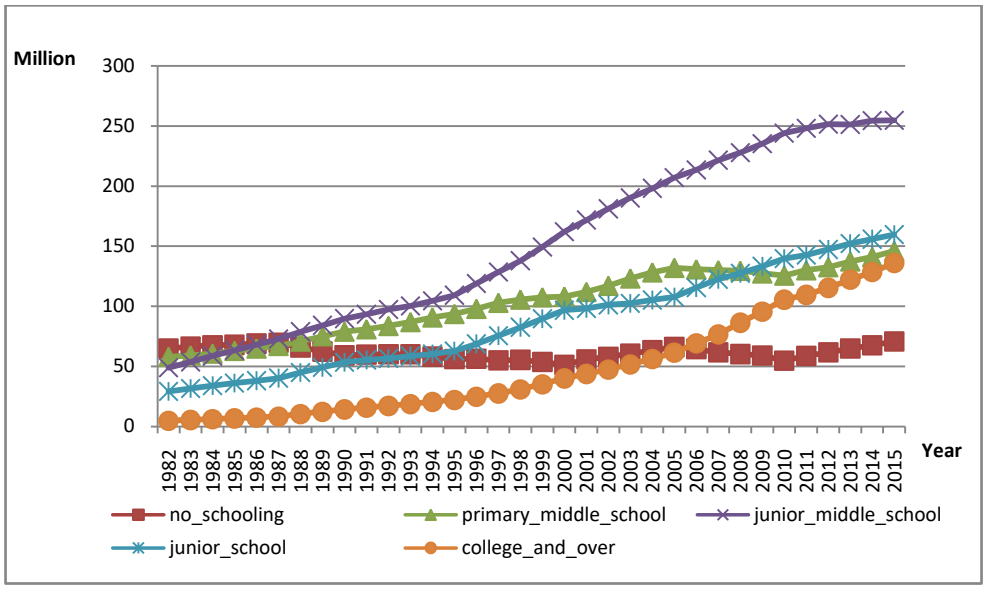


Figure 4.2.3 Urban Population by Educational Attainment 1982-2015

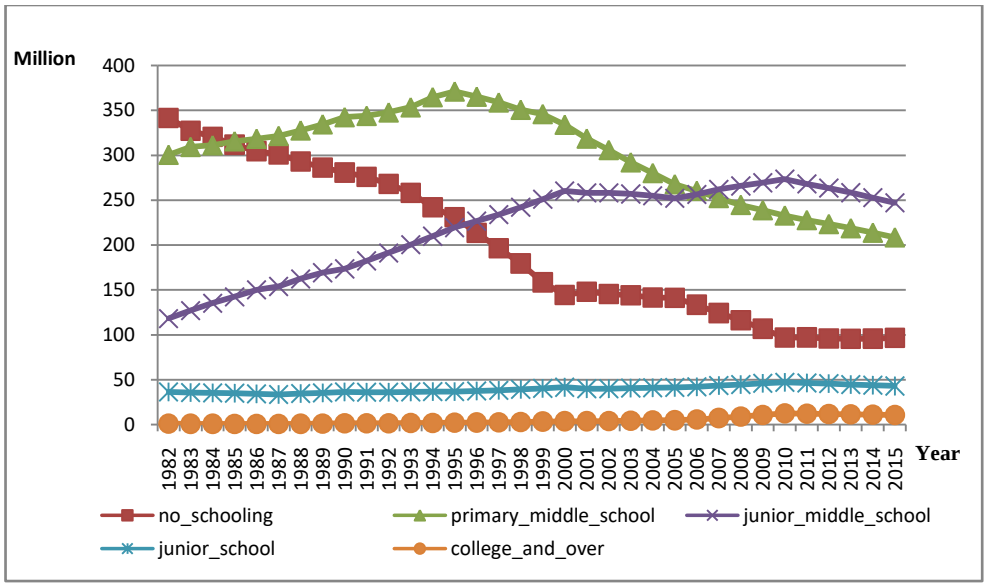


Figure 4.2.4 Rural Population by Educational Attainment 1982-2015

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 illustrate the increase in educational attainment over time.. In 1985, among the five education levels, the proportion of the illiterate population ,those 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 had become the dominant education level. Female educational attainment has increased 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.

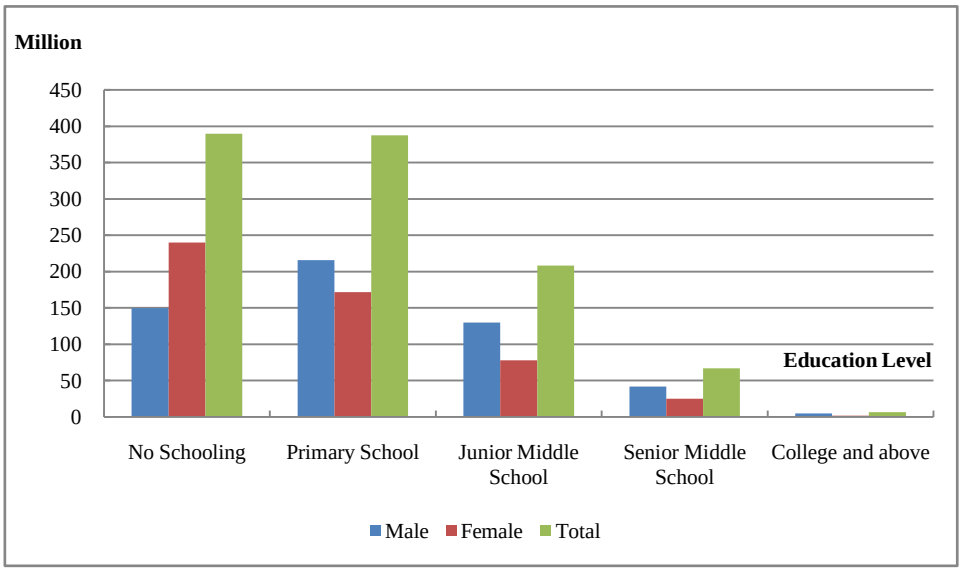


Figure 4.2.5 Population of Different Educational Levels by Gender, 1985

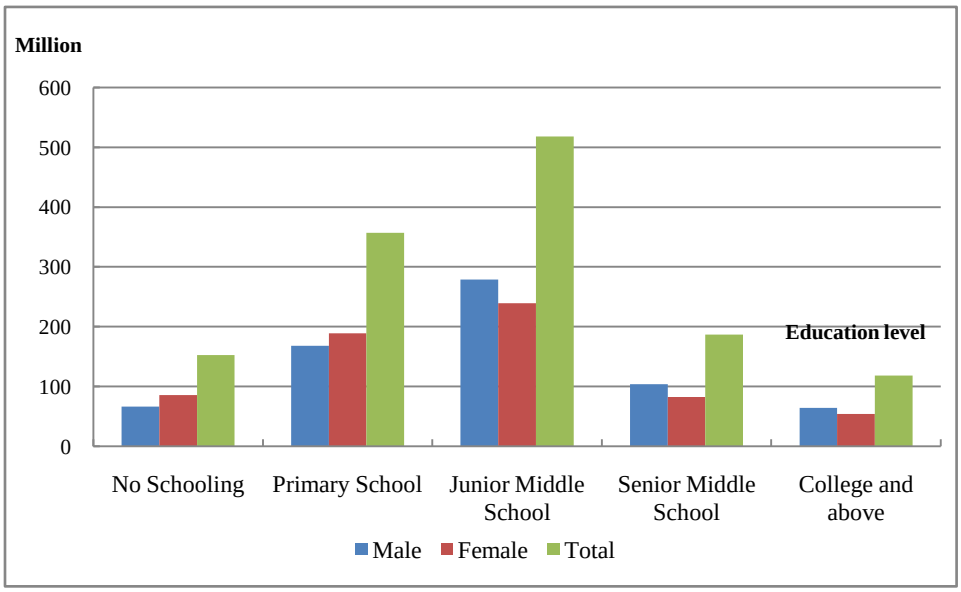


Figure 4.2.6 Population of Different Educational Levels by Gender, 1995

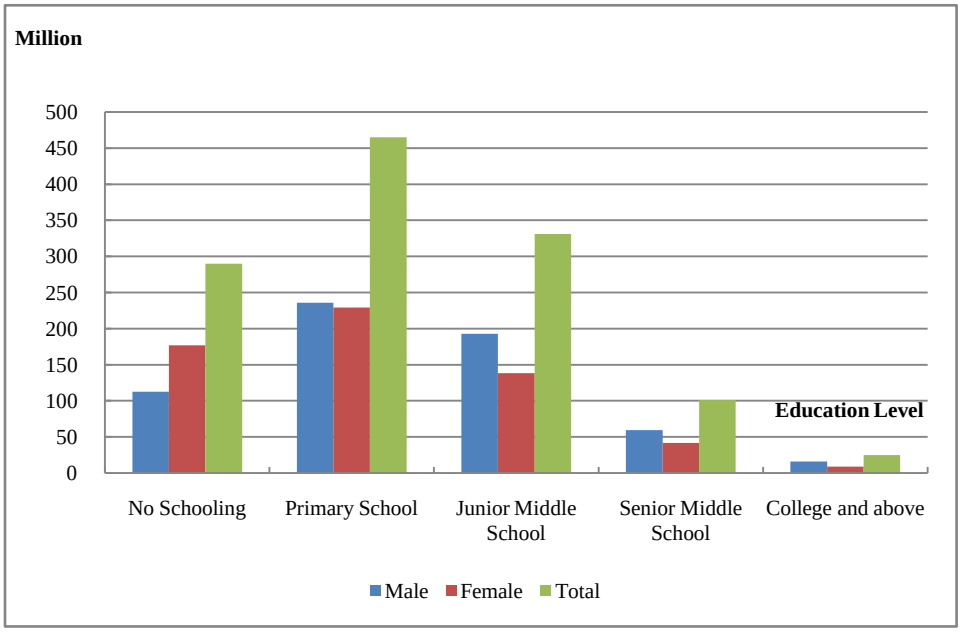


Figure 4.2.7 Population of Different Educational Levels by Gender, 2010

Chapter5 Age and Education of Labor Force

We calculate the provincial average age of the 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: population 16-59 years old

Female: population 16-54 years old

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

Table5.1.1 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

Table5.1.2 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

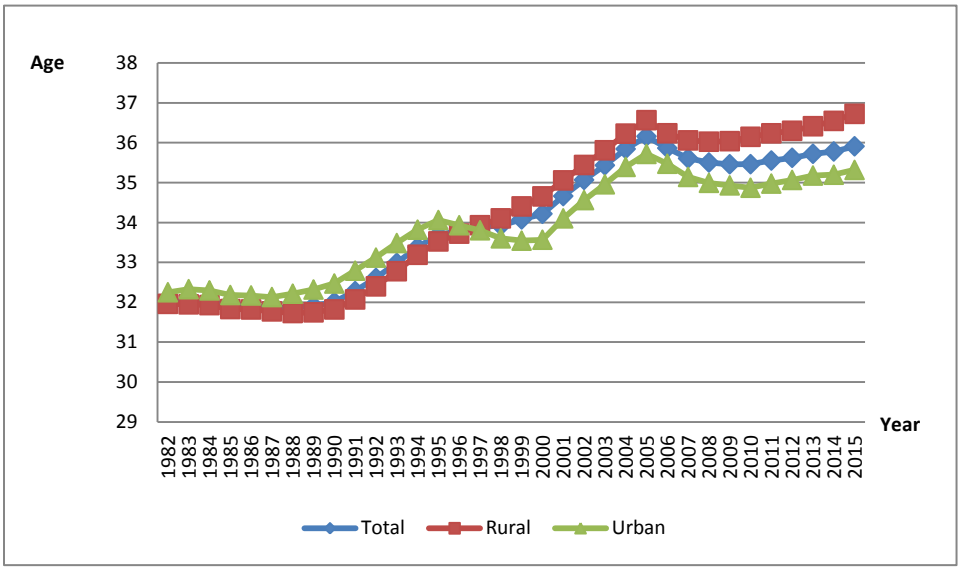


Figure5.2.1 Average Age of National Labor Force(By census data and 1% sample data)

Figure 5.2.1 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. Taking the 2005 1%-sample data as an example, the population with high school and higher education level in 2000 is 182.2 million while that in 2005 is 215.6 million, indicating a population increase of 33.4 million. Reported high school enrollment increased by 55.98 million between 2001 and 2005, implying a number of deaths equal to 22.59 million, which accounts for 12.40% of the population with that education level in 2000.Also, from the 1%-sample data of 2005, the population of men at the age between 20 to 24 is 38.2 million while that in 2010 is 50.8 million, which suggests a population increase of 12.7 million. There should be a population decrease in 2010 when the death factor is taken into consideration. It seems that there is unreasonable data of age structures and education levels in 2005.

Therefore, we use only census data to generate the new result.

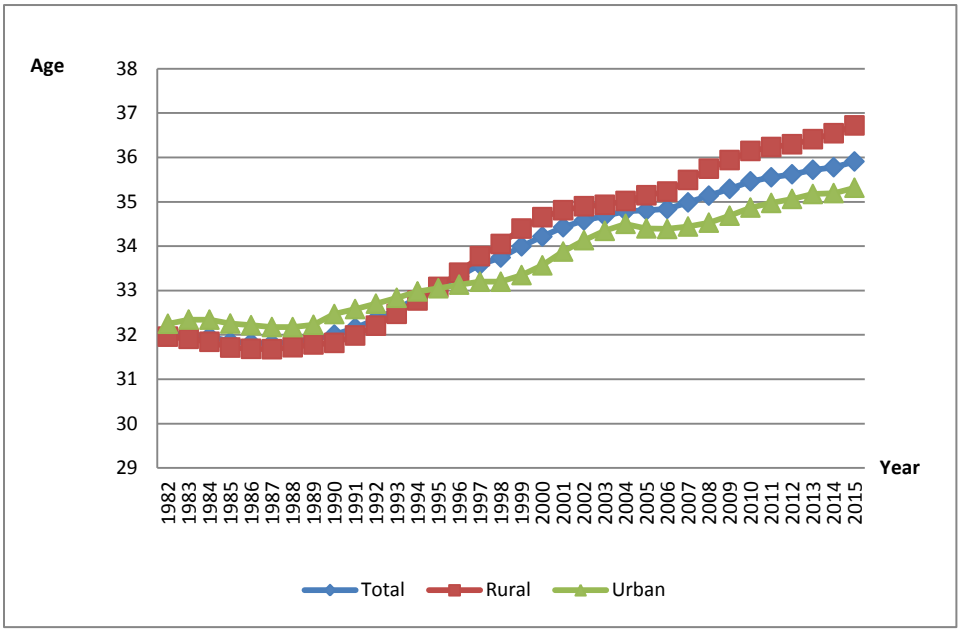


Figure5.2.2 Average Age of National Labor Force(By census data)

Figure 5.2.2 shows the upward trend in average age of labor force from 1982 to 2015 in Mainland China. The average age increases in both rural and urban areas.. After 1995, the urban labor force average age fell beneath that of rural areas due to rural-urban labor force immigration.

Table 5.2.1 Average Age of National Labor Force（1982-2015）

Unit：Year (of age)

Year	Average Age of Labor Force		
	Total	**Urban**	**Rural**
1982	32.03	32.25	31.96
1983	32.01	32.34	31.91
1984	31.97	32.34	31.84
1985	31.85	32.26	31.71
1986	31.82	32.22	31.68
1987	31.81	32.18	31.68
1988	31.84	32.17	31.72
1989	31.91	32.23	31.78
1990	32.01	32.47	31.82
1991	32.16	32.58	31.98
1992	32.35	32.70	32.21
1993	32.58	32.84	32.47
1994	32.83	32.98	32.77
1995	33.07	33.05	33.08
1996	33.32	33.13	33.40
1997	33.58	33.20	33.77
1998	33.74	33.20	34.05
1999	34.00	33.35	34.40
2000	34.22	33.57	34.65
2001	34.43	33.88	34.81
2002	34.58	34.13	34.90
2003	34.68	34.34	34.93
2004	34.79	34.50	35.02
2005	34.81	34.40	35.15
2006	34.84	34.39	35.23
2007	34.99	34.44	35.49
2008	35.14	34.53	35.75
2009	35.29	34.69	35.94
2010	35.46	34.87	36.15
2011	35.55	34.97	36.23
2012	35.62	35.06	36.30
2013	35.72	35.18	36.41
2014	35.78	35.20	36.55

Year	Average Age of Labor Force		
	Total	Urban	Rural
2015	35.91	35.32	36.72

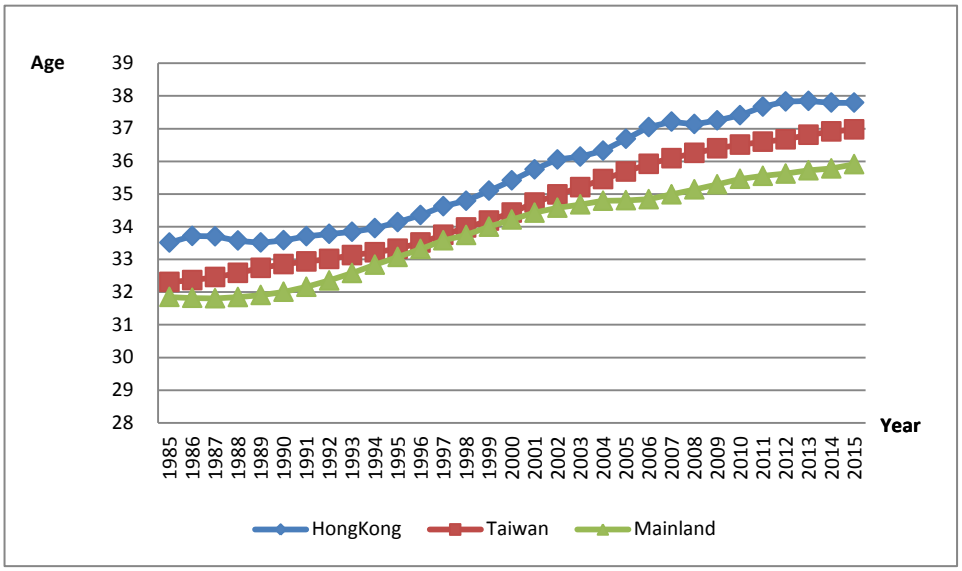


Figure5.2.3 Average Age of Labor Force in Mainland, Hong Kong and Taiwan

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 increased from 34 in 1985 to 38 in 2015, while that of Taiwan increased from 32 in 1985 to 37 in 2015. The labor force average age of Taiwan lies between that of Hong Kong and Mainland China.

Table5.2.2 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	31.85
1986	33.71	32.36	31.82

Year	Average Age of Labor Force		
	Hong Kong	Taiwan	Mainland
1987	33.70	32.46	31.81
1988	33.57	32.58	31.84
1989	33.51	32.74	31.91
1990	33.58	32.85	32.01
1991	33.71	32.93	32.16
1992	33.78	33.01	32.35
1993	33.84	33.13	32.58
1994	33.95	33.21	32.83
1995	34.14	33.32	33.07
1996	34.35	33.51	33.32
1997	34.62	33.75	33.58
1998	34.79	33.97	33.74
1999	35.10	34.18	34.00
2000	35.41	34.43	34.22
2001	35.75	34.73	34.43
2002	36.05	34.98	34.58
2003	36.14	35.20	34.68
2004	36.32	35.45	34.79
2005	36.68	35.68	34.81
2006	37.04	35.92	34.84
2007	37.21	36.09	34.99
2008	37.14	36.25	35.14
2009	37.25	36.39	35.29
2010	37.41	36.51	35.46
2011	37.67	36.60	35.55
2012	37.83	36.67	35.62
2013	37.84	36.81	35.72
2014	37.79	36.91	35.78
2015	37.79	36.97	35.91

5.3 Average Years of Schooling of National Labor Force

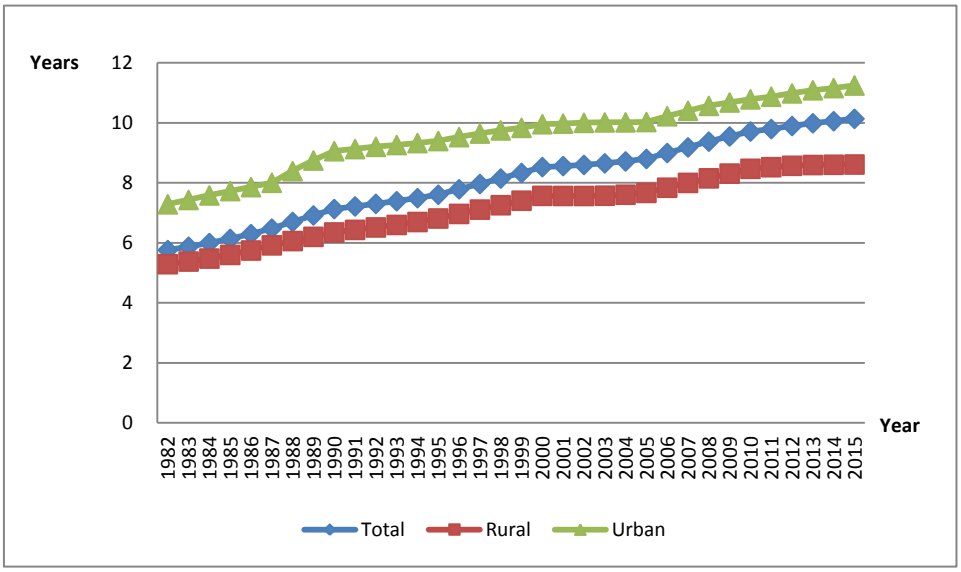


Figure5.3.1 Average Years of Schooling of National Labor Force(by census data and 1%-sample data)

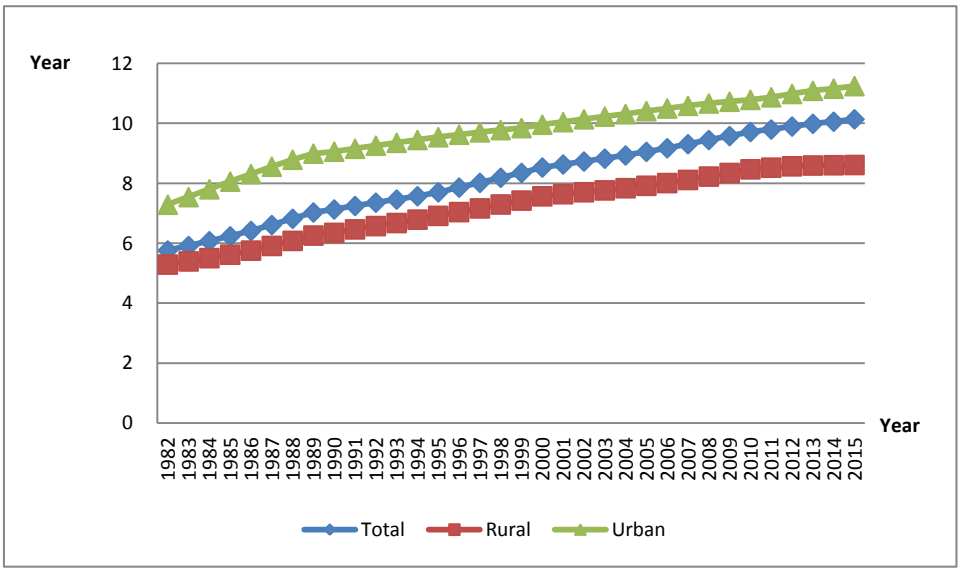


Figure5.3.2 Average Years of Schooling of National Labor Force(by census data)

Figure 5.3.1 shows average schooling years of the national labor force., Although we use census data and the 1%-sample data to obtain this result, there exists unreasonable data of age structures and education levels in 1987, 1995 and 2005. Thus we use only census data to obtain the modified data shown in figure 5.3.2. Figure 5.3.2 shows the upward trend in average schooling years of national labor force from 1982 to 2015. The national average years of schooling increased from 5.76 years in 1982 to 10.14 in 2015. The rural average years of schooling increased from 5.29 in 1982 to 8.62 in 2015 while the urban average years increase from 7.29 to 11.25 during the same period.

Table5.3.1 Average Years of Schoolingof National Labor Force(1982-2015)

Unit: Year

Year	Average Years of Schooling		
	Total	**Urban**	**Rural**
1982	5.76	7.29	5.29
1983	5.91	7.54	5.40
1984	6.07	7.80	5.51
1985	6.23	8.06	5.62
1986	6.41	8.31	5.76
1987	6.61	8.56	5.92
1988	6.82	8.79	6.08
1989	7.03	8.99	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	9.70	7.17
1998	8.19	9.78	7.30

Year	Average Years of Schooling		
	Total	Urban	Rural
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	10.23	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	10.87	8.53
2012	9.90	10.99	8.57
2013	9.99	11.09	8.60
2014	10.06	11.16	8.61
2015	10.14	11.25	8.62

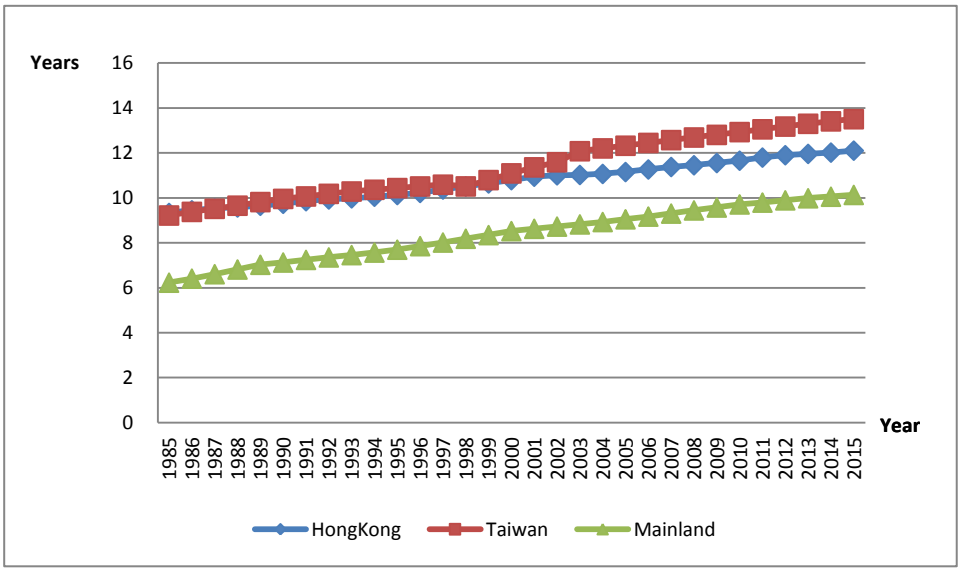


Figure 5.3.3 Average Years of Schooling of Labor Force in Mainland, Hong Kong and Taiwan

Figure5.3.3 and 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 12.11 in 2015 while that of Taiwan increased from 9.22 in 1982 to 13.51 in 2015. The labor force years of schooling of Hong Kong and Taiwan are similar in 1985-2000, and both of them are significantly higher than in the Mainland.

Table5.3.2 Average Years of Schooling of Labor Force in Mainland, Hong Kongand Taiwan

Unit: Year

Year	Average Years of Schooling		
	Hong Kong	**Taiwan**	**Mainland**
1985	9.34	9.22	6.23
1986	9.45	9.38	6.41
1987	9.53	9.52	6.61
1988	9.58	9.66	6.82
1989	9.66	9.82	7.03
1990	9.74	9.96	7.13
1991	9.86	10.07	7.25
1992	9.94	10.19	7.36
1993	9.99	10.29	7.46
1994	10.06	10.37	7.57
1995	10.13	10.44	7.70
1996	10.23	10.51	7.86
1997	10.38	10.59	8.02
1998	10.51	10.52	8.19
1999	10.65	10.80	8.35
2000	10.80	11.10	8.53
2001	10.95	11.37	8.63
2002	11.01	11.59	8.73
2003	11.03	12.08	8.83
2004	11.07	12.21	8.93

Year	Average Years of Schooling		
	Hong Kong	Taiwan	Mainland
2005	11.16	12.33	9.05
2006	11.27	12.45	9.17
2007	11.38	12.58	9.31
2008	11.46	12.69	9.45
2009	11.56	12.81	9.58
2010	11.66	12.93	9.72
2011	11.80	13.06	9.80
2012	11.90	13.18	9.90
2013	11.96	13.30	9.99
2014	12.02	13.41	10.06
2015	12.11	13.51	10.14

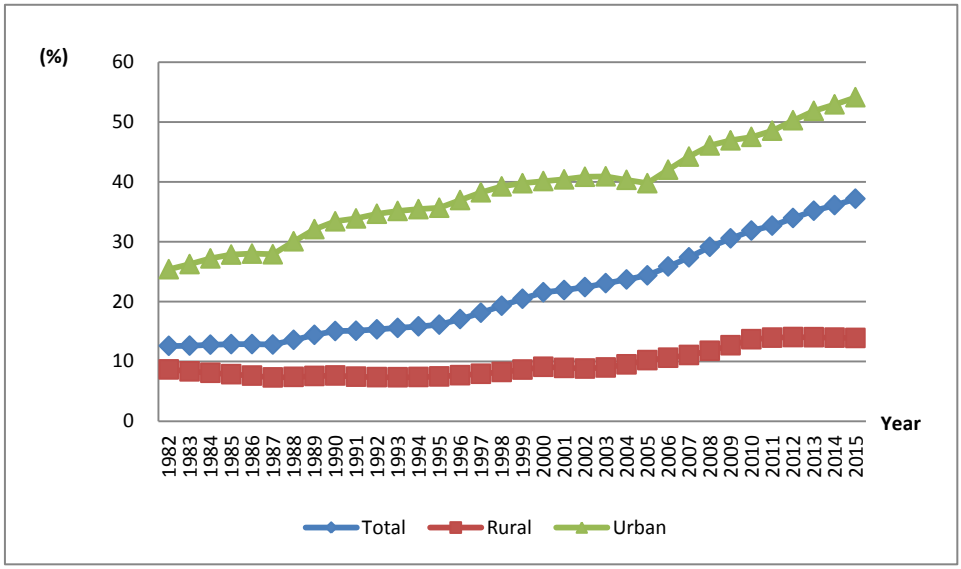


Figure5.3.4 Proportions of High School and Above in Labor Force(By census data and 1%-sample data)

Figure 5.3.4 shows the proportions of workers with education level high school and above in labor force. We use census data and 1%-sample data to obtain this result, but because of data anomalies discussed above, we also use only census data to obtain modified results reported in Figure 5.3.5.

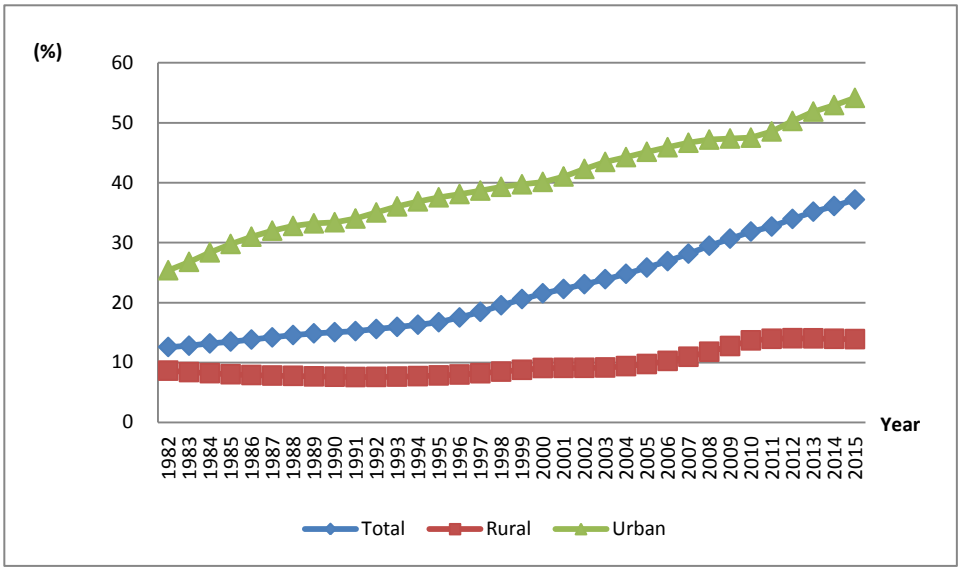


Figure5.3.5 Proportions of High School and Above in Labor Force (By census data)

Figure 5.3.5 shows the upward trend in the proportions of high school and above in labor force. The national proportion of workers with at least high-school education increased from 12% in 1982 to 37% in 2015, and in the rural proportion it increased from 8% in 1982 to 14% in 2015, while the comparable data for the urban population increased from 25% to 54%.

Table5.3.3 National Proportions of High School and Above of National Labor Force (1982-2015)

Unit:%

Year	Proportions of High School and Above		
	Total	**Urban**	**Rural**
1982	12.58	25.39	8.64
1983	12.80	26.78	8.40
1984	13.17	28.37	8.22
1985	13.49	29.77	8.04
1986	13.83	30.98	7.91

Year	Proportions of High School and Above		
	Total	Urban	Rural
1987	14.19	31.99	7.82
1988	14.58	32.77	7.77
1989	14.86	33.20	7.68
1990	15.05	33.39	7.63
1991	15.23	34.01	7.57
1992	15.58	35.02	7.59
1993	15.94	36.03	7.64
1994	16.30	36.87	7.72
1995	16.71	37.55	7.84
1996	17.51	38.09	7.99
1997	18.44	38.67	8.21
1998	19.54	39.30	8.48
1999	20.58	39.72	8.78
2000	21.54	40.12	9.08
2001	22.26	41.02	9.10
2002	23.06	42.29	9.11
2003	23.90	43.45	9.16
2004	24.79	44.26	9.39
2005	25.83	45.14	9.74
2006	26.90	45.90	10.26
2007	28.15	46.65	10.95
2008	29.47	47.18	11.79
2009	30.66	47.36	12.74
2010	31.84	47.50	13.69
2011	32.67	48.54	13.95
2012	33.95	50.29	14.04
2013	35.16	51.85	14.02
2014	36.10	52.94	13.95
2015	37.17	54.13	13.90

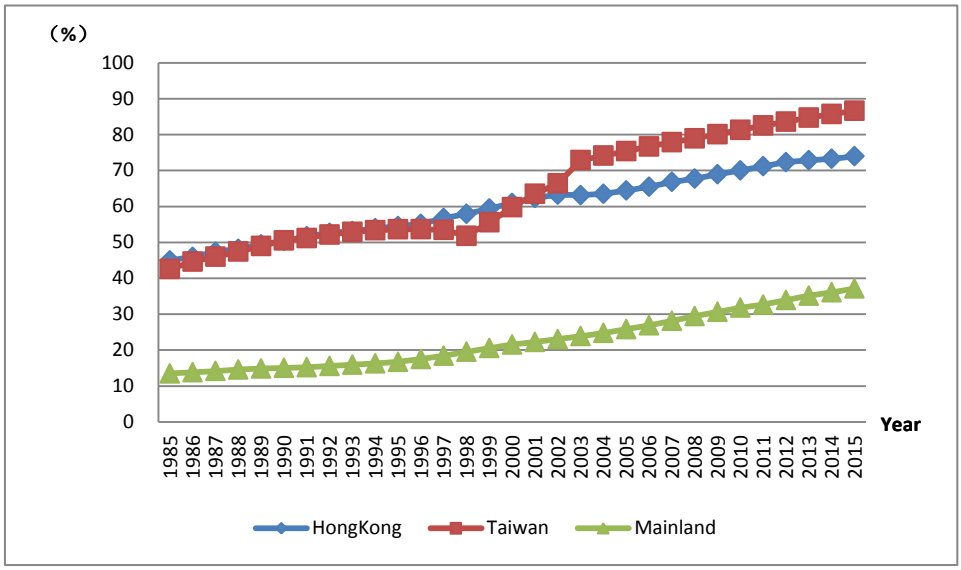


Figure 5.3.6 Proportions of High School Education and Above in Labor Force of Mainland, Hong Kong and Taiwan

Figures 5.3.6 and Table 5.3.4 show the trends in proportions of population with high school educational attainment and above in the labor forces of Mainland, Hong Kong and Taiwan. The proportion in Hong Kong increases from 44.96% in 1985 to 74.00% in 2015 while that of Taiwan increases from 42.60% in 1985 to 86.66% in 2015. The proportion in Hong Kong is greater than that in Taiwan before 2001, but smaller since 2001; the proportions in both regions always exceed that in Mainland China.

Table5.3.4 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	13.49
1986	45.95	44.64	13.83

Year	Proportions of High School Education and Above		
	Hong Kong	Taiwan	Mainland
1987	47.36	46.01	14.19
1988	48.20	47.44	14.58
1989	49.42	48.99	14.86
1990	50.44	50.54	15.05
1991	51.69	51.19	15.23
1992	52.65	52.17	15.58
1993	53.13	52.91	15.94
1994	53.93	53.38	16.30
1995	54.52	53.65	16.71
1996	55.15	53.67	17.51
1997	56.77	53.48	18.44
1998	57.94	51.82	19.54
1999	59.43	55.60	20.58
2000	60.97	59.80	21.54
2001	62.38	63.52	22.26
2002	63.28	66.42	23.06
2003	63.15	72.91	23.90
2004	63.52	74.17	24.79
2005	64.46	75.41	25.83
2006	65.49	76.70	26.90
2007	66.85	77.91	28.15
2008	67.76	78.96	29.47
2009	68.96	80.12	30.66
2010	70.05	81.33	31.84
2011	71.21	82.56	32.67
2012	72.34	83.62	33.95
2013	72.88	84.74	35.16
2014	73.29	85.75	36.10
2015	74.00	86.66	37.17

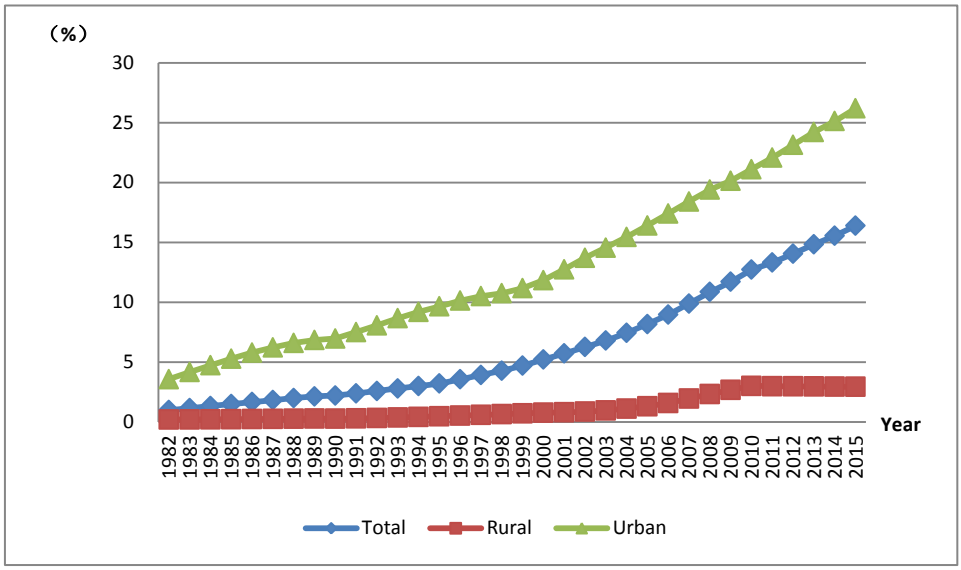


Figure 5.3.7 National Proportions of College Education and Above of National Labor Force(By census data and 1%-sample data)

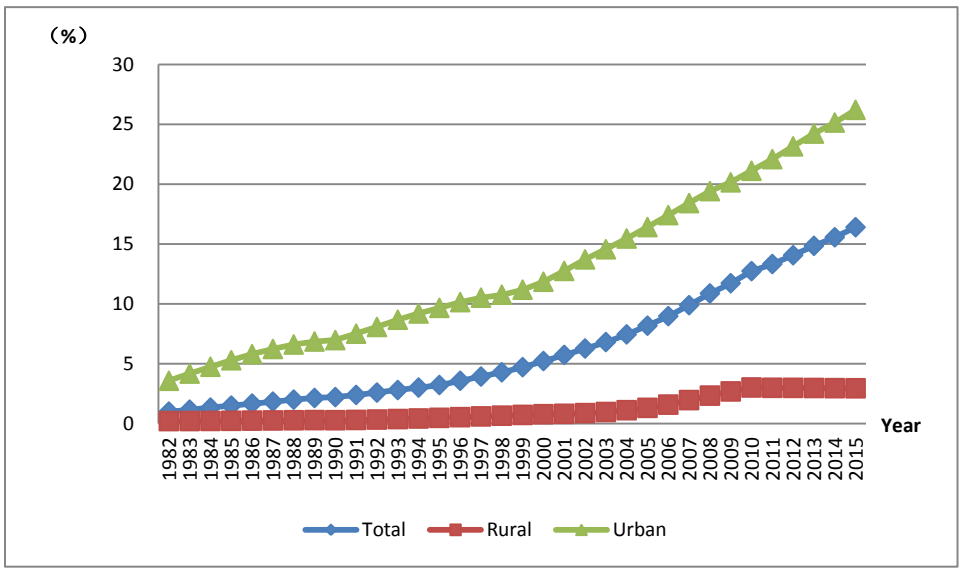


Figure 5.3.8 National Proportions of College Education and Above of National Labor Force(By census data)

Figure 5.3.7 shows proportion workers with education of college and above in labor force. We use census data and the 1%-sample data to obtain these results, but again because of unreasonable data of age structures and education levels in 1987, 1995 and 2005, we report modified results in Figure 5.3.8. Figure 5.3.8 shows national proportion of workers with schooling of college and above in the labor force increased from 0.9% in 1982 to 16% in 2015.Among the rural proportion it increased from 0.2% in 1982 to 3% in 2015 while in the urban proportion the proportion increased from 4% to 26%. The trend is consistent with the improvement and expansion of higher education in China.

Table 5.3.5 National Proportions of College and Above of National Labor Force(1982-2015)

Unit:%

Year	Proportions of College and Above		
	Total	**Urban**	**Rural**
1982	0.99	3.57	0.20
1983	1.15	4.17	0.20
1984	1.32	4.73	0.21
1985	1.49	5.28	0.22
1986	1.66	5.79	0.24
1987	1.82	6.22	0.25
1988	1.99	6.60	0.26
1989	2.13	6.84	0.28
1990	2.20	6.96	0.27
1991	2.38	7.50	0.29
1992	2.58	8.06	0.32
1993	2.79	8.67	0.37
1994	2.99	9.19	0.41
1995	3.21	9.66	0.46
1996	3.56	10.14	0.52
1997	3.92	10.51	0.59

Year	Proportions of College and Above		
	Total	Urban	Rural
1998	4.27	10.75	0.65
1999	4.70	11.18	0.71
2000	5.21	11.84	0.77
2001	5.73	12.74	0.80
2002	6.26	13.71	0.86
2003	6.80	14.55	0.95
2004	7.44	15.45	1.10
2005	8.17	16.41	1.30
2006	8.96	17.41	1.57
2007	9.88	18.41	1.95
2008	10.86	19.41	2.32
2009	11.71	20.14	2.67
2010	12.73	21.11	3.00
2011	13.32	22.08	2.98
2012	14.05	23.15	2.97
2013	14.84	24.22	2.96
2014	15.56	25.14	2.94
2015	16.40	26.20	2.94

Figures 5.3.9 and Table5.3.6 show the trends in the proportions of workers with college educational attainment and above in labor force of Mainland, Hong Kong and Taiwan. The proportion in Hong Kong increased from 10.09% in 1985 to 39.48% in 2015while that in Taiwan increased from12.67% in 1985 to 52.56% in 2015. The proportion in 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.

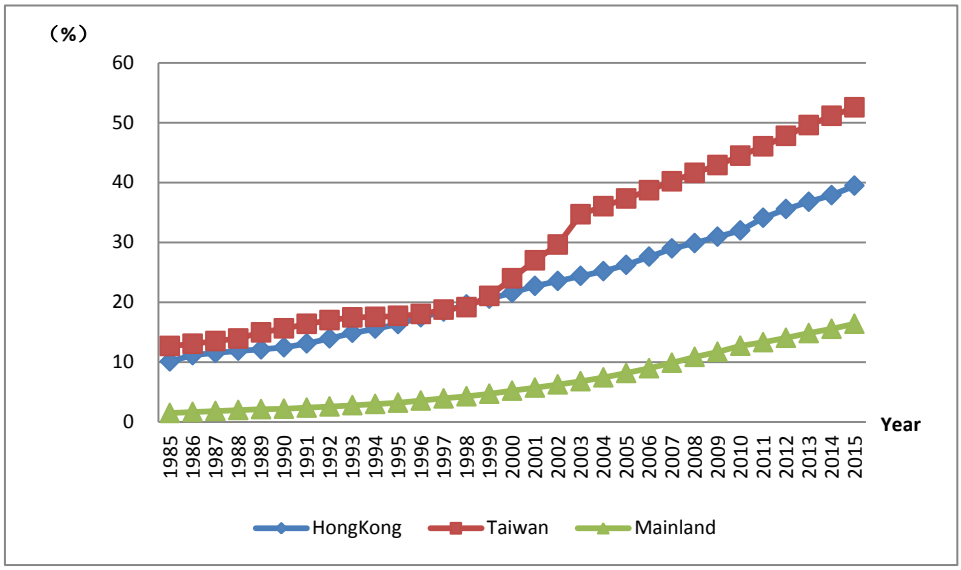


Figure 5.3.9 Proportions of College Education and Above in Labor Force of Mainland, Hong Kong and Taiwan

Table5.3.6 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	12.67	1.49
1986	11.14	13.05	1.66
1987	11.52	13.50	1.82
1988	11.89	13.92	1.99
1989	12.11	14.95	2.13
1990	12.46	15.62	2.20
1991	13.11	16.38	2.38
1992	13.95	17.00	2.58
1993	14.88	17.45	2.79
1994	15.57	17.54	2.99
1995	16.33	17.71	3.21
1996	17.47	18.03	3.56

Year	Proportions of College Education and Above		
	Hong Kong	Taiwan	Mainland
1997	18.43	18.75	3.92
1998	19.61	19.16	4.27
1999	20.59	21.04	4.70
2000	21.57	23.99	5.21
2001	22.72	26.99	5.73
2002	23.54	29.63	6.26
2003	24.40	34.69	6.80
2004	25.18	36.03	7.44
2005	26.23	37.32	8.17
2006	27.61	38.71	8.96
2007	28.99	40.20	9.88
2008	29.87	41.60	10.86
2009	30.94	42.91	11.71
2010	31.99	44.48	12.73
2011	34.11	46.04	13.32
2012	35.57	47.79	14.05
2013	36.77	49.59	14.84
2014	37.89	51.14	15.56
2015	39.48	52.56	16.40

5.4 Average Age of Labor Force at Provincial Level

Table 5.4.1 shows the comparison of average age of labor force in 2015among all provinces in China in descending order. In general, the average age of the labor force is between 33 and 39 years in 2015, and the three northeast provinces of China (Liaoning, Heilongjiang and Jilin) ranked at the oldest, while Tibet is the youngest. The average age of the urban labor force is slightly lower than that of the rural labor force except for Xinjiang and Qinghai.

Table 5.4.1 Average Age of Labor Force at Provincial Level(2015)

Unit: Year (of age)

Rank	Province	Average Age		
		Sub-Total	Urban	Rural
1	Liaoning	37.85	37.48	38.65
2	Heilongjiang	37.75	37.45	38.16
3	Jilin	37.29	36.50	38.30
4	InnerMongolia	37.11	36.41	38.18
5	Zhejiang	37.03	36.17	38.74
6	Shanghai	36.85	36.85	-
7	Beijing	36.72	36.57	37.82
8	Jiangsu	36.62	35.99	38.00
9	Shandong	36.55	35.26	38.06
10	Hubei	36.35	35.60	37.42
11	Hunan	36.25	35.29	37.32
12	Tianjin	35.99	35.72	37.43
13	Mainland	35.91	35.32	36.72
14	Anhui	35.89	35.02	36.86
15	Chongqing	35.87	35.32	36.87
16	Hebei	35.79	34.70	37.01
17	Fujian	35.72	34.95	37.15
18	Sichuan	35.66	34.61	36.72
19	Qinghai	35.44	35.59	35.28
20	Xinjiang	35.34	35.74	34.97
21	Shanxi	35.31	34.48	36.22
22	Shaanxi	35.13	33.93	36.61
23	Yunnan	35.09	34.19	35.70
24	Gansu	35.04	33.90	35.97
25	Jiangxi	35.02	34.12	36.04
26	Hainan	34.79	34.17	35.50
27	Guangdong	34.65	34.74	34.40
28	Henan	34.57	33.14	35.92
29	Ningxia	34.46	34.08	35.06
30	Guangxi	34.45	32.96	35.88
31	Guizhou	33.95	32.89	34.78
32	Tibet	33.50	32.55	33.80

5.5 Education Indicators at Provincial Level

Table 5.5.1 shows the provincial rankings of average years of schooling of the labor force in 2015. In general, the provinces with better economic development have more schooling; leading examples are Beijing, Shanghai and Tianjin; in contrast, underdeveloped provinces, such as Yunnan, Qinghai and Tibet, rank at the bottom in terms of educational attainment. Average schooling years of the urban labor force exceeds that of the rural labor force in each province, and the urban-rural gap is greater in the less-developed provinces. For example, the urban-rural differential in Tibet is 5.12 years while the gap in Beijing is only 2.30.

Table 5.5.1 Average Years of Schooling of Labor Force at Provincial Level(2015)

Unit: Year

Rank	Province	Average Years of Schooling		
		Sub-total	Urban	Rural
1	Beijing	12.21	12.49	10.19
2	Shanghai	11.59	11.59	-
3	Tianjin	11.33	11.74	9.08
4	Liaoning	10.64	11.55	8.67
5	Jiangsu	10.64	11.31	9.14
6	Shaanxi	10.57	11.87	8.97
7	Hubei	10.53	11.59	9.01
8	Jilin	10.41	11.86	8.57
9	Hunan	10.38	11.52	9.10
10	Shanxi	10.38	11.56	9.08
11	Shandong	10.28	11.51	8.85
12	Chongqing	10.27	11.30	8.40
13	Guangdong	10.23	10.76	8.86
14	InnerMongolia	10.21	11.21	8.64
15	Henan	10.16	11.44	8.94
16	Hebei	10.15	11.28	8.91

Rank	Province	Average Years of Schooling		
		Sub-total	Urban	Rural
17	Mainland	10.14	11.25	8.62
18	Heilongjiang	10.14	11.39	8.48
19	Ningxia	10.09	11.33	8.05
20	Zhejiang	10.08	10.74	8.77
21	Fujian	10.07	10.78	8.75
22	Hainan	10.01	11.18	8.67
23	Jiangxi	9.99	11.20	8.64
24	Xinjiang	9.95	11.52	8.50
25	Anhui	9.78	10.97	8.44
26	Guangxi	9.77	11.15	8.46
27	Sichuan	9.69	11.18	8.20
28	Gansu	9.49	11.47	7.88
29	Guizhou	9.01	10.81	7.62
30	Yunnan	8.79	10.67	7.54
31	Qinghai	8.78	10.73	6.75
32	Tibet	6.14	10.02	4.90

Table5.5.2 shows the 2015 provincial rankings for the proportion of worker with high school education and above in the total, rural and urban labor forces. Beijing, Shanghai and Tianjin are top 3 in accordance with their rankings of average years of schooling. Meanwhile Yunnan and Tibet are at the bottom, the same as their rankings in average years of schooling.

Table5.5.2 The Proportion of High School Education and Above of Labor Force at Provincial Level (2015)

Unit：%

Rank	Province	The proportion of high school education and above		
		Sub-total	Urban	Rural
1	Beijing	64.88	68.82	35.62
2	Shanghai	54.99	54.99	

Rank	Province	The proportion of high school education and above		
		Sub-total	Urban	Rural
3	Tianjin	52.78	59.20	17.40
4	Shanxi	43.46	62.50	19.99
5	Jiangsu	42.85	53.30	19.75
6	Hubei	41.55	58.23	17.69
7	Liaoning	40.53	54.75	9.57
8	Ningxia	40.29	56.69	13.57
9	Chongqing	40.27	55.43	12.81
10	Hunan	39.65	58.24	18.87
11	Jilin	39.21	61.73	10.75
12	InnerMongolia	38.89	54.00	15.33
13	Shanxi	38.62	58.48	16.76
14	Guangdong	37.65	46.11	15.78
15	Shandong	37.27	56.99	14.30
16	Mainland	37.17	54.13	13.90
17	Zhejiang	36.29	45.34	18.13
18	Fujian	36.27	46.61	16.83
19	Henan	35.39	57.69	14.22
20	Hainan	34.98	53.88	13.24
21	Xinjiang	34.86	59.57	12.16
22	Gansu	34.80	60.97	13.42
23	Jiangxi	34.63	53.93	13.05
24	Heilongjiang	34.50	54.19	8.31
25	Hebei	33.69	52.19	13.23
26	Sichuan	33.05	54.89	11.09
27	Anhui	32.27	50.89	11.24
28	Qinghai	31.78	54.16	8.57
29	Guangxi	31.55	53.27	10.71
30	Guizhou	27.34	52.63	7.80
31	Yunnan	24.90	48.75	8.96
32	Tibet	17.73	48.93	7.75

Table 5.5.3 shows the provincial rankings for proportion of workers with college education and above in the labor force in 2015. The rankings

are consistent with the rankings of the proportion of workers with high school education in general. However, some provinces with power education systems rank lower in their proportions of college graduates than of high-school graduates; Liaoning is an example.

Table5.5.3 The Proportion of College Education and Above of Labor Force at Provincial Level (2015)

Unit: %

Rank	Province	The proportion of college education and above		
		Sub-total	Urban	Rural
1	Beijing	38.39	42.03	11.36
2	Shanghai	32.99	32.99	
3	Tianjin	29.08	33.65	3.90
4	Liaoning	21.29	29.84	2.68
5	Shaanxi	20.95	34.97	3.67
6	Jiangsu	20.91	28.15	4.92
7	Hubei	19.88	30.87	4.14
8	Jilin	19.33	32.73	2.39
9	Ningxia	18.85	28.48	3.15
10	Chongqing	18.69	27.77	2.24
11	Zhejiang	17.88	24.74	4.10
12	InnerMongolia	17.81	26.22	4.69
13	Xinjiang	17.40	32.25	3.75
14	Shandong	16.97	29.28	2.63
15	Fujian	16.77	23.61	3.90
16	Hunan	16.55	28.45	3.24
17	Mainland	16.40	26.20	2.94
18	Heilongjiang	16.14	26.97	1.76
19	Shanxi	16.10	28.16	2.83
20	Hebei	15.62	27.52	2.46
21	Jiangxi	15.48	26.65	3.00
22	Guangdong	14.69	19.41	2.50
23	Hainan	14.56	24.84	2.74
24	Henan	14.49	27.02	2.59
25	Qinghai	14.39	26.25	2.08

Rank	Province	The proportion of college education and above		
		Sub-total	Urban	Rural
26	Gansu	14.01	28.45	2.22
27	Anhui	13.86	23.87	2.56
28	Sichuan	13.71	25.14	2.21
29	Guangxi	13.20	24.76	2.12
30	Yunnan	11.45	24.80	2.51
31	Guizhou	10.90	22.40	2.01
32	Tibet	9.53	30.24	2.90

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 2015, human capital increased 8.21 times from 39.466 trillion Yuan to 363.708 trillion Yuan, an average annual growth rate of 7.40%, lower than the average annual growth rate of the economy.[1] Based on 6-education categories, the human capital increased from 39.454 trillion Yuan in 1985 to 377.579 trillion Yuan in 2015, an average annual growth rate of 7.53%. These measures reflect 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 1985-2015. Rural real human capital increased from 20.857 trillion Yuan to 60.123 trillion Yuan; urban real human capital grew from 18.61 trillion Yuan to 303.585 trillion Yuan. The corresponding annual growth rates are 3.53% for

[1] The average annual growth rate in this table and subsequent tables is the average of the annual logarithmic growth rates.

rural areas and 9.30% for urban areas. Through 1989, urban real human capital is smaller than rural real human capital, while beginning in 1990 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	39466	21827	17639	18610	20857
1986	42860	24389	18470	20467	22393
1987	46170	26854	19316	21990	24180
1988	45531	26986	18545	21780	23752
1989	45170	27277	17893	22307	22863
1990	51666	31777	19889	26282	25384
1991	57241	35603	21638	28974	28266
1992	61726	38884	22842	31033	30694
1993	61845	39313	22532	31133	30711
1994	56757	36439	20318	28538	28219
1995	54888	35472	19417	27780	27108
1996	58848	38370	20478	31257	27592
1997	66048	43299	22749	36696	29352
1998	76237	50268	25969	43962	32274
1999	88464	58337	30127	52956	35508
2000	100118	66162	33956	61594	38524
2001	111130	73356	37774	70053	41077
2002	122645	80907	41738	78957	43688
2003	136109	90005	46104	90571	45538
2004	144272	95209	49062	98383	45889
2005	155942	102363	53579	108681	47261
2006	172558	113658	58900	122506	50052
2007	185880	121820	64060	135216	50664
2008	196614	128331	68282	146054	50560
2009	221400	144479	76922	167373	54028

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

Year	National	Male	Female	Urban	Rural
2010	238230	154994	83236	183200	55031
2011	255464	165339	90125	201034	54431
2012	276673	178144	98529	221031	55642
2013	307112	197590	109522	250664	56448
2014	333565	214646	118919	275472	58093
2015	363708	233986	129722	303585	60123

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 1990. However, since 1998, 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 in 1985 the rural population at 805 million was more than three times the size of the urban population at 238 million and thus had larger amount of human capital in the earlier years, by 2015, the population in rural China had fallen to 606 million, lower than the urban population of 768 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 mostly depends on the trend of urban human capital.

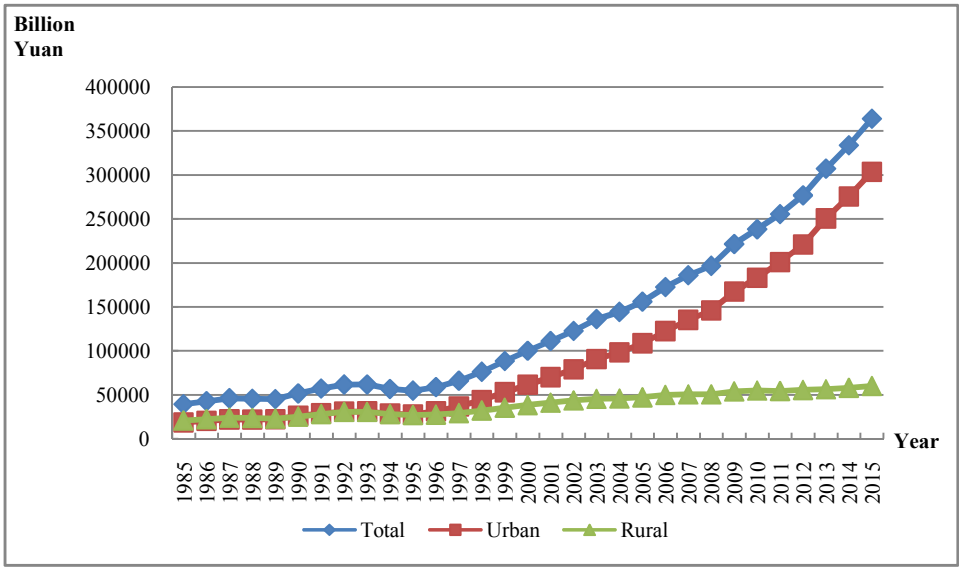


Figure 6.1.1 National Real Human Capital by Region,1985-2015

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	108.60	111.74	104.71	109.98	107.37
1987	116.99	123.03	109.51	118.16	115.93
1988	115.37	123.64	105.14	117.04	113.88
1989	114.45	124.97	101.44	119.87	109.62
1990	130.91	145.58	112.76	141.23	121.71
1991	145.04	163.11	122.67	155.69	135.53
1992	156.40	178.15	129.50	166.76	147.16
1993	156.70	180.11	127.74	167.30	147.25
1994	143.81	166.94	115.19	153.35	135.30
1995	139.08	162.51	110.08	149.28	129.97
1996	149.11	175.79	116.10	167.96	132.29
1997	167.35	198.37	128.97	197.19	140.73

Year	National	Male	Female	Urban	Rural
1998	193.17	230.30	147.23	236.24	154.74
1999	224.15	267.27	170.80	284.56	170.25
2000	253.68	303.12	192.50	330.98	184.71
2001	281.58	336.07	214.15	376.43	196.95
2002	310.76	370.67	236.62	424.28	209.47
2003	344.87	412.35	261.38	486.69	218.34
2004	365.56	436.19	278.15	528.67	220.02
2005	395.13	468.97	303.76	584.01	226.60
2006	437.23	520.71	333.92	658.30	239.98
2007	470.98	558.11	363.17	726.59	242.92
2008	498.18	587.94	387.11	784.83	242.42
2009	560.99	661.92	436.09	899.39	259.04
2010	603.63	710.09	471.89	984.44	263.85
2011	647.30	757.49	510.94	1080.27	260.97
2012	701.04	816.15	558.58	1187.73	266.78
2013	778.16	905.24	620.91	1346.96	270.65
2014	845.19	983.38	674.18	1480.27	278.54
2015	921.57	1071.99	735.43	1631.34	288.27

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 a rural to an 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 6.67 times, from 41.90 thousand Yuan in 1985 to 321.54 thousand Yuan in 2015, with an average annual growth rate of 6.79%. 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 was higher than that for the rural population in all years.

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	41.90	43.94	39.62	86.08	28.74
1986	45.05	48.62	41.07	91.00	30.83
1987	48.06	53.06	42.49	94.25	33.24
1988	46.52	52.24	40.13	89.00	32.36
1989	45.33	51.77	38.11	87.28	30.86
1990	50.93	59.08	41.74	98.57	33.95
1991	55.87	65.70	44.83	105.69	37.67
1992	59.68	71.14	46.83	110.23	40.77
1993	59.29	71.50	45.68	108.11	40.67
1994	53.96	65.84	40.76	96.96	37.25
1995	51.77	63.75	38.54	92.44	35.68
1996	55.07	68.31	40.41	96.91	36.99
1997	61.52	76.67	44.70	106.54	40.25
1998	70.70	88.48	50.90	120.50	45.23
1999	81.67	101.97	58.94	137.41	50.88
2000	91.78	114.57	66.15	151.43	56.32
2001	101.70	127.19	73.21	164.48	61.60
2002	112.15	140.45	80.65	177.52	67.33
2003	124.63	156.88	88.93	196.07	72.26
2004	132.59	166.80	94.85	206.18	75.12
2005	144.05	180.57	103.91	221.10	79.97
2006	158.13	198.12	113.81	240.40	86.05

Year	National	Male	Female	Urban	Rural
2007	169.25	210.45	123.34	256.41	88.74
2008	177.94	219.58	131.18	268.68	90.07
2009	199.52	245.08	147.88	299.69	98.02
2010	213.38	260.36	159.72	319.11	101.47
2011	227.92	276.27	172.54	340.05	102.77
2012	246.61	297.09	188.65	364.80	107.83
2013	273.26	328.87	209.39	403.98	112.14
2014	295.75	356.58	226.11	433.04	118.14
2015	321.54	387.89	245.73	466.34	125.22

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.

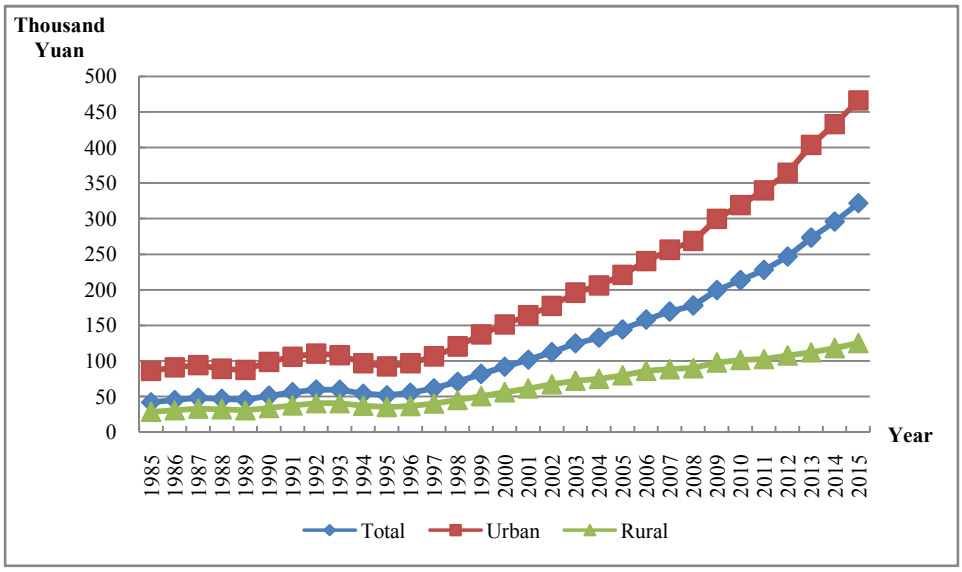


Figure 6.2.1 National Real Human Capital Per Capita by Region, 1985-2015

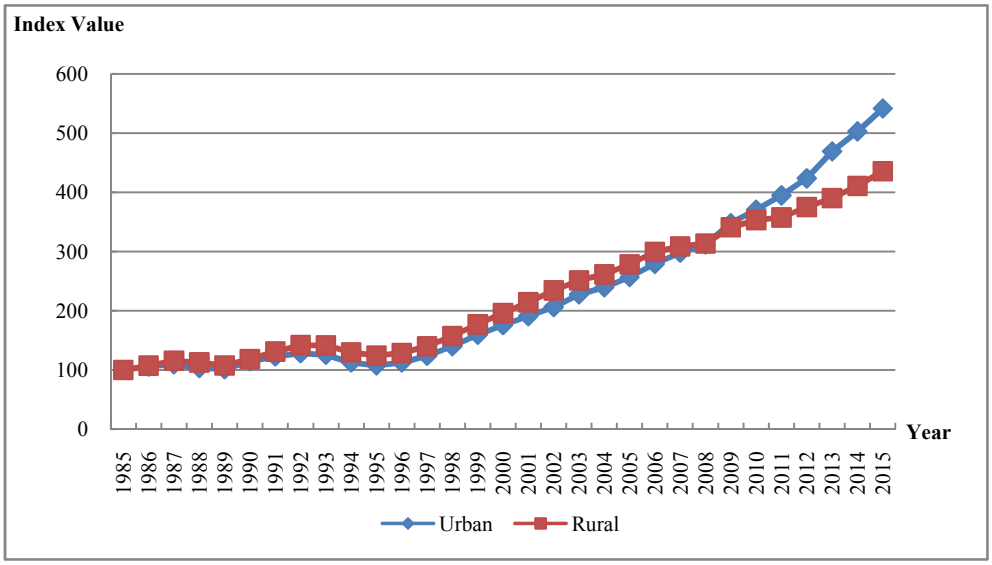


Figure 6.2.2 National Real Human Capital Per Capita Index by Region, 1985-2015

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	15904	15895	15904	15895	904	0.06
1986	18690	18673	17546	17530	1031	0.06
1987	22133	22109	19342	19321	1210	0.05
1988	26393	26370	19386	19370	1510	0.06
1989	31285	31258	19490	19473	1709	0.05
1990	37275	37232	22551	22525	1877	0.05
1991	42957	42914	25080	25055	2190	0.05

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		
1992	48815	48789	26771	26757	2707	0.06
1993	55227	55198	26397	26384	3552	0.06
1994	62479	62451	24064	24053	4846	0.08
1995	70703	70691	23232	23229	6113	0.09
1996	81026	81037	24539	24542	7157	0.09
1997	93177	93244	27399	27418	7943	0.09
1998	107771	107862	31875	31901	8488	0.08
1999	124403	124551	37205	37247	9019	0.07
2000	144589	143484	42928	42617	9978	0.07
2001	155985	155293	45926	45733	11027	0.07
2002	166962	166727	49506	49440	12100	0.07
2003	184130	184251	53873	53907	13656	0.07
2004	200914	202479	56475	56900	16071	0.08
2005	224956	226869	61961	62472	18590	0.08
2006	250099	252729	67859	68551	21766	0.09
2007	282388	285831	73040	73907	26802	0.09
2008	319980	324546	78050	79140	31675	0.10
2009	372292	378524	91276	92776	34563	0.09
2010	430070	438355	101884	103817	40890	0.10
2011	468152	477643	105128	107230	48412	0.10
2012	504533	515509	110341	112708	53412	0.11
2013	550478	562912	119533	122214	58802	0.11
2014	614046	628141	130157	133119	63614	0.10
2015	677345	693514	141442	144790	68905	0.10

The ratio of nominal GDP to nominal labor force human capital shows the efficiency of the use of human capital. The decrease in the ratio over time can reflect growing productivity of human capital, but when its growth rate slows down may also 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 the ratio's growth slows down in recent years. The ratio remained between 0.06 and 0.12 in 1994-2015.

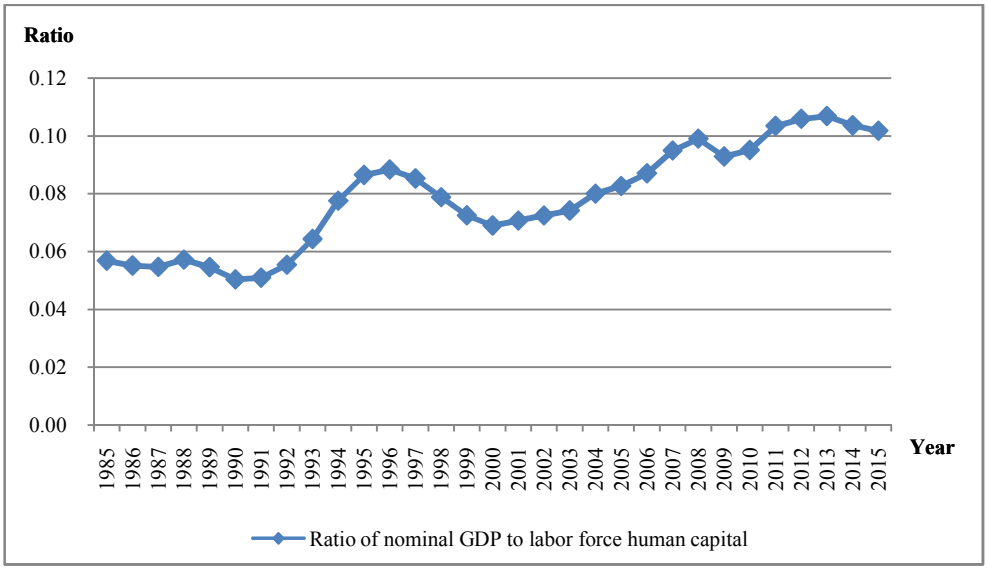


Figure 6.3.1 National Ratio of nominal GDP to Labor Force Human Capital ,1985-2015

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	15904	8836	7068	15904	8836	7068
1986	18690	10673	8017	17546	10013	7533
1987	22133	12972	9161	19342	11311	8031
1988	26393	15804	10589	19386	11572	7815
1989	31285	19100	12185	19490	11882	7608

[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
1990	37275	23248	14027	22551	14063	8488
1991	42957	27050	15907	25080	15783	9297
1992	48815	31023	17793	26771	16999	9772
1993	55227	35372	19854	26397	16901	9496
1994	62479	40368	22111	24064	15551	8512
1995	70703	46015	24688	23232	15131	8102
1996	81026	53399	27627	24539	16191	8349
1997	93177	61973	31204	27399	18252	9147
1998	107771	72241	35529	31875	21408	10467
1999	124403	83896	40507	37205	25146	12059
2000	144589	98200	46389	42928	29223	13704
2001	155985	105745	50240	45926	31210	14716
2002	166962	112895	54067	49506	33554	15952
2003	184130	124110	60020	53873	36390	17483
2004	200914	135133	65781	56475	38047	18428
2005	224956	150232	74724	61961	41434	20527
2006	250099	167964	82135	67859	45618	22240
2007	282388	188309	94079	73040	48740	24299
2008	319980	212600	107381	78050	51871	26179
2009	372292	247712	124580	91276	60721	30555
2010	430070	285223	144847	101884	67534	34350
2011	468152	308712	159440	105128	69267	35861
2012	504533	330579	173953.97	110341	72212	38129
2013	550478	359391	191086	119533	77975	41558
2014	614046	399937	214109	130157	84664	45493
2015	677345	439957	237388	141442	91721	49721

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 1985-2015. 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 1999. The regional gap increased from 1.90 trillion Yuan in 1997 to 73.56 trillion Yuan in 2015. In 2015, the national real labor force human capital was 3.17 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	15904	7366	8538	15904	7366	8538
1986	18690	8764	9926	17546	8191	9355
1987	22133	10553	11579	19342	9065	10276
1988	26393	12572	13821	19386	8947	10439
1989	31285	14982	16303	19490	9168	10322
1990	37275	18106	19169	22551	10937	11614
1991	42957	20659	22298	25080	11874	13206
1992	48815	23114	25702	26771	12233	14538
1993	55227	25880	29346	26397	11798	14599
1994	62479	29247	33233	24064	10666	13398
1995	70703	33234	37469	23232	10377	12856
1996	81026	39530	41496	24539	11344	13195
1997	93177	47267	45910	27399	13157	14243
1998	107771	56892	50879	31875	15931	15944
1999	124403	68915	55489	37205	19552	17653
2000	144589	84274	60314	42928	23720	19207
2001	155985	92085	63900	45926	25738	20188
2002	166962	99067	67895	49506	27970	21536
2003	184130	111539	72591	53873	31210	22663
2004	200914	124941	75973	56475	33843	22632
2005	224956	145140	79816	61961	38695	23266
2006	250099	161753	88346	67859	42487	25371
2007	282388	184827	97561	73040	46457	26582

Year	Nominal labor force human capital			Real labor force human capital (Billions of 1985 Yuan)		
	National	Urban	Rural	National	Urban	Rural
2008	319980	214056	105925	78050	50951	27100
2009	372292	257763	114529	91276	61883	29393
2010	430070	308402	121668	101884	71744	30140
2011	468152	339718	128434	105128	75051	30076
2012	504533	369077	135455	110341	79394	30947
2013	550478	407154	143324	119533	87677	31857
2014	614046	462865	151181	130157	97148	33009
2015	677345	519864	157481	141442	107499	33943

Figure 6.3.3 shows the trends of real labor force human capital for urban and rural areas, respectively. Before 1999, the real labor force human capital for the rural regions was higher than that for urban areas. After 1999, 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.

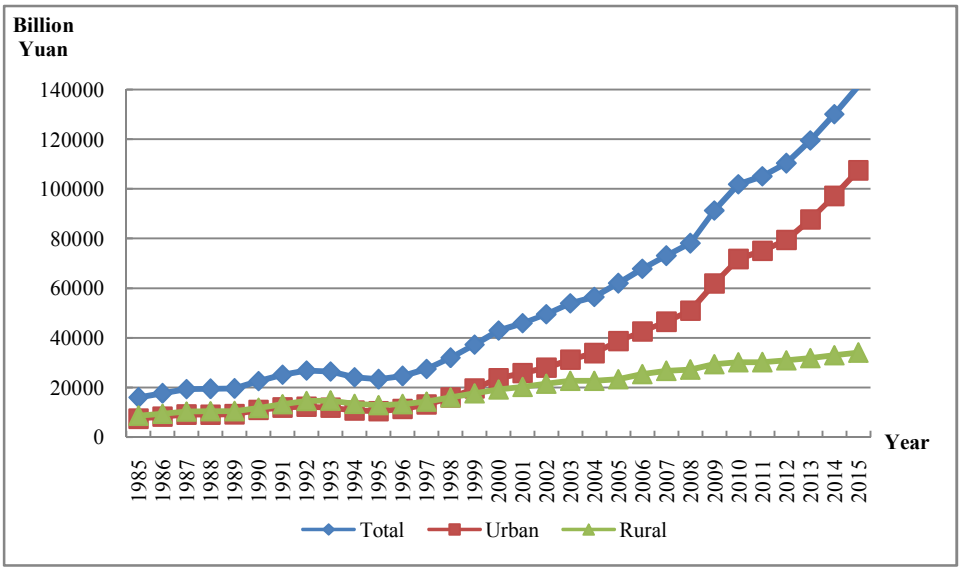


Figure 6.3.3 National Real Labor Force Human Capital by Region, 1985-2015

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.

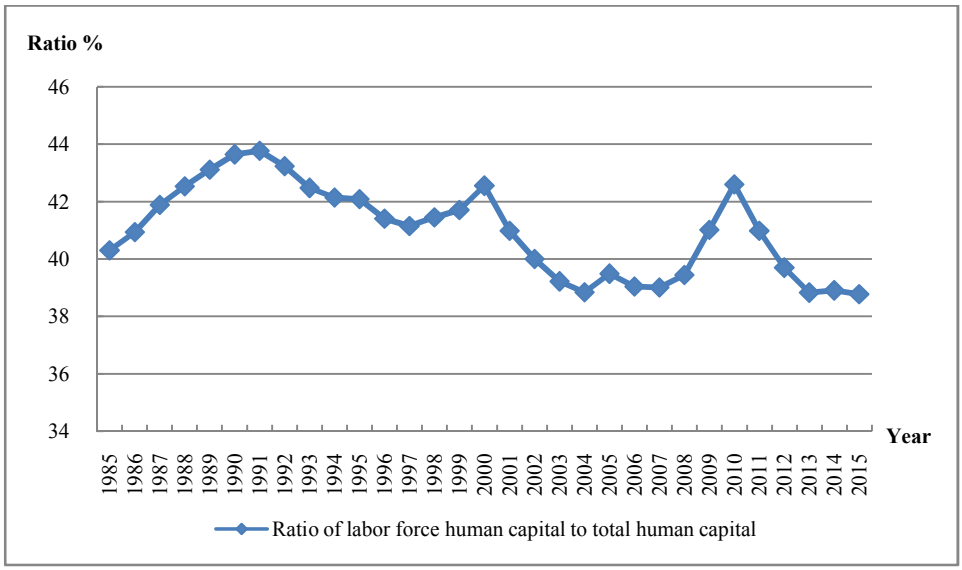


Figure 6.3.4 National Ratio of Labor Force Human Capital to Total Human Capital, 1985-2015

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)		Real 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	28.62	28.61	28.62	28.61
1986	32.90	32.88	30.88	30.87
1987	38.07	38.04	33.27	33.25
1988	43.62	43.60	32.04	32.03
1989	49.96	49.93	31.12	31.11
1990	57.87	57.83	35.01	34.98
1991	65.06	65.03	37.99	37.97
1992	72.55	72.54	39.79	39.78
1993	81.09	81.08	38.76	38.76
1994	90.75	90.75	34.95	34.95
1995	101.65	101.67	33.40	33.41
1996	115.43	115.49	34.96	34.98
1997	131.38	131.53	38.63	38.68
1998	149.61	149.80	44.25	44.30
1999	169.74	170.03	50.76	50.85
2000	193.54	192.32	57.46	57.12

2001	209.60	208.93	61.71	61.53
2002	223.59	223.57	66.30	66.29
2003	245.31	245.82	71.77	71.92
2004	267.67	269.76	75.24	75.81
2005	299.29	301.84	82.44	83.12
2006	330.08	333.55	89.56	90.47
2007	369.20	373.71	95.49	96.63
2008	413.83	419.73	100.94	102.35
2009	473.73	481.66	116.15	118.05
2010	538.61	548.98	127.60	130.02
2011	591.32	603.31	132.79	135.44
2012	642.74	656.73	140.57	143.58
2013	704.00	719.90	152.87	156.30
2014	783.94	801.94	166.17	169.95
2015	866.45	887.14	180.93	185.21

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 1985-2015, 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	28.62	30.12	26.95	28.62	30.12	26.95
1986	32.90	35.67	29.81	30.88	33.47	28.01
1987	38.07	42.47	33.20	33.27	37.03	29.10
1988	43.62	49.54	37.02	32.04	36.27	27.32

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
1989	49.96	57.60	41.36	31.12	35.83	25.82
1990	57.87	67.87	46.51	35.01	41.06	28.14
1991	65.06	77.38	51.21	37.99	45.15	29.93
1992	72.55	87.43	55.95	39.79	47.91	30.73
1993	81.09	98.93	61.38	38.76	47.27	29.36
1994	90.75	112.13	67.32	34.95	43.20	25.91
1995	101.65	126.96	74.11	33.40	41.75	24.32
1996	115.43	145.57	82.44	34.96	44.14	24.91
1997	131.38	166.85	92.38	38.63	49.14	27.08
1998	149.61	191.11	103.78	44.25	56.63	30.57
1999	169.74	217.37	116.76	50.76	65.15	34.76
2000	193.54	248.72	131.69	57.46	74.02	38.90
2001	209.60	270.31	142.33	61.71	79.78	41.69
2002	223.59	288.91	151.88	66.30	85.87	44.81
2003	245.31	317.39	166.93	71.77	93.06	48.62
2004	267.67	346.56	182.39	75.24	97.58	51.10
2005	299.29	385.71	206.35	82.44	106.38	56.68
2006	330.08	424.85	226.67	89.56	115.39	61.38
2007	369.20	469.45	258.65	95.49	121.51	66.81
2008	413.83	520.96	294.09	100.94	127.11	71.70
2009	473.73	593.07	338.35	116.15	145.38	82.98
2010	538.61	668.72	389.41	127.60	158.34	92.35
2011	591.32	728.85	433.09	132.79	163.54	97.41
2012	642.74	786.18	477.26	140.57	171.73	104.61
2013	704.00	857.53	526.67	152.87	186.05	114.54
2014	783.94	955.02	587.40	166.17	202.17	124.81
2015	866.45	1053.90	651.65	180.93	219.71	136.49

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

1985-2015.

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	28.62	53.11	20.48	28.62	53.11	20.48
1986	32.90	60.12	23.50	30.88	56.19	22.15
1987	38.07	68.36	27.12	33.27	58.72	24.07
1988	43.62	76.90	31.30	32.04	54.73	23.64
1989	49.96	87.10	35.89	31.12	53.30	22.72
1990	57.87	99.74	41.44	35.01	60.25	25.10
1991	65.06	110.27	47.15	37.99	63.38	27.93
1992	72.55	121.04	53.34	39.79	64.06	30.17
1993	81.09	133.59	60.22	38.76	60.90	29.96
1994	90.75	147.81	67.74	34.95	53.91	27.31
1995	101.65	163.88	76.04	33.40	51.17	26.09
1996	115.43	183.55	85.28	34.96	52.67	27.12
1997	131.38	206.23	95.64	38.63	57.40	29.67
1998	149.61	232.25	107.03	44.25	65.04	33.54
1999	169.74	260.60	118.45	50.76	73.94	37.68
2000	193.54	294.67	130.81	57.46	82.94	41.66
2001	209.60	312.04	142.29	61.71	87.22	44.95
2002	223.59	324.87	153.68	66.30	91.72	48.75
2003	245.31	354.50	166.51	71.77	99.19	51.98
2004	267.67	383.29	178.92	75.24	103.82	53.30
2005	299.29	426.17	194.17	82.44	113.62	56.60
2006	330.08	464.67	215.69	89.56	122.05	61.94
2007	369.20	518.45	238.91	95.49	130.32	65.09
2008	413.83	581.26	261.57	100.94	138.36	66.92
2009	473.73	668.60	286.07	116.15	160.52	73.42
2010	538.61	763.00	308.58	127.60	177.50	76.44
2011	591.32	837.36	332.73	132.79	184.99	77.92

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
2012	642.74	903.09	359.98	140.57	194.27	82.24
2013	704.00	985.71	388.55	152.87	212.26	86.36
2014	783.94	1096.21	418.74	166.17	230.08	91.43
2015	866.45	1208.42	447.97	180.93	249.88	96.55

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.

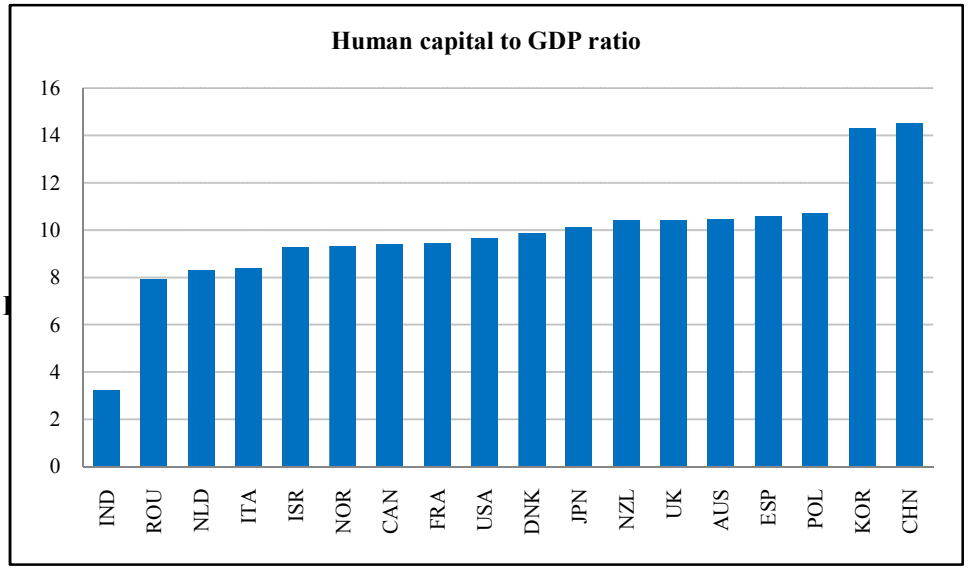
[4] The estimates for Australia are for 2001 and for Denmark 2002.

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
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.



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

[5] When we estimate the Mincer equation to generate annual earnings, we assign 15

educational attainment, we create a separate human capital series starting from 2000.[6]

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 24 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.[7]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.[8]

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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] We report the results based on six education categories from 1985-2015. Please see appendix C.7.

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

[8] Hechman（2005）and Liu（2007）also find that China invested too much on physical capital relative to human capital during the economy reform period.

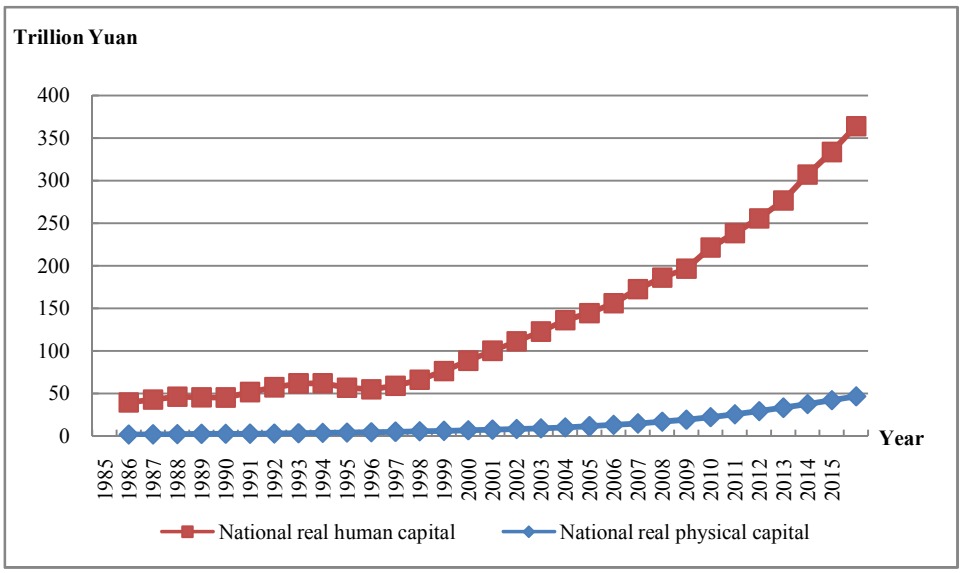

Figure 6.5.1 Human Capital and Physical Capital , 1985-2015

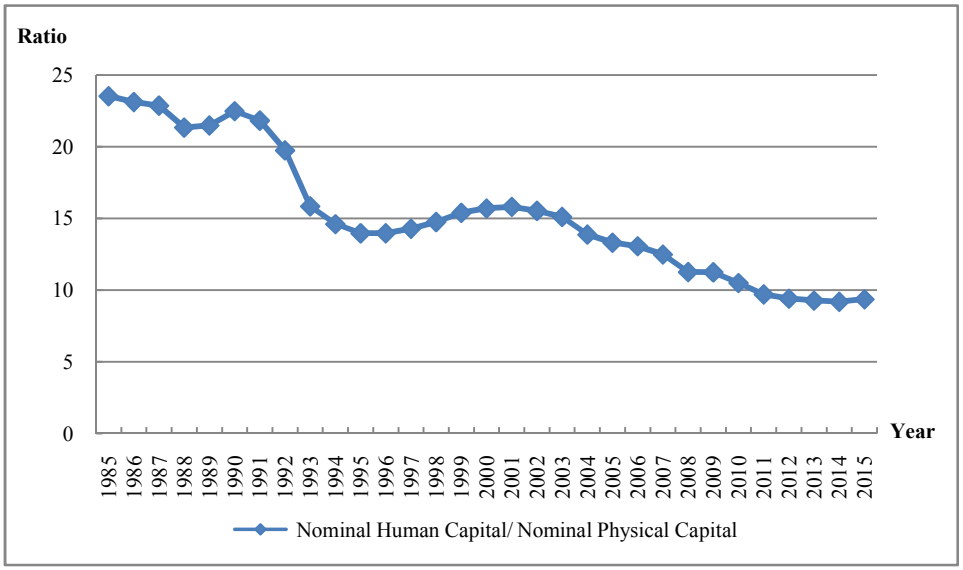

Figure 6.5.2 Human Capital and Physical Capital Ratio, 1985-2015

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 C results). 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

2015 5-education category nominal provincial human capital stocks are 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 2015 total human capital stocks. Shandong is the highest ranking province in terms of total real human capital, followed by Guangdong; 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 and Beijing, also rank high in terms of total stock but their total human wealth is magnified by differences in their education levels and age structure.

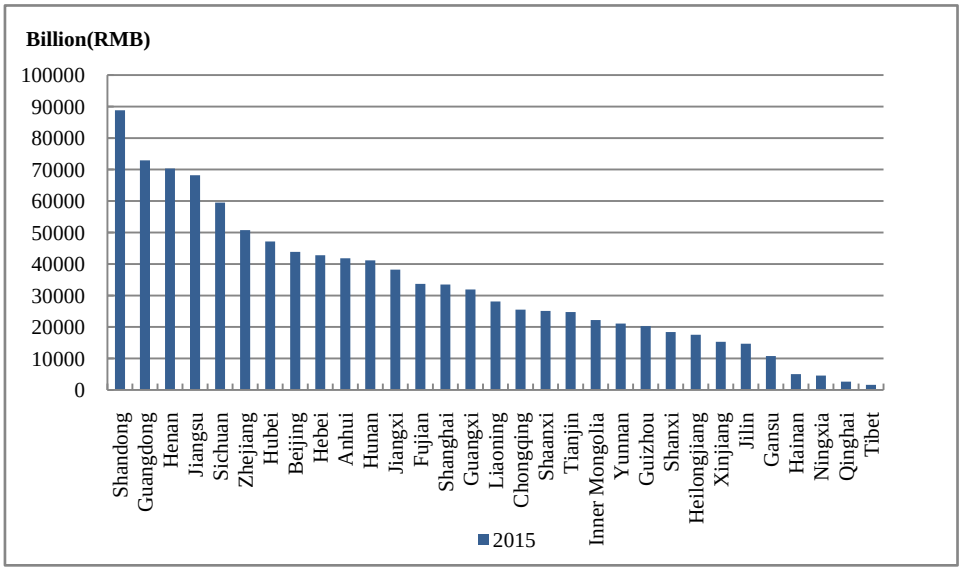

Figure 7.1.1 Provincial Current Year Human Capital in 2015

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: Shandong has the largest real human capital, followed by Guangdong; Tibet ranks the lowest.

[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.

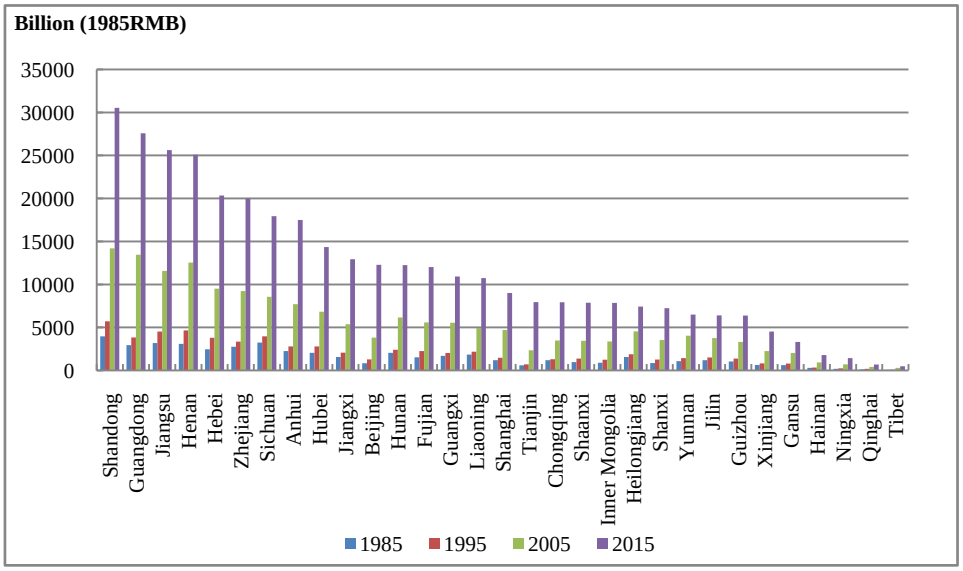

Figure 7.1.2 Provincial Real Human Capital

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 Qinghai 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

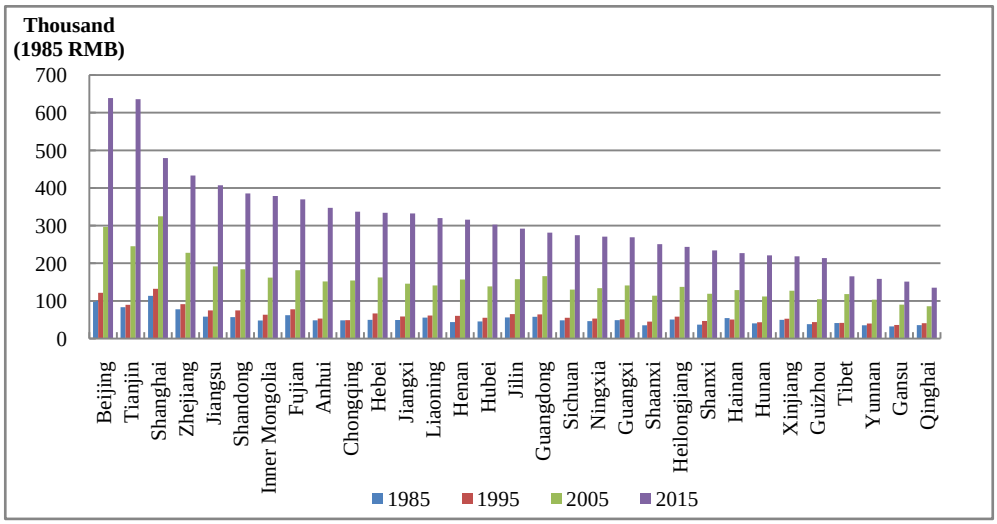

Figure 7.1.3 Provincial Real Human Capital Per Capita

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 Shandong and Jiangsu; 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.

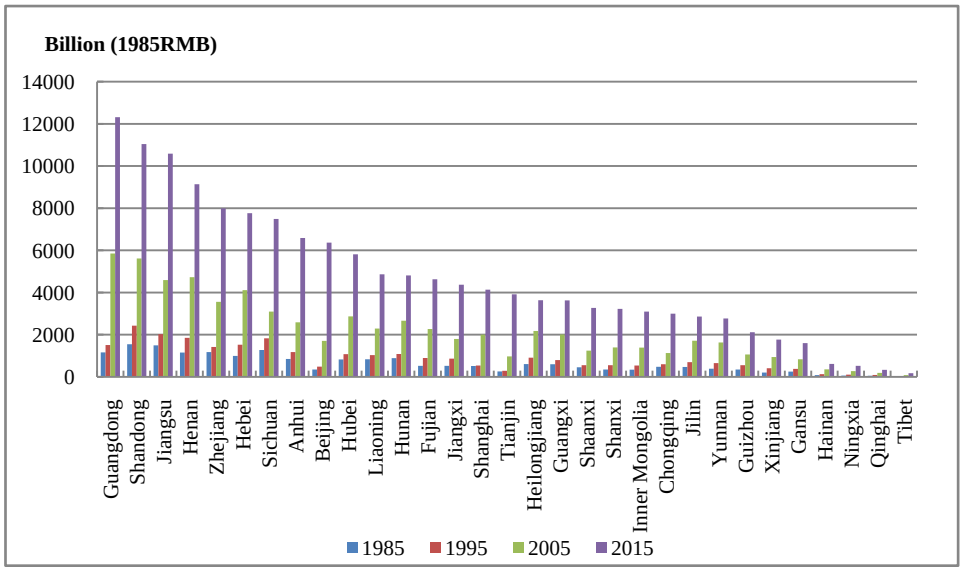

Figure 7.2.1 Provincial Real Labor Force Human Capital

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; Tibet stays in the last place.

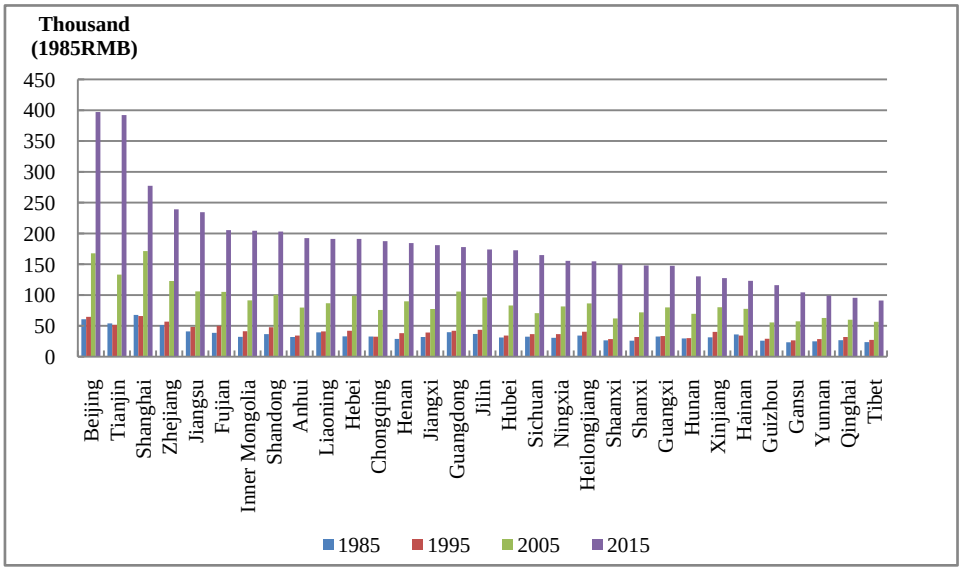

Figure 7.2.2 Provincial Real Average Labor Force Human Capital

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 to raise their ratios of labor-force to total human capital. In 2015 Beijing ranks highest, followed by Tianjin and Jiangxi.

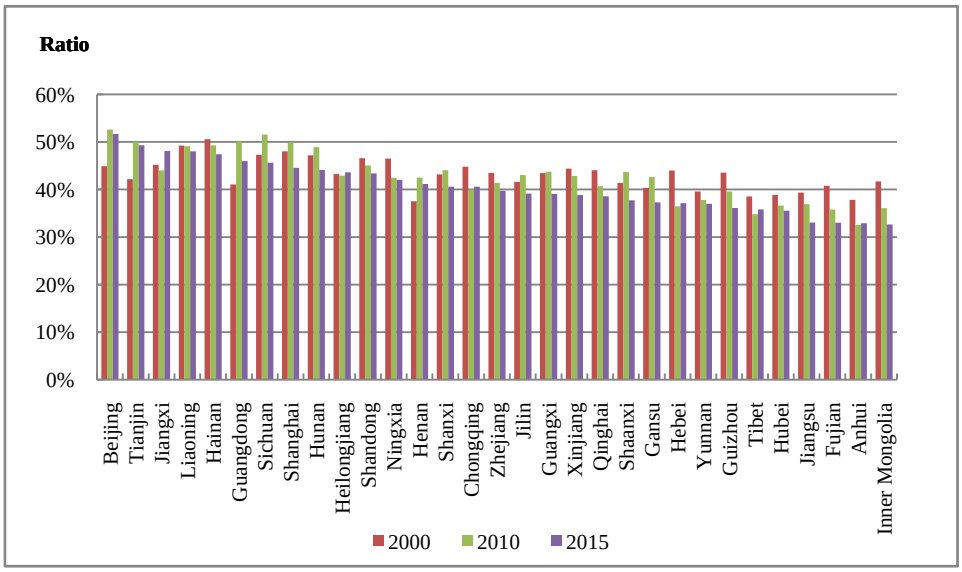

Figure 7.3.1 Ratio of Nominal Labor Force Human Capital to Total Nominal Human Capital

Figure 7.3.2 shows ratios of provincial nominal GDP to nominal labor force human capital. Qinghai ranks at the top in 2015, followed by Jiangsu, Liaoning and Inner Mongolia; Beijing and Anhui 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 7.3.3 shows ratios of provincial nominal total human capital to nominal physical capital. Shanghai ranks at the top in 2015, followed by Gansu, Tianjin and Ningxia; Tibet and Qinghai rank the last. It is obvious that human capital accounts for more in the total provincial wealth than physical capital in the more developed provinces than the less developed ones.

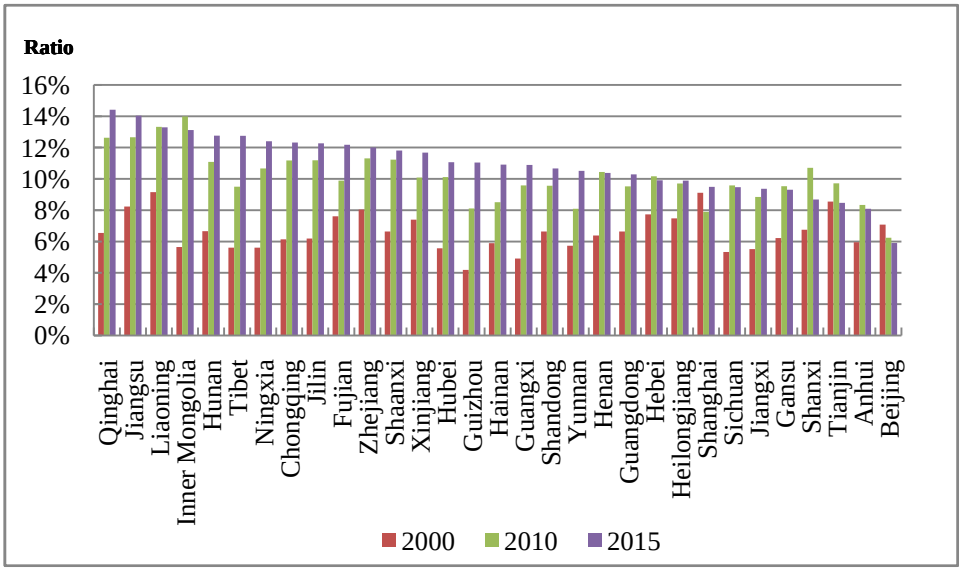

Figure 7.3.2 Ratio of Nominal GDP to Nominal Labor Force Human Capital

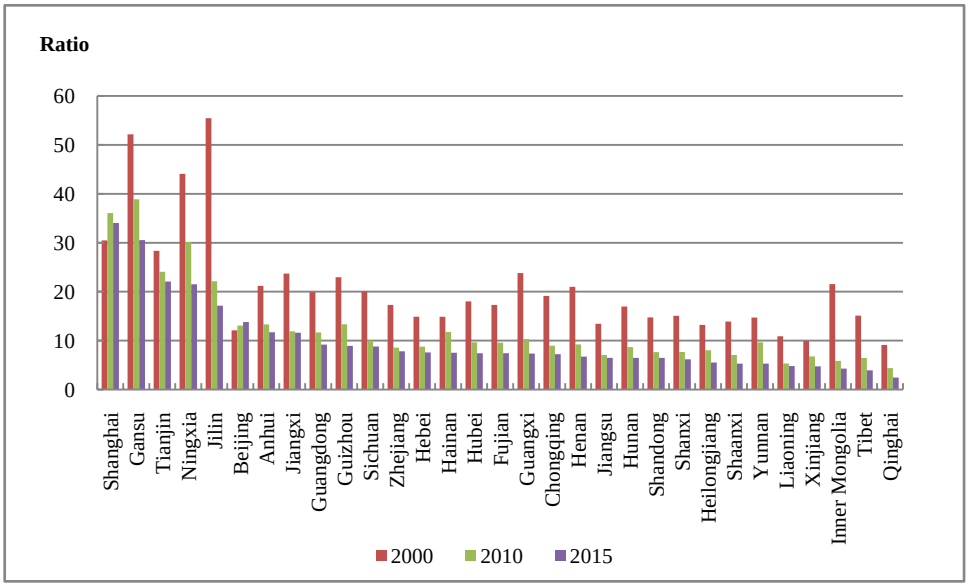

Figure 7.3.3 Ratio of Nominal Human Capital to Nominal Physical Capital

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	826	823	826	823	43
1986	1010	1008	945	944	51
1987	1222	1222	1053	1054	62
1988	1464	1467	1049	1051	75
1989	1778	1786	1087	1091	85
1990	2140	2217	1241	1285	99
1991	2506	2529	1298	1310	111
1992	2986	3024	1408	1426	128
1993	3548	3602	1405	1427	140
1994	4065	4131	1289	1310	160
1995	4681	4766	1266	1289	192
1996	5575	5700	1351	1381	222
1997	6485	6646	1492	1529	252
1998	7559	7897	1698	1774	287
1999	8708	9447	1945	2110	323

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	9946	11547	2146	2492	364
2001	11389	12820	2384	2683	410
2002	12688	14181	2704	3023	469
2003	14584	16147	3102	3435	544
2004	16431	18431	3460	3882	627
2005	18221	20817	3781	4319	721
2006	22198	27500	4565	5655	822
2007	26703	33399	5363	6707	934
2008	31627	40142	6043	7670	1036
2009	37313	47469	7238	9209	1149
2010	42993	54559	8145	10336	1296
2011	48468	60685	8695	10887	1432
2012	53954	66483	9370	11546	1600
2013	60862	74833	10232	12581	1767
2014	68167	83711	11280	13852	1937
2015	75343	92286	12247	15001	2119

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 2015, the nominal human capital per capita increases from 97,900 Yuan to 3,916,050 Yuan, an increase of more than 38 times; and the real human capital per capita increases from 97,900 Yuan to 636,540 Yuan, an increase of approximately 5.5 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 2015, 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.

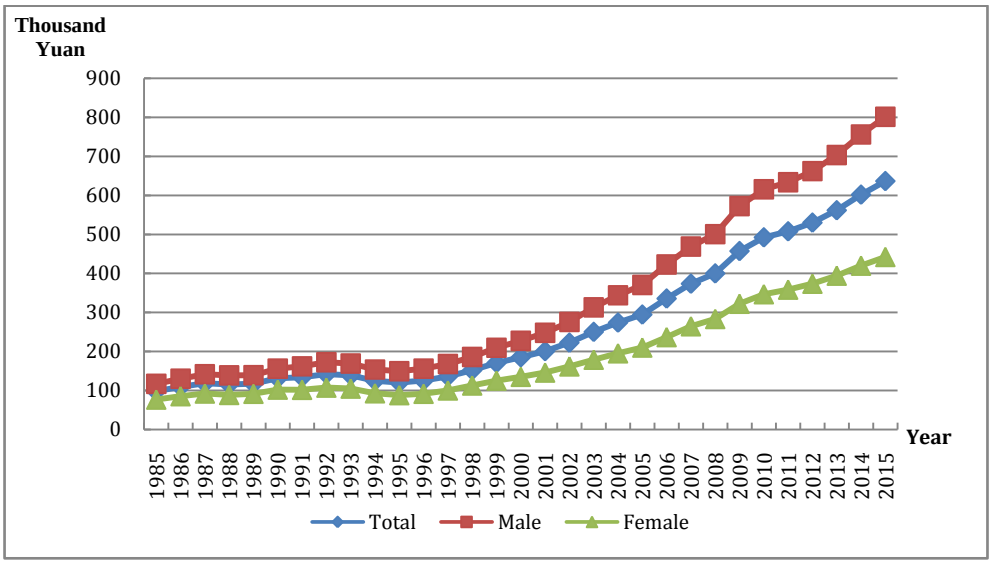

Figure BJ-2.1 Human Capital Per Capita by Gender for Beijing，1985-2015

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	97.90	129.62	32.99	97.90	129.62	32.99
1986	116.57	151.90	39.17	109.15	142.23	36.68
1987	137.53	176.52	46.38	118.57	152.19	39.99
1988	161.00	203.73	54.86	115.29	145.89	39.29

[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
1989	191.48	240.00	64.39	117.00	146.64	39.34
1990	226.05	280.78	75.14	131.04	162.77	43.56
1991	258.12	318.96	86.54	133.72	165.24	44.83
1992	300.59	370.56	98.98	141.69	174.68	46.66
1993	349.92	430.74	112.93	138.61	170.63	44.74
1994	392.91	481.75	128.08	124.61	152.79	40.62
1995	443.68	542.38	144.66	119.96	146.65	39.11
1996	516.77	630.61	162.81	125.20	152.78	39.44
1997	589.90	717.54	183.11	135.72	165.09	42.13
1998	674.87	818.22	204.83	151.63	183.84	46.02
1999	762.57	921.36	228.35	170.32	205.78	51.00
2000	856.86	1032.52	253.28	184.90	222.81	54.66
2001	958.45	1140.85	278.08	200.61	238.79	58.20
2002	1043.55	1226.43	303.10	222.42	261.40	64.60
2003	1175.25	1367.97	330.22	249.99	290.99	70.24
2004	1299.91	1497.86	361.08	273.77	315.47	76.05
2005	1418.75	1620.23	386.08	294.39	336.19	80.11
2006	1631.01	1854.97	424.37	335.41	381.47	87.27
2007	1859.43	2106.65	463.20	373.42	423.07	93.02
2008	2092.57	2362.16	503.00	399.85	451.37	96.11
2009	2356.69	2651.85	547.10	457.18	514.44	106.13
2010	2598.19	2915.22	584.13	492.21	552.27	110.66
2011	2829.81	3167.01	614.21	507.66	568.16	110.19
2012	3052.14	3406.54	645.80	530.06	591.61	112.15
2013	3341.12	3721.99	673.57	561.71	625.74	113.24
2014	3636.71	4043.31	704.18	601.77	669.06	116.52
2015	3916.05	4345.26	732.55	636.54	706.31	119.07

Figure BJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

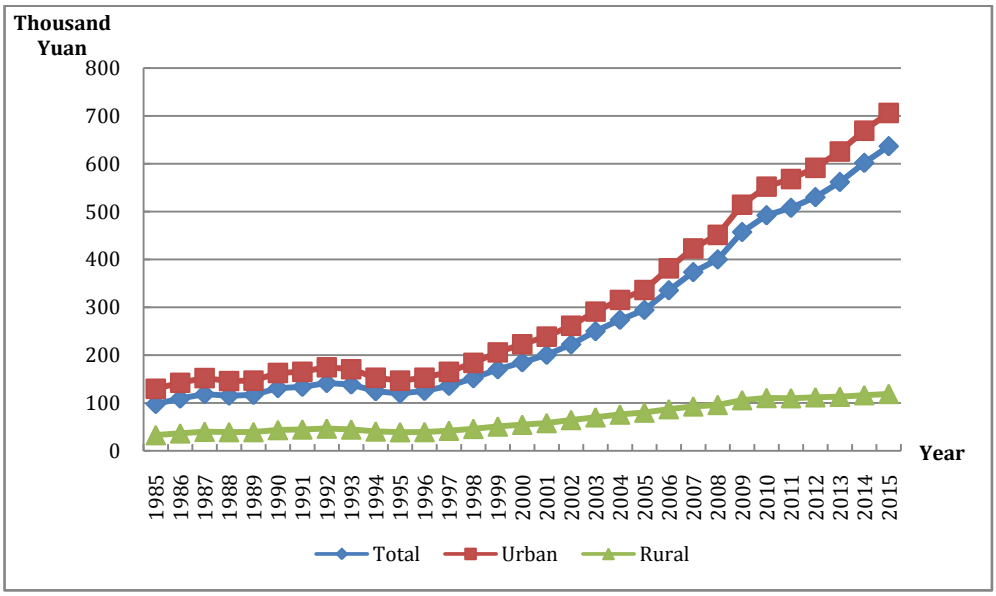

Figure BJ-2.2 Real Human Capital Per Capita by Region for Beijing，1985-2015

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 2015, the nominal labor force human capital increases

from 344 billion Yuan to 38,950 billion Yuan, an increase of more than 112 times; and the real labor force human capital increases from 344 billion Yuan to 6,331 billion Yuan, an increase of approximately 17 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	344	342	344	342
1986	419	416	392	389
1987	513	510	443	440
1988	621	618	445	443
1989	741	737	453	451
1990	875	871	507	505
1991	1010	1005	523	521
1992	1155	1156	545	545
1993	1329	1332	526	528
1994	1529	1534	485	486
1995	1759	1769	476	478
1996	2071	2081	502	504
1997	2510	2520	577	580
1998	3083	3092	693	695
1999	3688	3699	824	826
2000	4466	4362	964	941
2001	4942	4913	1034	1028
2002	5452	5514	1162	1175
2003	6376	6504	1356	1384
2004	7136	7449	1503	1569
2005	8118	8515	1685	1767
2006	10131	10707	2083	2202
2007	12695	13498	2550	2711

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	15753	16837	3010	3217
2009	19056	20482	3697	3973
2010	22616	24429	4284	4628
2011	25466	27518	4569	4937
2012	28441	30735	4939	5338
2013	31929	34514	5368	5803
2014	35396	38228	5857	6326
2015	38950	41992	6331	6826

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 2015, the nominal average labor force human capital increases from 59,320 Yuan to 2,427,690 Yuan, an increase of more than 39 times; and the Real average labor force human capital from 59,320 Yuan to 394,610 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	59.32	73.80	26.40	59.32	73.80	26.40
1986	70.24	86.10	31.28	65.77	80.62	29.29
1987	83.33	100.74	36.93	71.84	86.86	31.84
1988	97.89	116.72	43.50	70.10	83.59	31.15
1989	113.89	134.15	50.90	69.59	81.96	31.10

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	130.65	152.36	59.67	75.74	88.32	34.59
1991	146.49	170.44	68.84	75.89	88.30	35.66
1992	163.83	190.35	78.80	77.23	89.73	37.15
1993	184.88	214.86	90.00	73.24	85.11	35.65
1994	208.45	242.27	102.23	66.11	76.83	32.42
1995	234.72	272.61	115.51	63.46	73.71	31.23
1996	270.14	313.71	130.83	65.45	76.00	31.70
1997	315.98	366.78	149.08	72.70	84.39	34.30
1998	369.72	428.44	169.83	83.07	96.27	38.16
1999	423.68	490.16	191.09	94.63	109.48	42.68
2000	495.41	574.04	213.30	106.91	123.87	46.03
2001	537.44	616.93	234.55	112.49	129.13	49.09
2002	578.30	657.84	256.78	123.26	140.21	54.73
2003	655.95	742.72	281.73	139.53	157.99	59.93
2004	719.90	810.30	306.13	151.62	170.66	64.47
2005	799.35	894.83	329.86	165.86	185.67	68.44
2006	934.34	1044.90	369.87	192.14	214.88	76.06
2007	1096.27	1224.73	409.68	220.16	245.96	82.27
2008	1273.10	1419.44	450.45	243.27	271.23	86.07
2009	1453.96	1617.59	493.29	282.06	313.80	95.69
2010	1633.30	1813.88	532.44	309.42	343.63	100.87
2011	1778.92	1972.80	560.45	319.13	353.92	100.54
2012	1929.65	2136.89	589.51	335.12	371.11	102.38
2013	2104.10	2327.68	618.12	353.74	391.33	103.92
2014	2267.78	2504.55	644.87	375.25	414.43	106.71
2015	2427.69	2676.39	666.91	394.61	435.04	108.40

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	592	591	592	591	32
1986	680	680	637	636	37
1987	783	783	686	686	42
1988	905	905	679	679	47
1989	1048	1049	685	686	52
1990	1222	1225	776	778	56
1991	1377	1381	793	796	62
1992	1587	1594	820	824	68
1993	1815	1824	798	802	75
1994	2055	2067	729	733	85
1995	2318	2333	713	718	95
1996	2660	2684	750	757	107
1997	3071	3105	841	850	120
1998	3503	3546	964	975	136
1999	4102	4168	1141	1159	151

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	4771	5410	1332	1511	166
2001	5409	6141	1492	1694	185
2002	5967	6863	1653	1901	208
2003	6957	7767	1908	2130	237
2004	7920	8908	2123	2388	271
2005	8959	10307	2367	2723	313
2006	10517	13115	2737	3413	363
2007	12343	16247	3083	4058	425
2008	14295	19239	3387	4559	508
2009	16593	22623	3971	5415	635
2010	19159	26150	4431	6048	788
2011	22348	30550	4927	6735	965
2012	25826	35388	5544	7596	1153
2013	30174	41372	6282	8614	1362
2014	34951	47882	7141	9783	1597
2015	40217	55058	8080	11062	1794

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 2015, the nominal human capital per capita increases from 83,480 Yuan to 3,220,740 Yuan, an increase of more than 37 times; and the real human capital per capita increases from 83,480 Yuan to 647,080 Yuan, an increase of approximately 7 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 2015, 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.

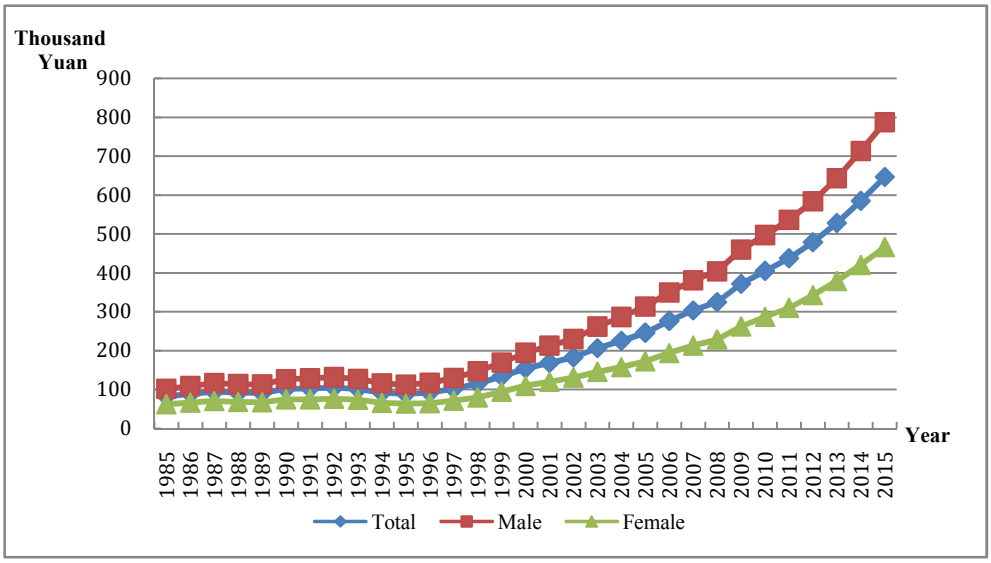

Figure TJ-2.1 Human Capital Per Capita by Gender for Tianjin，1985-2015

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	83.48	103.17	38.33	83.48	103.17	38.33
1986	95.02	116.52	45.43	88.97	109.10	42.53
1987	108.38	132.01	53.59	95.02	115.73	46.98
1988	123.25	148.66	62.94	92.43	111.49	47.21
1989	140.45	168.20	73.04	91.83	109.98	47.76
1990	161.57	192.18	85.55	102.56	122.00	54.31

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	179.66	210.83	100.36	103.49	121.45	57.81
1992	204.65	238.06	117.63	105.82	123.10	60.83
1993	231.90	267.85	136.11	101.97	117.78	59.85
1994	260.19	298.23	156.49	92.27	105.75	55.49
1995	290.50	331.14	178.14	89.34	101.84	54.79
1996	328.12	372.70	201.01	92.58	105.16	56.72
1997	373.49	423.55	227.11	102.21	115.91	62.15
1998	419.55	474.80	254.02	115.40	130.59	69.87
1999	483.51	548.97	282.57	134.47	152.67	78.58
2000	554.63	631.40	313.42	154.87	176.30	87.51
2001	613.54	697.57	344.62	169.28	192.47	95.09
2002	661.49	749.03	376.05	183.25	207.50	104.17
2003	754.09	857.77	409.63	206.83	235.27	112.35
2004	841.48	958.25	446.63	225.61	256.92	119.75
2005	934.23	1065.52	482.87	246.78	281.46	127.55
2006	1065.15	1217.29	525.34	277.20	316.80	136.72
2007	1216.98	1393.54	570.26	303.95	348.05	142.43
2008	1372.43	1573.62	612.11	325.21	372.88	145.05
2009	1555.70	1785.28	661.38	372.36	427.31	158.30
2010	1753.74	2014.76	706.34	405.57	465.93	163.35
2011	1986.73	2280.63	751.53	437.99	502.78	165.68
2012	2233.40	2558.49	801.03	479.43	549.21	171.95
2013	2539.83	2906.61	850.23	528.81	605.18	177.02
2014	2866.42	3275.45	904.40	585.68	669.26	184.79
2015	3220.74	3674.97	955.86	647.08	738.34	192.04

Figure TJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

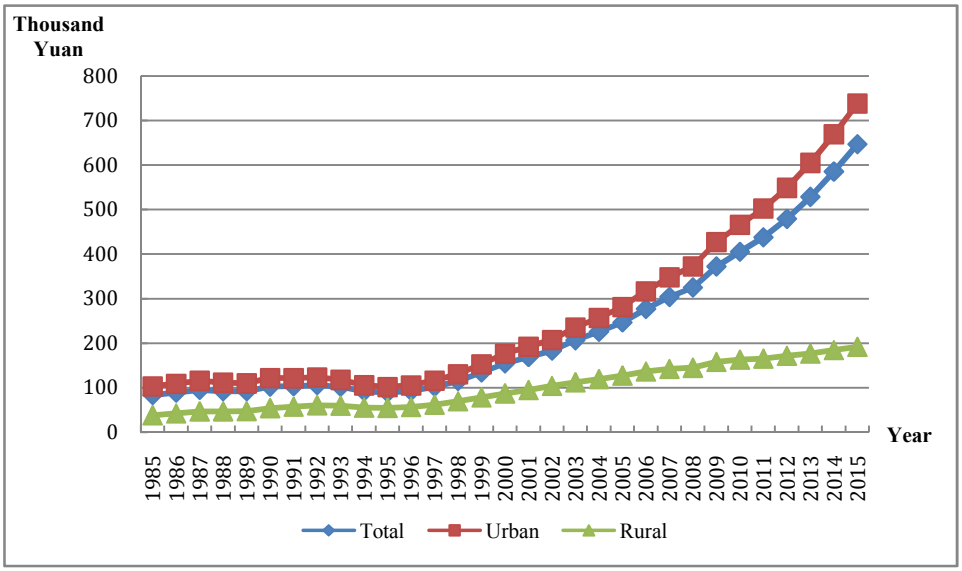

Figure TJ-2.2 Real Human Capital Per Capita by Region for Tianjin，1985-2015

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 2015, the nominal labor force human capital increases from 261 billion Yuan to 19,792 billion Yuan, an increase of more than 74

times; and the real labor force human capital increases from 261 billion Yuan to 3,976 billion Yuan, an increase of approximately 14 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	261	260	261	260
1986	298	297	279	279
1987	343	342	301	300
1988	395	394	296	296
1989	454	453	297	296
1990	524	522	332	331
1991	592	590	341	340
1992	663	662	343	342
1993	741	740	326	325
1994	831	829	295	294
1995	931	930	286	286
1996	1063	1062	300	300
1997	1242	1241	340	340
1998	1469	1467	404	403
1999	1713	1710	476	476
2000	2006	1980	560	553
2001	2244	2234	619	616
2002	2498	2501	692	693
2003	2887	2890	792	793
2004	3225	3274	865	878
2005	3662	3723	967	983
2006	4460	4551	1161	1184
2007	5463	5594	1364	1397
2008	6679	6864	1583	1626

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	8045	8308	1926	1989
2010	9582	9947	2216	2300
2011	10987	11455	2422	2525
2012	12597	13181	2704	2829
2013	14728	15458	3066	3218
2014	17115	18035	3497	3685
2015	19792	20943	3976	4208

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 2015, the nominal average labor force human capital increases from 54,240 Yuan to 1,982,294 Yuan, an increase of more than 35 times; and the Real average labor force human capital from 54,240 Yuan to 398,390 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	54.24	63.98	26.47	54.24	63.98	26.47
1986	61.38	71.89	31.64	57.47	67.31	29.62
1987	69.61	81.08	37.73	61.03	71.09	33.08
1988	78.14	90.23	44.23	58.60	67.67	33.17

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	87.73	100.66	51.40	57.36	65.82	33.61
1990	99.28	112.99	60.21	63.02	71.73	38.22
1991	110.27	124.05	69.79	63.52	71.46	40.20
1992	122.05	135.83	80.52	63.11	70.24	41.63
1993	135.49	149.51	92.61	59.57	65.74	40.72
1994	150.50	164.80	106.09	53.37	58.44	37.62
1995	166.88	181.59	121.13	51.32	55.85	37.25
1996	187.32	203.01	136.90	52.85	57.28	38.63
1997	213.42	231.18	155.16	58.41	63.27	42.46
1998	244.06	264.24	175.67	67.13	72.68	48.32
1999	275.78	298.59	196.33	76.70	83.04	54.60
2000	314.21	341.08	217.82	87.73	95.24	60.82
2001	342.21	370.64	240.62	94.42	102.26	66.39
2002	369.41	399.14	264.48	102.33	110.57	73.27
2003	414.61	449.82	290.95	113.72	123.38	79.80
2004	454.22	493.21	317.67	121.78	132.24	85.17
2005	504.41	549.52	344.21	133.24	145.16	90.92
2006	591.47	648.39	385.63	153.93	168.74	100.36
2007	696.83	770.22	423.76	174.04	192.37	105.84
2008	817.62	909.89	461.28	193.74	215.61	109.30
2009	950.90	1063.39	501.93	227.60	254.53	120.14
2010	1094.43	1229.27	537.36	253.10	284.28	124.27
2011	1219.89	1369.70	573.64	268.93	301.96	126.46
2012	1362.22	1528.87	614.34	292.42	328.19	131.88
2013	1549.99	1741.86	655.55	322.72	362.67	136.49
2014	1755.56	1974.55	692.07	358.70	403.45	141.41
2015	1982.94	2231.44	724.25	398.39	448.32	145.51

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1994	1993	1994	1993	76
1986	2323	2323	2200	2200	84
1987	2694	2694	2369	2369	92
1988	3211	3212	2393	2393	101
1989	3790	3792	2357	2359	110
1990	4397	4400	2724	2726	118
1991	5072	5077	3038	3041	129
1992	5839	5847	3313	3317	142
1993	6732	6742	3372	3377	157
1994	7670	7684	3156	3161	175
1995	8656	8676	3090	3096	200
1996	9877	9906	3282	3291	232
1997	11214	11255	3589	3601	270
1998	12684	12728	4116	4129	313
1999	14314	14375	4725	4743	359

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	16187	16281	5342	5370	402
2001	18389	18552	6006	6055	446
2002	20089	20302	6603	6667	491
2003	22400	22686	7176	7260	548
2004	24620	25015	7546	7658	621
2005	26556	27016	7987	8116	723
2006	30271	30871	8912	9077	840
2007	34202	34959	9580	9779	976
2008	38175	39104	10023	10255	1155
2009	42463	43607	11193	11483	1353
2010	47099	48506	12017	12363	1562
2011	53018	54694	12768	13159	1825
2012	58829	60705	13785	14212	2105
2013	65465	67548	14876	15337	2393
2014	72827	75084	16245	16737	2679
2015	80691	83137	17808	18335	2955

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 2015, the nominal human capital per capita increases from 40,360 Yuan to1,325,340 Yuan, an increase of more than31 times; and the real human capital per capita increases from 40,360 Yuan to 292,490 Yuan, an increase of approximately6.25 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 2015, 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.

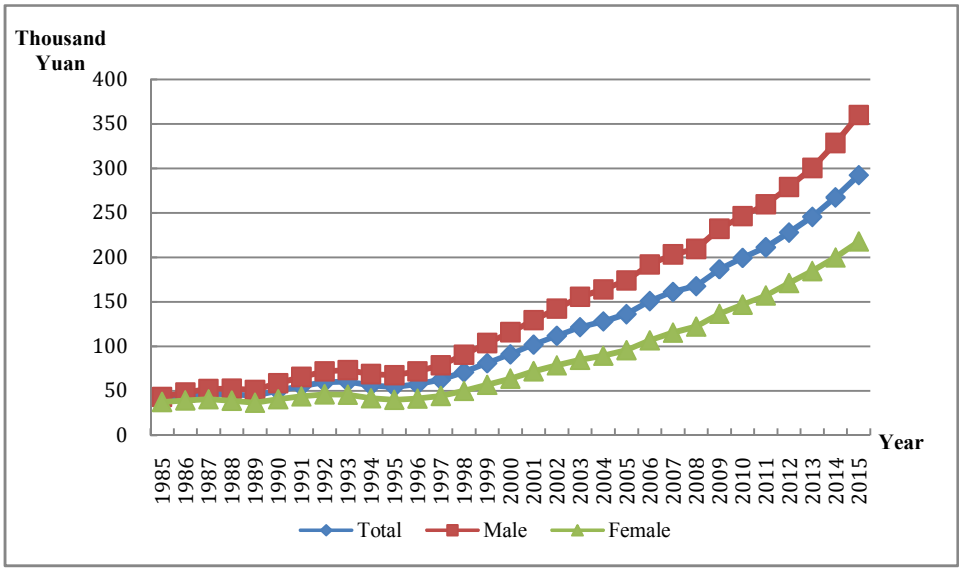

Figure HeB-2.1 Human Capital Per Capita by Gender for Hebei，1985-2015

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	40.36	84.61	31.68	40.36	84.61	31.68
1986	46.33	95.14	36.31	43.87	89.76	34.45
1987	52.92	104.73	41.85	46.54	91.31	36.97
1988	61.58	121.77	48.05	45.89	89.75	36.03
1989	71.00	139.36	54.93	44.16	88.62	33.71
1990	80.59	149.53	63.77	49.92	93.96	39.18

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	92.00	171.11	72.28	55.11	100.86	43.70
1992	104.89	195.66	81.80	59.51	106.30	47.60
1993	119.87	224.28	92.83	60.05	105.49	48.28
1994	135.47	251.71	104.95	55.74	94.80	45.48
1995	151.83	279.61	117.83	54.19	90.70	44.48
1996	171.93	314.84	131.06	57.13	94.92	46.32
1997	194.27	352.89	145.71	62.18	102.59	49.81
1998	218.78	394.83	161.39	71.00	116.29	56.24
1999	245.82	440.87	178.55	81.14	131.56	63.75
2000	275.64	492.29	196.66	90.97	146.18	70.85
2001	312.03	550.30	216.40	101.91	162.75	77.50
2002	340.25	582.06	234.36	111.83	174.59	84.35
2003	379.45	643.75	254.46	121.56	188.75	89.79
2004	417.83	695.71	277.08	128.06	196.71	93.29
2005	453.06	734.47	301.80	136.27	204.80	99.43
2006	512.79	816.89	332.36	150.98	223.98	107.67
2007	575.65	904.12	361.76	161.24	237.59	111.53
2008	638.96	988.69	392.47	167.76	246.97	111.93
2009	708.49	1077.44	428.97	186.76	272.34	121.93
2010	781.66	1175.71	462.43	199.43	289.02	126.86
2011	878.00	1314.18	499.68	211.43	306.80	128.72
2012	973.13	1439.28	540.67	228.02	327.28	135.93
2013	1081.10	1585.36	581.88	245.66	351.02	141.35
2014	1199.20	1737.63	631.19	267.50	378.31	150.61
2015	1325.34	1899.06	681.09	292.49	408.95	161.71

Figure HeB-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

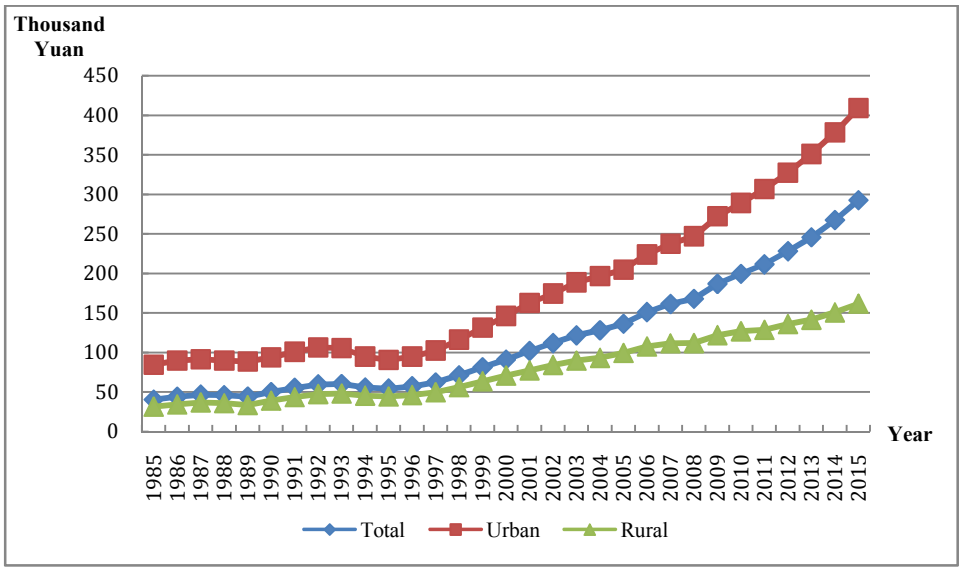

Figure HeB-2.2 Real Human Capital Per Capita by Region for Hebei，1985-2015

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-3.1From 1985 to 2015, thenominal labor force human capital increases from 801billion Yuan to 30,088 billion Yuan, an increase of more than 36 times; and the real labor force human capital increases from 801billion Yuan

to 6,690 billion Yuan, an increase of approximately 7.35 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	801	800	801	800
1986	947	946	897	896
1987	1132	1131	996	995
1988	1332	1331	993	992
1989	1559	1558	968	967
1990	1836	1835	1137	1136
1991	2089	2088	1252	1252
1992	2349	2349	1338	1338
1993	2642	2642	1333	1333
1994	2992	2992	1243	1243
1995	3398	3398	1225	1225
1996	3835	3836	1291	1291
1997	4343	4347	1412	1413
1998	4935	4940	1630	1632
1999	5618	5623	1889	1890
2000	6524	6504	2192	2186
2001	7198	7184	2401	2397
2002	7942	7935	2669	2667
2003	8882	8878	2920	2919
2004	9852	9900	3097	3110
2005	10949	11009	3367	3383
2006	12302	12381	3709	3731
2007	13848	13948	3969	3995
2008	15458	15586	4133	4165

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	17596	17769	4703	4747
2010	20070	20301	5173	5231
2011	21653	21925	5264	5327
2012	23043	23354	5453	5524
2013	24894	25248	5708	5787
2014	27365	27766	6154	6241
2015	30088	30563	6690	6793

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 2015, thenominal average labor force human capital increases from 26,610 Yuan to 740,320 Yuan, an increase of more than 26 times; and the Real average labor force human capital from 26,610 Yuan to 164,620 Yuan, an increase of approximately 5.19 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	26.61	50.88	21.92	26.61	50.88	21.92
1986	30.76	58.03	25.18	29.13	54.74	23.89
1987	35.83	66.40	29.00	31.51	57.89	25.62

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	40.71	72.77	33.51	30.36	53.63	25.13
1989	46.23	79.96	38.42	28.71	50.85	23.58
1990	53.27	88.98	44.18	32.98	55.91	27.14
1991	59.66	97.99	50.04	35.77	57.76	30.25
1992	66.52	107.41	56.46	37.89	58.35	32.86
1993	74.40	118.28	63.61	37.53	55.64	33.08
1994	83.40	131.26	71.46	34.65	49.43	30.97
1995	93.58	146.17	80.09	33.74	47.41	30.23
1996	104.58	161.46	89.51	35.21	48.68	31.64
1997	117.41	179.02	100.41	38.16	52.04	34.33
1998	131.57	197.67	112.57	43.47	58.22	39.23
1999	147.70	222.74	124.57	49.66	66.47	44.48
2000	167.34	255.00	137.97	56.24	75.72	49.71
2001	183.42	271.02	151.67	61.19	80.15	54.32
2002	199.03	285.43	165.90	66.89	85.62	59.71
2003	218.57	308.32	182.50	71.85	90.40	64.40
2004	239.24	331.95	199.72	75.20	93.86	67.25
2005	263.26	361.45	217.86	80.95	100.79	71.77
2006	294.84	399.25	242.66	88.89	109.47	78.61
2007	329.66	447.28	265.93	94.48	117.54	81.98
2008	365.53	494.86	288.88	97.73	123.61	82.39
2009	412.67	563.14	314.22	110.29	142.34	89.31
2010	465.34	642.41	336.62	119.95	157.92	92.35
2011	510.67	708.01	359.70	124.14	165.29	92.66
2012	553.16	761.80	384.78	130.90	173.23	96.74
2013	604.13	830.38	410.79	138.53	183.86	99.79
2014	669.04	921.96	438.29	150.45	200.73	104.58
2015	740.32	1021.77	465.14	164.62	220.04	110.44

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	723	722	723	722	43
1986	849	849	804	804	49
1987	1010	1010	889	889	55
1988	1159	1159	843	843	58
1989	1368	1368	833	834	61
1990	1665	1665	993	993	64
1991	1889	1891	1076	1077	68
1992	2198	2201	1170	1172	72
1993	2556	2559	1188	1190	77
1994	2952	2957	1096	1097	82
1995	3388	3395	1075	1077	87
1996	3890	3902	1143	1147	92
1997	4423	4440	1261	1265	100
1998	4983	5004	1440	1446	111
1999	5581	5609	1620	1627	123

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	6399	6438	1784	1794	135
2001	7376	7448	2054	2073	149
2002	8308	8409	2346	2374	166
2003	9577	9720	2646	2684	188
2004	10755	10949	2847	2896	218
2005	11921	12136	3078	3132	256
2006	13394	13687	3385	3458	303
2007	14848	15210	3583	3669	359
2008	16242	16681	3653	3751	418
2009	17807	18324	4021	4136	504
2010	19997	20614	4380	4515	601
2011	22288	23007	4640	4789	716
2012	24758	25580	5028	5194	826
2013	27515	28430	5424	5603	948
2014	30509	31509	5911	6104	1065
2015	33708	34803	6489	6699	1172

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 2015, the nominal human capital per capita increases from 31,190 Yuan to 1,090,360 Yuan, an increase of more than 34 times; and the real human capital per capita increases from 31,190 Yuan to 209,890 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 2015, 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.

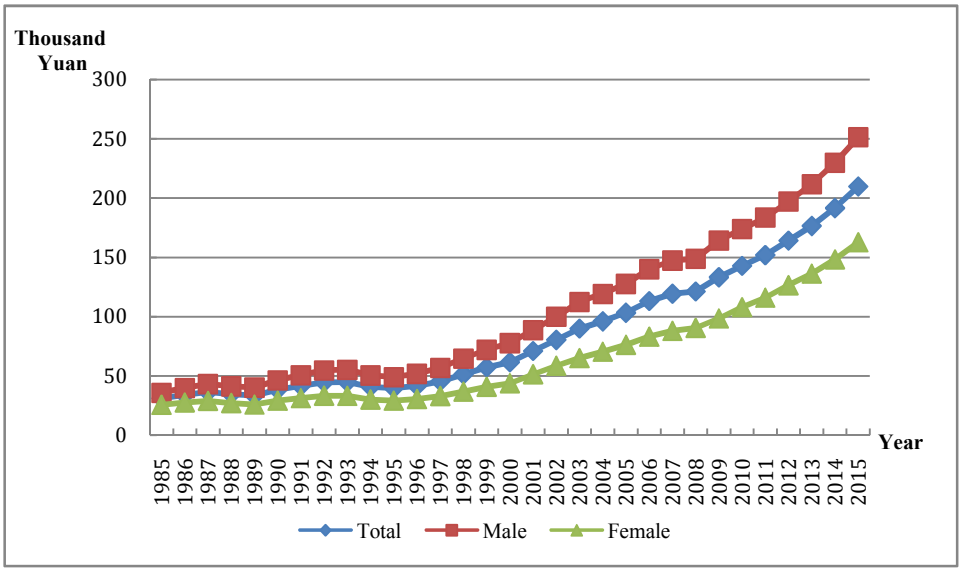

Figure SX-2.1 Human Capital Per Capita by Gender for Shanxi，1985-2015

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	31.19	68.11	19.66	31.19	68.11	19.66
1986	36.12	76.13	22.95	34.20	71.55	21.89
1987	41.59	83.65	26.41	36.58	72.46	23.64
1988	47.70	94.13	30.85	34.71	66.78	23.07
1989	55.10	105.96	35.69	33.57	64.64	21.71
1990	64.33	118.72	41.56	38.36	71.35	24.55
1991	73.08	133.36	47.88	41.63	75.47	27.49
1992	84.02	151.46	54.86	44.73	78.56	30.11

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1993	96.56	172.26	62.82	44.89	76.96	30.59
1994	110.26	194.47	71.57	40.92	69.01	28.02
1995	125.16	218.52	81.02	39.70	66.45	27.06
1996	142.07	247.21	90.98	41.76	69.41	28.32
1997	159.80	275.65	101.96	45.55	75.07	30.82
1998	178.15	303.97	113.70	51.48	83.87	34.89
1999	197.44	333.01	126.24	57.30	91.52	39.33
2000	221.41	369.14	139.77	61.71	96.90	42.27
2001	255.36	434.21	156.11	71.12	114.55	47.03
2002	284.96	473.51	172.14	80.49	127.72	52.22
2003	325.79	537.18	190.29	90.03	142.62	56.32
2004	363.21	588.31	209.64	96.14	150.76	58.87
2005	400.53	639.53	228.18	103.42	161.15	61.78
2006	448.02	709.20	248.83	113.25	175.55	65.73
2007	494.88	774.74	270.03	119.41	184.04	67.49
2008	539.52	835.63	289.89	121.36	185.52	67.27
2009	590.75	906.39	312.22	133.38	203.16	71.80
2010	652.63	978.74	335.84	142.96	212.78	75.13
2011	730.43	1108.74	360.37	152.08	229.35	76.49
2012	808.71	1219.87	387.56	164.24	246.31	80.16
2013	896.02	1347.61	413.51	176.63	264.39	82.86
2014	989.61	1482.20	440.95	191.73	285.64	87.13
2015	1090.36	1623.81	472.17	209.89	311.07	92.65

Figure SX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

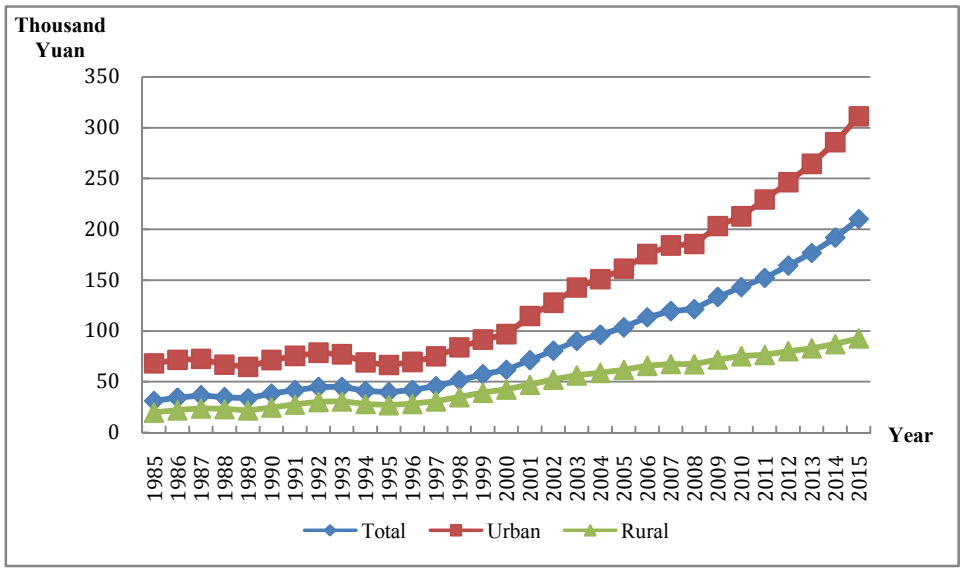

Figure SX-2.2 Real Human Capital Per Capita by Region for Shanxi，1985-2015

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 2015, the nominal labor force human capital increases from 296 billion Yuan to 14,697 billion Yuan, an increase of more than 48 times; and the real labor force human capital increases from 296 billion Yuan to 2,836 billion Yuan, an increase of approximately 8 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	296	296	296	296
1986	349	349	331	331
1987	438	438	386	386
1988	510	509	371	371
1989	610	610	372	372
1990	765	764	456	456
1991	864	863	492	492
1992	986	986	526	526
1993	1123	1123	524	524
1994	1277	1276	476	476
1995	1454	1453	463	463
1996	1635	1635	483	483
1997	1838	1839	527	527
1998	2083	2083	606	606
1999	2349	2351	687	687
2000	2766	2750	777	772
2001	2956	2944	833	829
2002	3248	3242	928	927
2003	3654	3652	1023	1022
2004	4041	4064	1082	1088
2005	4541	4570	1183	1190
2006	5088	5129	1297	1307
2007	5651	5702	1372	1384
2008	6384	6449	1443	1458

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	7318	7402	1657	1676
2010	8578	8693	1884	1909
2011	9252	9380	1932	1958
2012	10090	10239	2055	2085
2013	11354	11526	2243	2277
2014	12978	13178	2521	2560
2015	14697	14943	2836	2883

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 2015, the nominal average labor force human capital increases from 21,760 Yuan to 673,930 Yuan, an increase of more than 29 times; and the Real average labor force human capital from 21,760 Yuan to 130,020 Yuan, an increase of approximately 5 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	21.76	44.14	14.49	21.76	44.14	14.49
1986	25.28	49.41	16.90	23.94	46.44	16.13
1987	29.61	55.72	19.61	26.06	48.26	17.55

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	34.12	62.60	23.00	24.84	44.41	17.20
1989	39.54	70.33	26.77	24.09	42.90	16.29
1990	46.75	79.93	31.36	27.88	48.04	18.52
1991	52.66	88.60	36.27	30.00	50.14	20.82
1992	59.16	97.54	41.64	31.55	50.60	22.85
1993	66.58	107.77	47.61	31.06	48.15	23.19
1994	74.98	119.60	54.10	27.96	42.44	21.18
1995	84.39	133.04	61.04	26.90	40.45	20.39
1996	93.87	146.06	68.25	27.75	41.01	21.25
1997	104.51	160.59	76.19	29.97	43.73	23.03
1998	116.01	175.75	85.03	33.74	48.49	26.09
1999	127.98	191.42	94.08	37.42	52.61	29.31
2000	145.15	216.83	104.17	40.75	56.91	31.51
2001	157.49	234.05	115.94	44.36	61.74	34.93
2002	172.27	251.55	128.29	49.24	67.85	38.92
2003	191.78	277.71	142.55	53.68	73.73	42.19
2004	210.62	301.11	156.79	56.39	77.16	44.03
2005	233.79	334.50	171.48	60.90	84.29	46.43
2006	259.13	368.97	188.28	66.05	91.33	49.74
2007	285.58	404.53	204.19	69.34	96.10	51.03
2008	315.94	446.96	221.23	71.43	99.23	51.34
2009	353.03	499.62	241.38	79.93	111.99	55.51
2010	400.10	561.23	261.31	87.87	122.01	58.46
2011	436.79	622.62	283.75	91.19	128.79	60.23
2012	476.06	675.59	308.19	96.95	136.41	63.74
2013	530.30	756.43	333.65	104.79	148.41	66.85
2014	599.40	862.29	360.59	116.44	166.18	71.25
2015	673.93	976.60	386.48	130.02	187.08	75.84

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	781	781	781	781	25
1986	912	912	868	868	28
1987	1066	1066	944	944	31
1988	1235	1236	941	941	35
1989	1427	1428	936	936	38
1990	1677	1678	1074	1074	41
1991	1889	1890	1156	1157	45
1992	2137	2139	1224	1225	52
1993	2428	2431	1222	1223	60
1994	2758	2762	1127	1129	68
1995	3137	3143	1091	1093	76

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	3615	3626	1167	1170	83
1997	4186	4205	1290	1296	92
1998	4762	4788	1477	1484	101
1999	5432	5470	1684	1695	111
2000	6182	6246	1889	1908	123
2001	7149	7270	2165	2201	136
2002	7869	8020	2331	2374	157
2003	8936	9135	2590	2646	197
2004	9956	10217	2803	2876	254
2005	11051	11357	3039	3123	337
2006	12557	12959	3402	3510	435
2007	14249	14728	3693	3816	556
2008	16097	16697	3950	4097	700
2009	18022	18701	4435	4601	899
2010	20516	21426	4896	5113	1123
2011	23427	24548	5297	5550	1371
2012	25886	27135	5671	5944	1659
2013	28820	30211	6110	6404	2007
2014	32066	33575	6687	7001	2274
2015	35246	36866	7269	7602	2531

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 2015, the nominal human capital per capita increases from 41,980 Yuan to 1,700,920 Yuan, an

increase of more than 39 times; and the real human capital per capita increases from 41,980 Yuan to 350,800 Yuan, an increase of approximately 7 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 2015, 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.

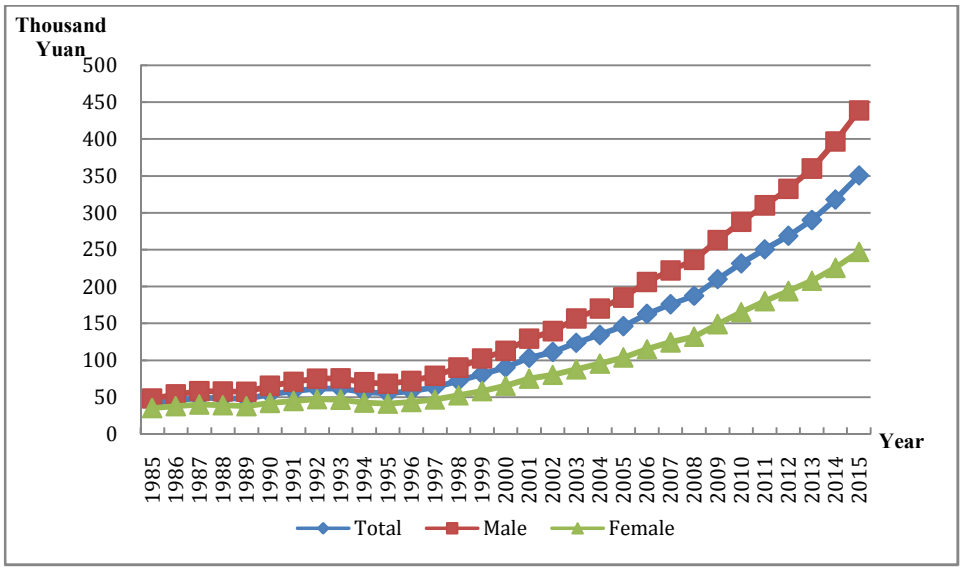

Figure NMG-2.1 Human Capital Per Capita by Gender for Inner Mongolia，1985-2015

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	41.98	76.35	25.51	41.98	76.35	25.51
1986	48.42	87.02	29.25	46.08	82.48	27.99

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	55.95	99.60	33.52	49.53	87.01	30.26
1988	64.03	112.29	38.18	48.76	83.84	29.97
1989	73.07	126.65	43.28	47.92	82.45	28.72
1990	84.86	145.06	50.13	54.34	92.76	32.17
1991	95.49	162.08	56.74	58.43	97.78	35.53
1992	108.00	182.74	64.12	61.86	101.42	38.64
1993	122.84	207.41	72.84	61.81	100.36	39.02
1994	139.59	235.47	82.52	57.04	91.66	36.44
1995	158.73	267.67	93.50	55.21	88.98	34.99
1996	180.73	302.52	104.22	58.34	93.55	36.21
1997	206.79	345.28	115.53	63.75	102.08	38.49
1998	233.04	385.81	127.83	72.27	114.86	42.93
1999	263.10	432.28	141.43	81.56	128.31	47.93
2000	296.08	483.56	155.61	90.48	141.69	52.11
2001	342.05	557.16	170.50	103.61	162.28	56.81
2002	376.28	601.88	184.88	111.45	173.92	58.45
2003	427.65	679.36	201.13	123.94	193.41	61.43
2004	478.04	750.56	218.31	134.59	208.46	64.18
2005	532.94	826.02	237.29	146.57	224.92	67.53
2006	601.92	925.97	257.08	163.07	248.90	71.73
2007	679.79	1036.16	279.43	176.18	267.04	74.11
2008	764.80	1157.17	301.81	187.70	282.95	75.30
2009	854.63	1279.09	328.73	210.30	313.70	82.18
2010	969.99	1444.12	353.49	231.49	343.86	85.38
2011	1108.16	1642.49	378.23	250.56	370.71	86.43
2012	1227.59	1800.56	406.04	268.96	393.40	90.52
2013	1369.38	1991.30	434.52	290.32	420.77	94.23
2014	1525.94	2195.95	469.49	318.23	456.25	100.61

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2015	1700.92	2433.54	506.36	350.80	500.12	107.33

Figure NMG-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

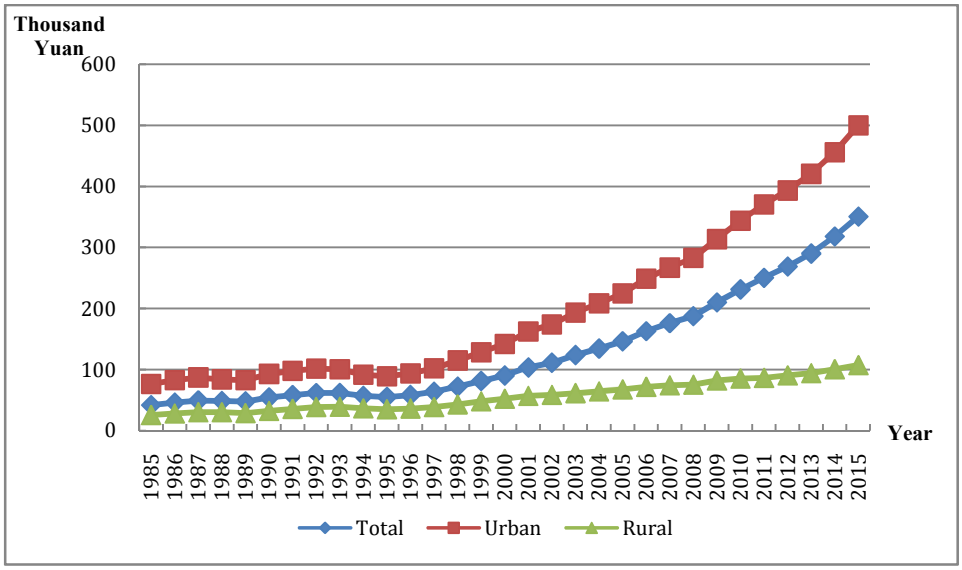

Figure NMG-2.2 Real Human Capital Per Capita by Region for Inner Mongolia，1985-2015

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 2015, the nominal labor force human capital increases from 295 billion Yuan to 13,593 billion Yuan, an increase of more than 45 times; and the real labor force human capital increases from 295 billion Yuan to 2,811 billion Yuan, an increase of approximately 8 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	295	295	295	295
1986	348	348	331	331
1987	413	413	366	366
1988	496	496	379	378
1989	594	594	390	390
1990	703	702	450	450
1991	813	812	498	498
1992	924	924	532	532
1993	1046	1046	529	529
1994	1180	1180	486	486
1995	1328	1328	465	465
1996	1531	1532	498	498
1997	1773	1774	551	552
1998	2051	2053	642	642
1999	2364	2366	740	741

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)
2000	2723	2721	840	840
2001	2995	2997	918	919
2002	3228	3236	965	967
2003	3594	3601	1049	1052
2004	3943	3979	1117	1127
2005	4436	4483	1225	1238
2006	4912	4972	1337	1353
2007	5547	5620	1443	1461
2008	6290	6381	1547	1570
2009	7242	7359	1786	1814
2010	8347	8496	1995	2030
2011	9047	9218	2048	2087
2012	9855	10050	2164	2206
2013	10866	11092	2310	2358
2014	12361	12620	2585	2639
2015	13593	13894	2811	2873

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 2015, the nominal average labor force human capital increases from 27,990 Yuan to 897,830 Yuan, an increase of more than 31 times; and the Real average labor force human capital from 27,990 Yuan to 185,660 Yuan, an

increase of approximately 5.63 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	71.56	109.48	48.67	41.16	60.76	29.33
1986	80.37	122.08	55.16	40.67	59.07	29.55
1987	90.40	136.59	62.25	37.21	53.17	27.49
1988	101.62	152.75	70.07	35.59	50.78	26.22
1989	114.48	170.94	78.41	37.23	52.86	27.24
1990	129.15	192.16	87.71	40.17	56.81	29.22
1991	145.70	215.89	97.98	45.60	64.27	32.91
1992	163.99	241.95	108.34	51.34	71.82	36.72
1993	184.17	270.91	119.50	56.83	79.38	40.02
1994	201.82	294.50	130.77	61.89	85.78	43.57
1995	216.51	311.02	141.78	64.71	89.87	44.82
1996	239.52	343.74	154.09	69.95	97.86	47.07
1997	261.88	373.44	166.08	74.19	103.72	48.82
1998	293.00	416.38	180.48	80.94	113.38	51.36
1999	321.89	454.11	199.48	87.58	122.07	55.66
2000	361.41	508.98	220.20	93.99	131.18	58.40
2001	405.35	569.78	241.40	99.72	139.32	60.23
2002	71.56	109.48	48.67	41.16	60.76	29.33
2003	80.37	122.08	55.16	40.67	59.07	29.55
2004	90.40	136.59	62.25	37.21	53.17	27.49
2005	101.62	152.75	70.07	35.59	50.78	26.22
2006	114.48	170.94	78.41	37.23	52.86	27.24
2007	129.15	192.16	87.71	40.17	56.81	29.22
2008	145.70	215.89	97.98	45.60	64.27	32.91

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	461.92	649.55	264.41	113.90	159.31	66.10
2010	526.42	740.68	286.64	125.81	176.36	69.23
2011	577.97	811.12	309.74	130.85	183.07	70.78
2012	632.80	878.86	335.92	138.94	192.02	74.89
2013	701.32	968.75	363.39	149.08	204.70	78.81
2014	798.46	1101.67	393.46	167.00	228.90	84.32
2015	897.83	1242.43	423.20	185.66	255.33	89.70

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	1652	1652	1652	1652	79
1986	1887	1887	1774	1774	89
1987	2164	2165	1876	1876	100
1988	2523	2524	1847	1848	112
1989	2935	2938	1819	1820	122
1990	3363	3366	2015	2017	132
1991	3776	3781	2147	2150	144
1992	4224	4231	2265	2269	156
1993	4761	4772	2228	2233	174
1994	5324	5339	2008	2013	192
1995	5923	5943	1926	1932	207
1996	6702	6737	2020	2030	221
1997	7504	7554	2189	2202	236
1998	8346	8415	2444	2463	252

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)	
1999	9448	9552	2798	2826	268
2000	10617	10765	3139	3179	289
2001	11685	11898	3448	3506	313
2002	12466	12728	3718	3790	340
2003	13690	14036	3991	4085	378
2004	14932	15352	4182	4293	433
2005	16131	16634	4434	4566	522
2006	17987	18598	4876	5035	626
2007	20148	20929	5180	5374	742
2008	22281	23216	5465	5688	884
2009	24880	26038	6089	6364	1036
2010	27741	29113	6575	6893	1220
2011	31320	33010	7041	7413	1427
2012	34953	36961	7626	8056	1655
2103	38978	41269	8238	8714	1887
2014	43362	45919	8994	9516	2103
2015	48382	51236	9882	10457	2199

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 2015, the nominal human capital per capita increases from 49,700 Yuan to1,441,800 Yuan, an increase of more than28 times; and the real human capital per capita increases from

49,700Yuan to294,480 Yuan, an increase of approximately5 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 2015, 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.

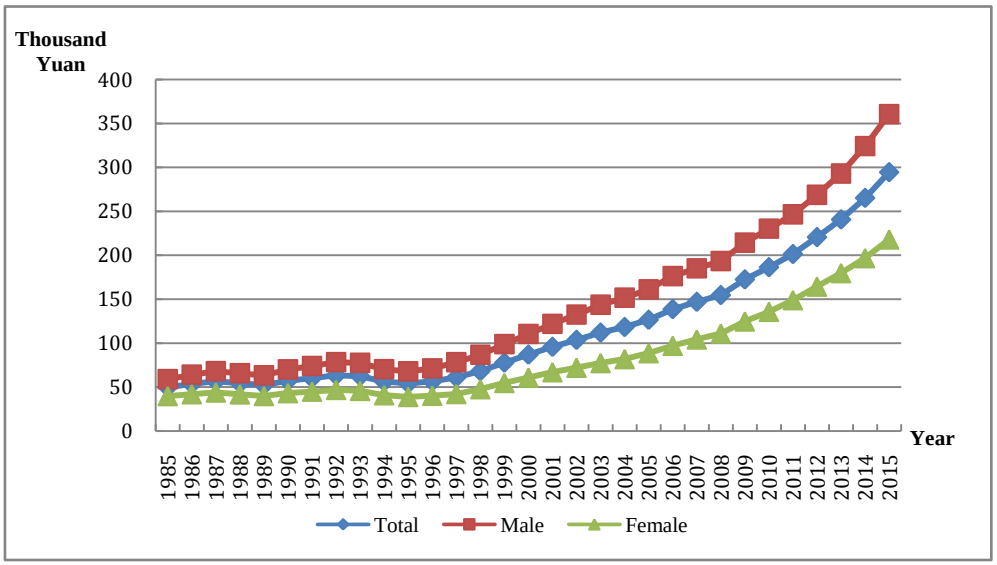

Figure LN-2.1 Human Capital Per Capita by Gender for Liaoning，1985-2015

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	49.70	73.96	28.83	49.70	73.96	28.83
1986	56.84	82.96	33.40	53.44	77.54	31.81
1987	65.25	93.70	38.72	56.55	79.75	34.92
1988	74.13	104.35	44.72	54.26	74.27	34.80
1989	84.20	116.69	51.25	52.16	70.86	33.20

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	95.55	129.81	59.44	57.24	76.45	37.00
1991	105.71	141.87	67.64	60.11	78.83	40.40
1992	118.10	157.32	76.87	63.32	80.86	44.88
1993	133.17	176.95	87.18	62.31	77.94	45.90
1994	149.02	196.94	98.68	56.20	68.79	42.98
1995	165.99	218.20	111.18	53.98	65.65	41.74
1996	187.11	245.51	124.08	56.41	68.26	43.62
1997	209.15	273.69	137.50	61.00	73.31	47.34
1998	232.41	302.73	151.79	68.07	81.26	52.95
1999	262.81	343.81	167.25	77.83	93.49	59.35
2000	293.86	385.59	183.18	86.88	104.86	65.20
2001	324.49	421.45	202.04	95.74	114.72	71.77
2002	347.61	444.86	219.19	103.67	122.44	78.88
2003	384.06	490.37	237.63	111.96	133.37	82.47
2004	422.35	537.35	257.41	118.29	142.17	84.04
2005	460.28	584.25	275.80	126.51	153.35	86.58
2006	511.45	650.33	299.92	138.65	168.84	92.67
2007	571.46	731.12	322.00	146.93	181.46	92.98
2008	630.41	809.49	343.94	154.63	192.44	94.14
2009	704.72	909.73	369.01	172.46	216.28	100.70
2010	786.28	1023.63	388.66	186.36	236.73	101.98
2011	895.65	1171.21	409.83	201.35	257.75	101.92
2012	1011.11	1323.09	432.59	220.60	282.97	104.96
2013	1138.86	1489.08	455.12	240.69	309.53	106.28
2014	1278.77	1665.78	483.10	265.23	340.13	111.26
2015	1441.80	1870.58	511.28	294.48	376.67	116.12

Figure LN-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

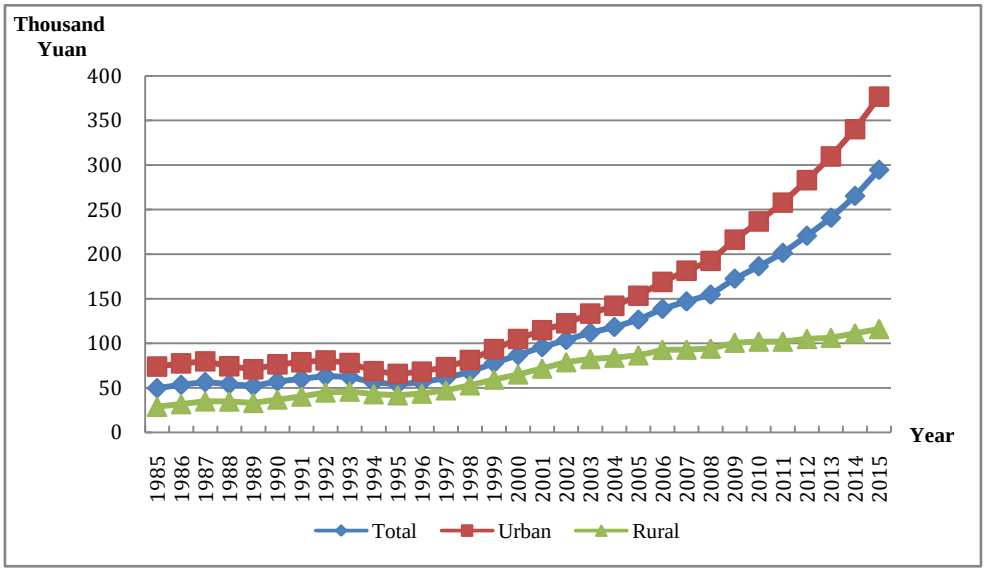

Figure LN-2.2 Real Human Capital Per Capita by Region for Liaoning，1985-2015

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-3.1From 1985 to 2015, thenominal labor force human capital increases from 748billion Yuan to 21,564 billion Yuan, an increase of more than 27

times; and the real labor force human capital increases from 748billion Yuan to 4,432 billion Yuan, an increase of approximately 5 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	748	747	748	747
1986	861	859	809	808
1987	995	994	863	861
1988	1172	1171	859	858
1989	1370	1369	849	849
1990	1584	1582	949	948
1991	1811	1809	1031	1030
1992	2011	2009	1081	1080
1993	2232	2230	1050	1049
1994	2479	2477	942	941
1995	2769	2768	908	908
1996	3129	3128	952	952
1997	3549	3551	1046	1047
1998	4051	4056	1199	1200
1999	4532	4536	1357	1358
2000	5098	5056	1522	1510
2001	5485	5459	1634	1627
2002	5828	5814	1757	1753
2003	6374	6385	1880	1883
2004	6819	6884	1931	1948
2005	7361	7441	2041	2062
2006	8322	8431	2276	2304
2007	9298	9444	2410	2447

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	10458	10654	2583	2630
2009	12031	12301	2961	3026
2010	13853	14219	3298	3383
2011	14989	15424	3389	3485
2012	16240	16753	3567	3677
2013	17701	18290	3766	3889
2014	19669	20347	4106	4245
2015	21564	22352	4432	4591

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 2015, thenominal average labor force human capital increases from 35,140 Yuan to 847,570 Yuan, an increase of more than 23 times; and the Real average labor force human capital from 35,140 Yuan to 174,200 Yuan, an increase of approximately 4 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	35.14	49.33	21.39	35.14	49.33	21.39
1986	40.24	55.64	24.91	37.83	52.00	23.73

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
1987	46.22	63.10	28.97	40.07	53.71	26.13
1988	52.05	69.47	33.58	38.13	49.44	26.13
1989	58.54	76.67	38.69	36.30	46.55	25.07
1990	66.60	85.54	44.81	39.92	50.38	27.89
1991	73.80	93.69	51.17	42.00	52.05	30.56
1992	81.23	101.87	58.02	43.66	52.36	33.88
1993	89.62	111.31	65.62	42.15	49.02	34.55
1994	99.20	122.04	74.10	37.69	42.63	32.27
1995	110.14	134.50	83.64	36.12	40.46	31.40
1996	122.95	149.50	93.24	37.42	41.57	32.78
1997	137.53	167.06	103.74	40.54	44.75	35.72
1998	154.32	187.31	115.14	45.65	50.28	40.16
1999	171.08	207.75	125.97	51.21	56.50	44.70
2000	190.25	232.43	136.67	56.79	63.21	48.64
2001	205.74	248.78	148.37	61.28	67.72	52.70
2002	218.44	260.72	160.58	65.86	71.76	57.79
2003	238.33	283.94	174.56	70.28	77.23	60.58
2004	256.93	305.12	187.79	72.75	80.73	61.31
2005	278.70	331.32	200.24	77.29	86.96	62.86
2006	312.26	372.83	220.34	85.39	96.79	68.08
2007	346.47	416.33	238.97	89.81	103.33	69.01
2008	386.39	468.52	256.98	95.45	111.38	70.34
2009	440.64	541.22	277.10	108.47	128.67	75.62
2010	501.98	624.88	295.51	119.52	144.51	77.54
2011	553.46	691.94	315.71	125.13	152.28	78.51
2012	608.89	761.49	338.70	133.74	162.86	82.18
2013	673.75	845.30	362.32	143.35	175.71	84.61
2014	757.51	953.37	385.32	158.14	194.66	88.74
2015	847.57	1070.25	407.60	174.20	215.51	92.58

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1040	1039	1040	1039	32
1986	1182	1182	1119	1118	36
1987	1335	1335	1182	1182	40
1988	1550	1551	1146	1146	45
1989	1786	1787	1120	1121	48
1990	2072	2073	1231	1231	51
1991	2358	2360	1317	1318	55
1992	2689	2693	1401	1403	60
1993	3063	3068	1431	1434	66
1994	3469	3475	1342	1344	73
1995	3906	3912	1309	1311	80
1996	4411	4426	1381	1385	88
1997	5010	5042	1509	1518	95
1998	5549	5596	1684	1697	102
1999	6201	6268	1914	1934	111

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	6809	6885	2127	2150	122
2001	7792	8416	2401	2582	134
2002	8605	9063	2659	2793	149
2003	9713	10332	2959	3138	167
2004	10702	11344	3129	3308	191
2005	11490	12089	3307	3473	229
2006	12593	13164	3569	3725	289
2007	13769	14543	3716	3918	374
2008	14902	15953	3821	4082	493
2009	16113	17094	4124	4368	620
2010	17290	19439	4269	4786	776
2011	19008	22488	4489	5285	917
2012	20614	25553	4744	5845	1071
2013	22420	27968	5005	6208	1222
2014	24492	30514	5356	6634	1378
2015	26705	33116	5736	7074	1543

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 2015, the nominal human capital per capita increases from 48,91 Yuan to 1,217,630 Yuan, an increase of more than 23 times; and the real human capital per capita increases from 48,910 Yuan to 261,530 Yuan, an increase of approximately 4.53 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 2015, 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.

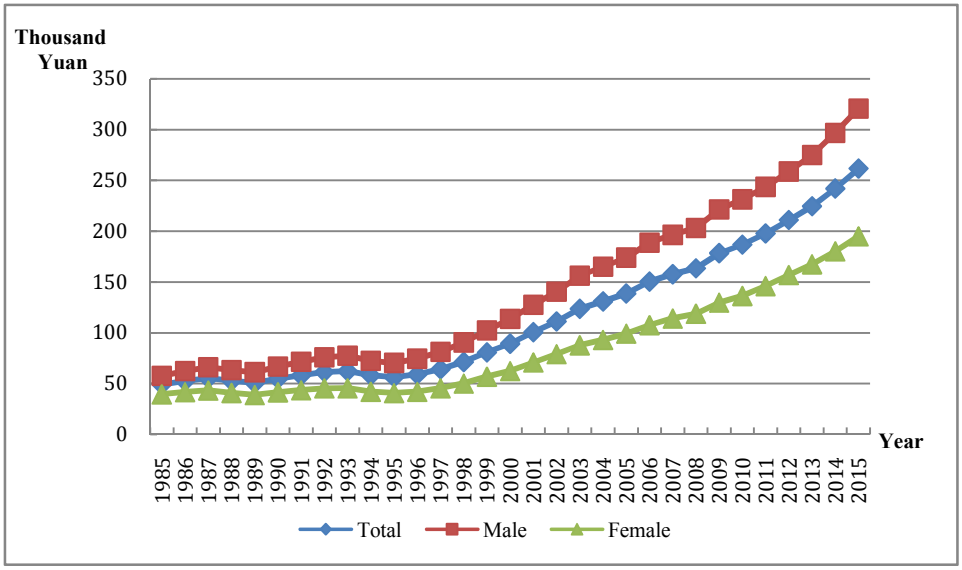

Figure JL-2.1 Human Capital Per Capita by Gender for Jilin，1985-2015

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	48.91	74.92	30.73	48.91	74.92	30.73
1986	55.40	83.65	35.40	52.43	78.91	33.68
1987	62.39	92.25	41.04	55.21	80.59	37.08
1988	71.13	104.16	47.31	52.56	74.83	36.51
1989	80.61	117.17	54.07	50.55	72.00	34.97
1990	92.08	132.94	62.29	54.69	78.62	37.24

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	103.99	148.44	70.48	58.07	81.97	40.05
1992	117.69	166.68	79.49	61.32	84.21	43.47
1993	133.17	187.41	89.46	62.23	83.64	44.97
1994	149.94	209.21	100.69	58.00	75.79	43.22
1995	167.85	232.13	112.83	56.27	73.06	41.90
1996	188.54	260.07	125.51	59.02	76.00	44.05
1997	212.94	294.53	139.03	64.14	83.00	47.06
1998	234.84	322.24	153.63	71.27	91.45	52.52
1999	261.38	358.42	168.94	80.69	103.90	58.58
2000	285.92	388.77	185.60	89.32	114.65	64.61
2001	326.44	449.22	204.62	100.58	130.52	70.88
2002	359.84	495.80	222.57	111.21	145.22	76.87
2003	405.76	564.81	242.35	123.59	163.63	82.46
2004	447.45	623.82	263.31	130.81	174.44	85.24
2005	481.51	667.57	284.97	138.60	184.10	90.54
2006	530.48	736.80	308.57	150.35	200.78	96.11
2007	584.07	813.81	332.79	157.63	212.42	97.70
2008	637.29	890.43	356.53	163.42	221.14	99.40
2009	696.95	974.98	384.69	178.38	242.38	106.50
2010	756.31	1061.64	409.07	186.72	255.25	108.79
2011	837.39	1183.97	434.40	197.76	270.61	113.04
2012	916.48	1300.71	460.37	210.90	290.02	116.97
2013	1005.39	1435.90	483.78	224.47	311.14	119.46
2014	1106.03	1583.14	515.14	241.87	335.99	125.32
2015	1217.63	1746.32	547.97	261.53	364.42	131.21

Figure JL-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

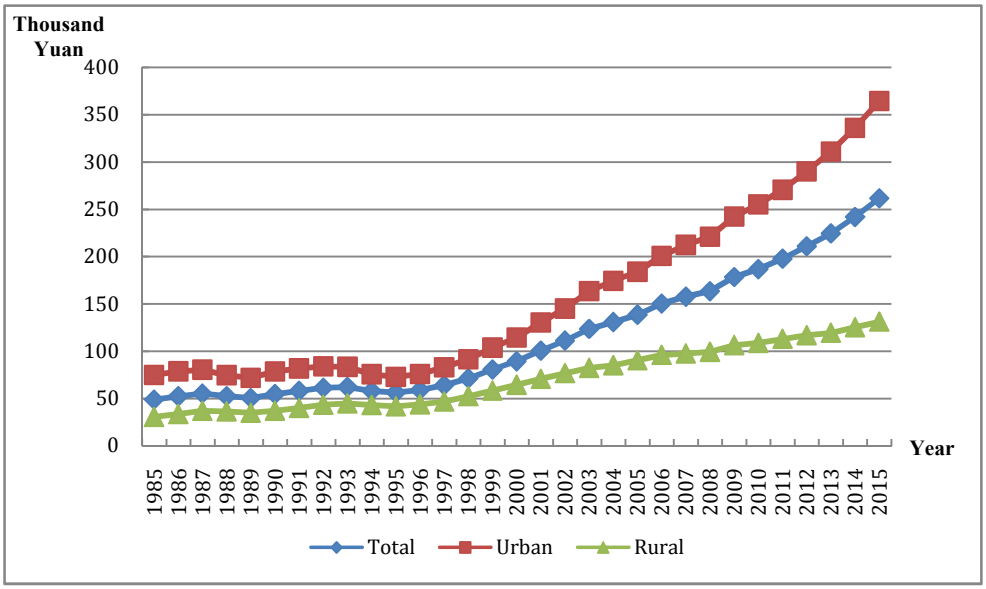

Figure JL-2.2 Real Human Capital Per Capita by Region for Jilin，1985-2015

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 2015, the nominal labor force human capital increases from 403 billion Yuan to 11,541 billion Yuan, an increase of more than 27 times;

and the real labor force human capital increases from 403 billion Yuan to 2,513 billion Yuan, an increase of approximately 5 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	403	403	403	403
1986	476	475	450	450
1987	570	569	505	504
1988	664	663	491	491
1989	765	764	480	480
1990	889	888	528	528
1991	1028	1027	575	574
1992	1182	1181	618	618
1993	1360	1358	639	639
1994	1544	1542	603	603
1995	1757	1756	595	595
1996	1981	1981	628	628
1997	2221	2221	678	678
1998	2506	2505	770	770
1999	2812	2810	878	878
2000	3163	3130	998	988
2001	3439	3420	1075	1069
2002	3689	3673	1159	1155
2003	4130	4119	1282	1279
2004	4512	4547	1344	1354
2005	5033	5080	1473	1487
2006	5529	5593	1593	1611
2007	5994	6072	1641	1662
2008	6511	6603	1693	1716

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	7133	7242	1848	1875
2010	7768	7904	1938	1971
2011	8312	8477	1991	2029
2012	8940	9139	2087	2132
2013	9641	9875	2185	2235
2014	10544	10818	2340	2399
2015	11541	11876	2513	2583

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 2015, the nominal average labor force human capital increases from 31,850 Yuan to 701,360 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 31,850 Yuan to 152,730 Yuan, an increase of approximately 4 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	31.85	46.36	22.16	31.85	46.36	22.16
1986	36.81	53.22	25.49	34.85	50.21	24.25
1987	42.95	61.28	29.38	38.03	53.53	26.54

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
1988	48.19	67.32	34.14	35.67	48.36	26.34
1989	54.04	74.21	39.22	33.94	45.60	25.37
1990	61.54	83.71	45.33	36.57	49.51	27.10
1991	69.41	93.15	51.59	38.80	51.44	29.32
1992	78.11	103.87	58.44	40.84	52.48	31.96
1993	87.96	116.14	66.07	41.36	51.84	33.21
1994	98.35	128.35	74.65	38.42	46.50	32.05
1995	110.39	143.27	84.04	37.38	45.09	31.21
1996	122.66	158.27	93.55	38.87	46.25	32.83
1997	135.90	174.35	103.49	41.48	49.14	35.03
1998	150.34	191.10	114.58	46.21	54.23	39.17
1999	165.73	209.52	125.66	51.77	60.74	43.57
2000	183.56	231.80	137.93	57.90	68.36	48.02
2001	199.33	249.53	151.97	62.28	72.50	52.64
2002	212.81	262.23	166.88	66.87	76.80	57.63
2003	234.65	289.21	184.21	72.82	83.79	62.68
2004	255.56	314.16	201.90	76.11	87.85	65.36
2005	282.20	349.73	219.91	82.62	96.45	69.87
2006	309.61	384.94	239.90	89.23	104.90	74.72
2007	337.49	422.05	257.96	92.42	110.17	75.73
2008	367.70	462.99	276.27	95.61	114.99	77.02
2009	404.07	512.97	297.06	104.69	127.53	82.24
2010	442.69	568.60	315.64	110.44	136.71	83.94
2011	481.46	624.79	336.13	115.33	142.81	87.47
2012	523.89	684.09	358.92	122.31	152.53	91.20
2013	571.34	753.18	382.05	129.46	163.20	94.34
2014	631.42	844.11	406.46	140.14	179.14	98.88
2015	701.36	952.75	430.23	152.73	198.82	103.02

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	1354	1353	1354	1353	56
1986	1558	1558	1462	1462	63
1987	1788	1788	1546	1546	70
1988	2069	2069	1520	1520	77
1989	2386	2386	1529	1530	81
1990	2765	2766	1674	1675	86
1991	3120	3122	1764	1765	91
1992	3525	3529	1841	1843	97
1993	3997	4003	1820	1823	103
1994	4497	4504	1682	1685	111
1995	5046	5057	1627	1630	122
1996	5632	5652	1697	1703	134
1997	6240	6267	1804	1811	148

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)	
1998	6905	6941	1986	1996	164
1999	7672	7725	2279	2294	179
2000	8564	8635	2589	2609	195
2001	9696	10437	2907	3117	213
2002	10650	11043	3211	3323	233
2003	11811	12257	3524	3650	254
2004	12897	13498	3696	3860	280
2005	13937	14598	3941	4120	310
2006	15394	15980	4263	4419	349
2007	16779	17441	4403	4571	399
2008	18272	19027	4533	4714	460
2009	19951	20817	4935	5144	537
2010	21751	23400	5169	5553	625
2011	23320	24356	5238	5467	720
2012	25353	26487	5514	5756	836
2013	27402	28571	5822	6067	973
2014	29558	30789	6188	6442	1097
2015	31782	33080	6577	6842	1226

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 2015, the nominal human capital per capita increases from 43,610 Yuan to 1,043,350 Yuan, an increase of more

than 22 times; and the real human capital per capita increases from 43,610 Yuan to 215,910 Yuan, an increase of approximately 4 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 2015, 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.

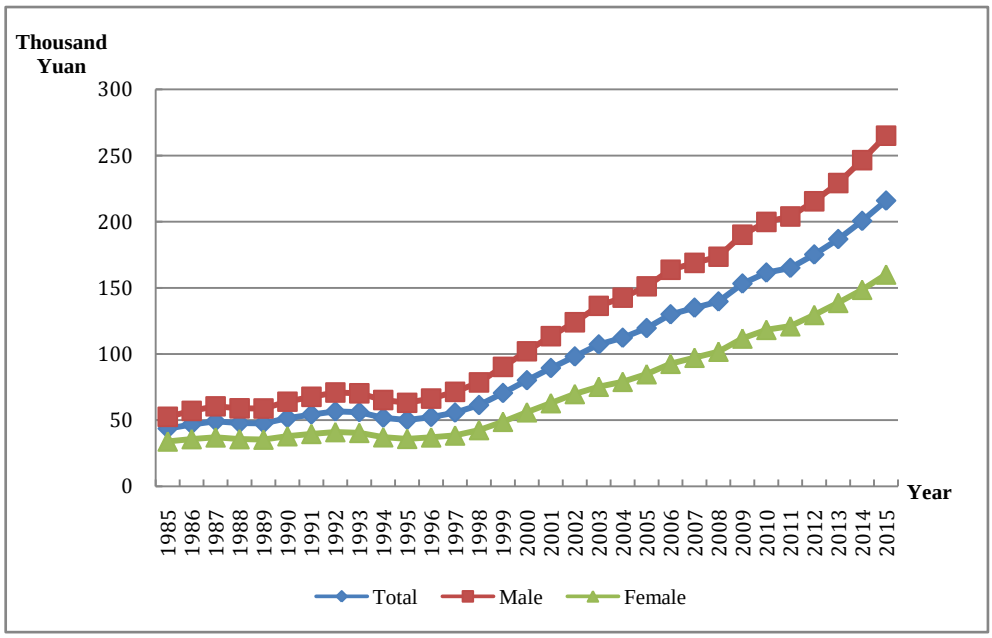

Figure HLJ-2.1 Human Capital Per Capita by Gender for Heilongjiang，1985-2015

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	43.61	62.99	28.88	43.61	62.99	28.88
1986	49.86	70.97	33.20	46.80	66.95	30.88
1987	56.89	79.87	38.10	49.19	68.69	33.25
1988	65.06	89.90	43.95	47.81	65.19	33.03
1989	74.23	101.35	50.34	47.58	64.13	33.01
1990	85.08	114.41	58.33	51.52	68.55	35.99
1991	95.98	128.03	66.34	54.26	70.90	38.87
1992	108.40	143.57	75.43	56.61	72.47	41.73
1993	122.98	162.52	85.44	56.01	71.21	41.58
1994	138.42	182.18	96.33	51.78	65.44	38.64
1995	155.46	203.98	108.20	50.12	63.22	37.35
1996	173.64	227.89	120.12	52.33	65.64	39.20
1997	192.52	251.88	133.23	55.65	69.42	41.88
1998	213.24	278.36	147.41	61.34	76.03	46.48
1999	237.15	310.36	162.22	70.46	87.40	53.12
2000	264.95	349.15	177.70	80.09	99.62	59.86
2001	297.97	395.22	195.60	89.34	111.86	65.63
2002	325.32	430.72	212.55	98.09	122.77	71.67
2003	359.17	476.65	231.56	107.16	134.79	77.16
2004	391.64	518.43	252.13	112.23	141.64	79.86
2005	422.68	557.47	272.22	119.53	151.10	84.29
2006	469.25	620.93	296.58	129.95	165.32	89.68
2007	514.25	682.18	318.87	134.96	172.33	91.48
2008	562.97	749.80	341.22	139.66	180.39	91.31
2009	619.43	827.80	367.39	153.21	199.55	97.15
2010	679.62	915.59	388.66	161.51	213.05	97.97
2011	734.78	992.36	411.15	165.05	218.87	97.43

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	805.53	1095.84	432.97	175.19	234.00	99.72
2013	879.15	1203.55	455.49	186.81	251.94	101.74
2014	958.12	1313.69	483.78	200.56	271.19	106.35
2015	1043.35	1433.49	511.82	215.91	292.70	111.29

Figure HLJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

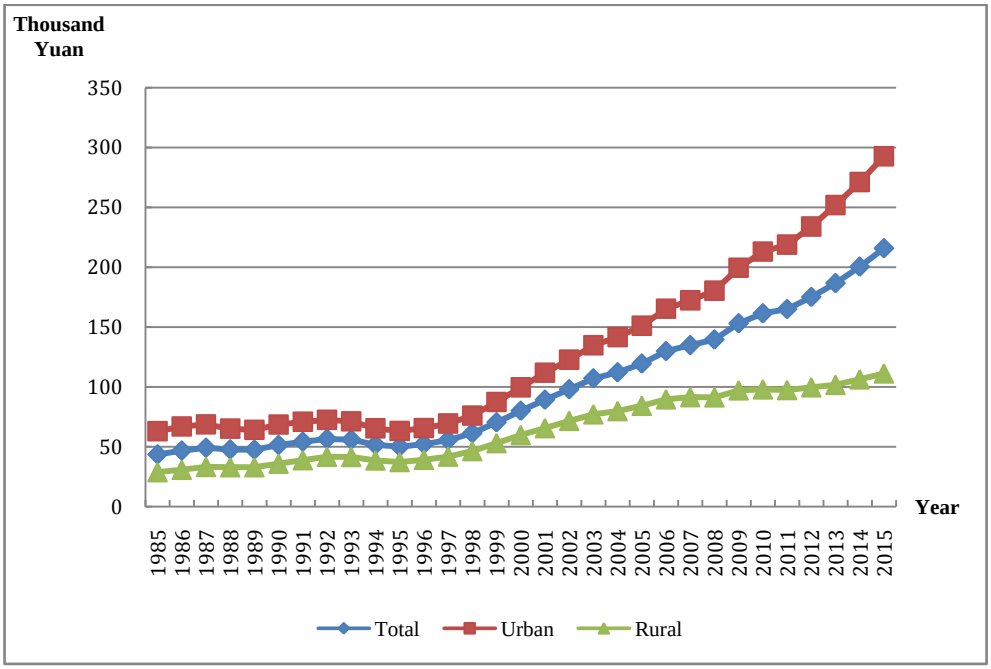

Figure HLJ-2.2 Real Human Capital Per Capita by Region for Heilongjiang，1985-2015

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 2015, the nominal labor force human capital increases from 526 billion Yuan to 15,258 billion Yuan, an increase of more than 28 times; and the real labor force human capital increases from 526 billion Yuan to 3,174 billion Yuan, an increase of approximately 5 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	526	526	526	526
1986	624	624	586	585
1987	743	742	642	642
1988	888	888	653	653
1989	1056	1056	677	677
1990	1257	1256	761	761
1991	1456	1456	823	823
1992	1661	1661	868	868
1993	1888	1887	861	861

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)
1994	2138	2137	802	801
1995	2425	2425	784	784
1996	2721	2721	823	823
1997	3034	3036	880	881
1998	3407	3409	984	985
1999	3785	3788	1130	1131
2000	4216	4188	1283	1275
2001	4621	4603	1398	1393
2002	5032	5022	1533	1531
2003	5606	5614	1692	1694
2004	6042	6076	1750	1760
2005	6555	6597	1872	1884
2006	7198	7252	2015	2029
2007	7847	7914	2083	2100
2008	8620	8706	2159	2179
2009	9582	9697	2388	2416
2010	10680	10837	2553	2590
2011	11383	11575	2571	2614
2012	12095	12318	2648	2696
2013	12953	13206	2769	2822
2014	14034	14324	2955	3015
2015	15258	15598	3174	3244

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 2015, the nominal average labor force human capital increases from 29,640 Yuan to 649,810 Yuan, an increase of more than 20 times; and the Real average labor force human capital from 29,640 Yuan to 135,190 Yuan, an increase of approximately 3.5 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	29.64	40.92	20.10	29.64	40.92	20.10
1986	34.15	46.55	23.33	32.05	43.92	21.71
1987	39.34	53.03	27.07	34.02	45.60	23.62
1988	45.16	59.82	31.61	33.18	43.38	23.76
1989	51.81	67.75	36.66	33.22	42.87	24.04
1990	60.01	77.44	42.72	36.34	46.40	26.36
1991	67.90	86.87	49.04	38.39	48.10	28.73
1992	76.16	96.55	55.86	39.80	48.74	30.91
1993	85.40	107.48	63.43	38.96	47.10	30.86
1994	95.79	119.85	71.79	35.92	43.05	28.80
1995	107.50	134.15	80.85	34.74	41.57	27.91
1996	119.28	148.47	90.16	36.08	42.76	29.42
1997	132.35	164.31	100.04	38.40	45.28	31.45
1998	146.68	181.49	111.07	42.38	49.57	35.02
1999	161.23	198.91	122.14	48.15	56.01	39.99
2000	177.71	219.39	133.98	54.07	62.59	45.13
2001	192.07	234.66	147.03	58.12	66.42	49.33
2002	204.97	246.91	160.21	62.47	70.38	54.03
2003	224.42	270.45	174.94	67.71	76.48	58.29
2004	241.02	288.84	189.67	69.83	78.92	60.08
2005	259.54	309.87	204.97	74.14	83.99	63.46

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
2006	285.94	341.64	225.27	80.03	90.96	68.11
2007	312.41	374.40	244.67	82.92	94.58	70.19
2008	343.50	415.99	263.30	86.02	100.08	70.46
2009	382.08	469.07	283.96	95.22	113.08	75.09
2010	425.72	532.18	302.48	101.78	123.83	76.25
2011	461.28	581.82	322.41	104.20	128.32	76.40
2012	498.22	631.64	344.90	109.08	134.88	79.43
2013	540.18	689.78	368.27	115.48	144.39	82.26
2014	590.98	761.04	392.21	124.42	157.11	86.22
2015	649.81	846.33	415.16	135.19	172.81	90.27

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-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	1263	1261	1263	1261	59
1986	1492	1492	1404	1403	68
1987	1772	1774	1542	1543	79
1988	2109	2114	1528	1532	91
1989	2519	2531	1575	1582	100
1990	2998	3017	1764	1774	110
1991	3460	3489	1841	1857	119
1992	3954	3993	1913	1932	131
1993	4491	4541	1808	1828	148
1994	5060	5121	1644	1664	175
1995	5738	5822	1571	1594	213
1996	6879	7011	1724	1757	256
1997	8055	8191	1964	1997	298
1998	9409	9609	2294	2343	339

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)	
1999	11063	11351	2658	2727	378
2000	12938	13593	3032	3186	418
2001	14829	17710	3475	4151	461
2002	16151	18166	3766	4236	510
2003	18341	21347	4273	4973	564
2004	20370	24992	4643	5697	627
2005	22259	28321	5024	6392	699
2006	26028	35629	5805	7946	789
2007	30372	42229	6564	9126	892
2008	34620	47448	7071	9691	988
2009	39520	54168	8105	11109	1101
2010	43971	59853	8746	11905	1203
2011	46399	62455	8773	11808	1292
2012	47222	60035	8685	11041	1383
2013	50703	64414	9116	11581	1479
2014	54693	69471	9179	11660	1572
2015	58589	74445	9603	12202	1693

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 2015, the nominal human capital per capita increases from 120,870 Yuan to 3,115,920 Yuan, an increase of more than 24 times; and the real human capital per capita increases from 120,870 Yuan to 510,700 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 2015, 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.

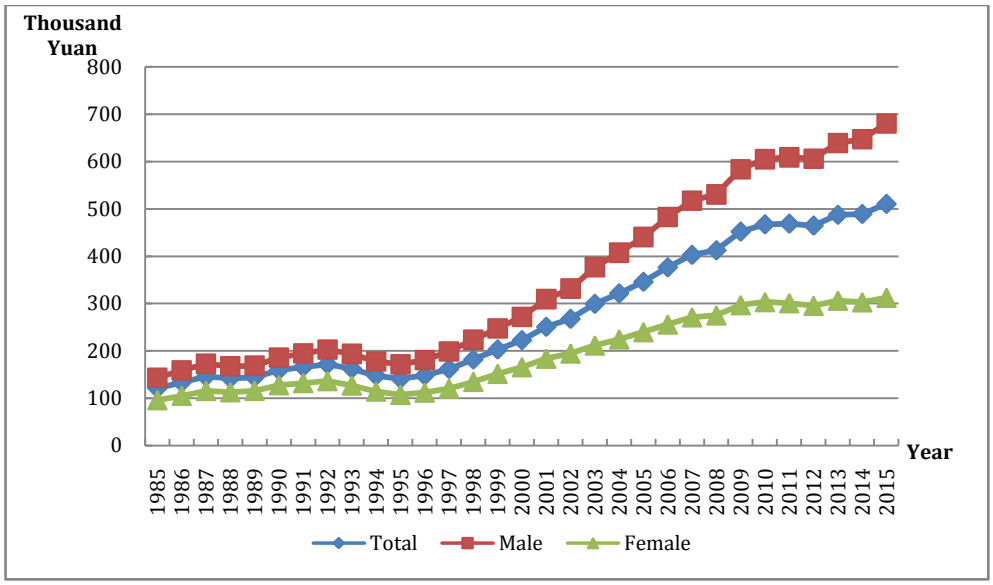

Figure SH-2.1 Human Capital Per Capita by Gender for Shanghai，1985-2015

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 2015, the nominal labor force human capital increases

from 551 billion Yuan to 26,868 billion Yuan, an increase of more than 47 times; and the real labor force human capital increases from 551 billion Yuan to 4,404 billion Yuan, an increase of approximately 7 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	551	549	551	549
1986	632	630	594	592
1987	723	719	629	626
1988	846	842	613	610
1989	995	991	622	620
1990	1166	1162	686	683
1991	1313	1309	699	697
1992	1471	1469	712	711
1993	1652	1650	665	664
1994	1857	1854	603	602
1995	2087	2086	571	571
1996	2512	2513	630	630
1997	3072	3075	749	750
1998	3766	3771	918	919
1999	4495	4508	1080	1083
2000	5293	5462	1240	1280
2001	6002	6077	1407	1424
2002	6693	6708	1561	1564
2003	7774	7812	1811	1820
2004	8556	8793	1950	2004
2005	9454	9792	2134	2210
2006	11316	11784	2524	2628

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	13679	14289	2956	3088
2008	16461	17264	3362	3526
2009	19223	20237	3942	4150
2010	21991	23228	4374	4620
2011	22980	24304	4345	4595
2012	23812	25187	4379	4632
2013	24823	26254	4463	4720
2014	25864	27356	4341	4591
2015	26868	28398	4404	4655

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 2015, the nominal average labor force human capital increases from 72,290 Yuan to 1,802,550 Yuan, an increase of more than 23 times; and the Real average labor force human capital from 72,290 Yuan to 295,440 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	2641	2639	2641	2639	83
1986	3055	3055	2848	2848	102
1987	3531	3532	3030	3030	123
1988	4218	4220	2970	2972	147
1989	5014	5018	3003	3005	166
1990	5991	5997	3478	3482	187
1991	6994	7005	3900	3906	212
1992	8131	8147	4268	4276	253
1993	9433	9456	4194	4203	303
1994	10778	10811	3885	3896	353
1995	12201	12241	3801	3813	408
1996	14278	14345	4061	4078	470
1997	16477	16587	4575	4603	538
1998	18794	18957	5215	5257	619
1999	21412	21653	5983	6046	704

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	24062	24309	6700	6764	799
2001	28353	31328	7773	8540	900
2002	30767	31995	8486	8808	1010
2003	34341	35625	9341	9674	1172
2004	37463	39085	9771	10178	1360
2005	40223	41663	10246	10600	1606
2006	45994	47731	11507	11927	1876
2007	52584	54889	12585	13120	2174
2008	59107	61856	13411	14019	2501
2009	66896	70773	15217	16077	2926
2010	74291	78956	16259	17258	3414
2011	81171	85196	16854	17674	3983
2012	90513	95132	18292	19209	4562
2013	100783	105891	19876	20868	5133
2014	111624	117216	21511	22573	5671
2015	123032	129108	23292	24427	6234

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 2015, the nominal human capital per capita increases from 48,160 Yuan to 1,954,930 Yuan, an increase of more than 39 times; and the real human capital per capita increases from 48,160 Yuan to 370,100 Yuan, an increase of approximately 6 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 2015, 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.

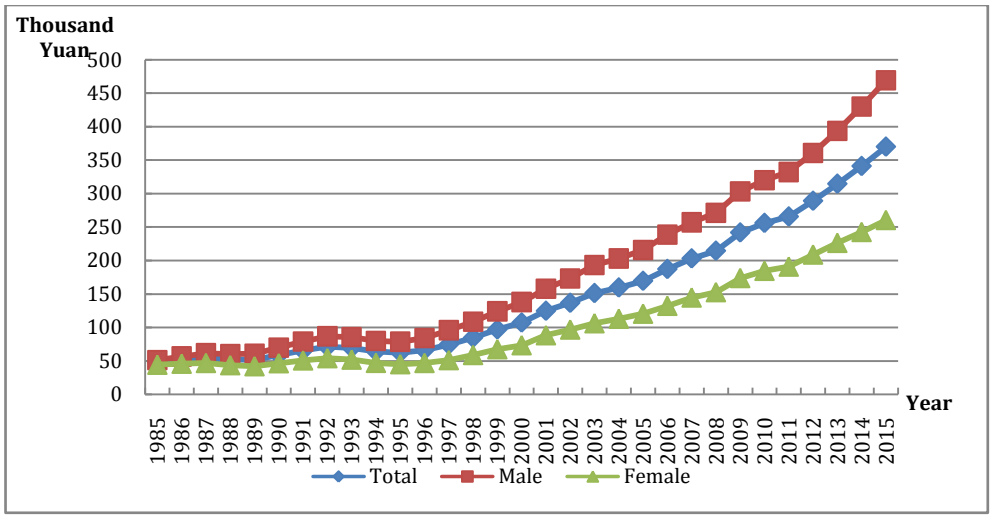

Figure JS-2.1 Human Capital Per Capita by Gender for Jiangsu，1985-2015

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	48.16	87.63	39.25	48.16	87.63	39.25
1986	55.49	99.76	45.04	51.74	93.76	41.82
1987	63.86	112.82	51.84	54.80	95.96	44.69
1988	74.65	130.73	60.17	52.57	90.69	42.73
1989	86.95	151.19	69.66	52.07	90.42	41.74
1990	101.74	174.19	81.56	59.07	100.75	47.45
1991	117.86	200.00	93.07	65.72	107.41	53.14

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	136.03	229.81	105.71	71.40	113.44	57.82
1993	156.92	263.98	120.14	69.76	109.78	56.02
1994	178.40	296.87	135.47	64.30	98.53	51.90
1995	201.04	323.59	154.29	62.63	92.42	51.27
1996	233.51	367.31	172.58	66.42	94.68	53.54
1997	268.92	413.48	192.07	74.66	105.22	58.42
1998	305.92	457.04	214.40	84.89	116.30	65.87
1999	348.09	513.13	236.10	97.27	132.43	73.42
2000	386.13	547.48	263.36	107.51	141.29	81.81
2001	456.21	647.66	289.01	125.06	166.98	88.46
2002	496.50	681.34	313.94	136.95	178.52	95.89
2003	557.19	751.64	342.64	151.56	195.18	103.42
2004	612.85	811.12	371.19	159.84	203.11	107.11
2005	666.52	864.35	398.87	169.78	212.20	112.40
2006	749.26	975.17	433.42	187.45	235.63	120.10
2007	849.37	1109.58	468.01	203.28	257.55	123.74
2008	946.49	1235.84	503.94	214.76	272.68	126.17
2009	1063.74	1389.22	545.18	241.98	307.75	137.19
2010	1170.87	1533.61	570.22	256.26	327.93	137.57
2011	1280.40	1662.59	604.50	265.85	338.34	137.67
2012	1431.37	1848.55	644.47	289.26	366.78	143.06
2013	1595.98	2052.14	684.08	314.76	398.10	148.15
2014	1770.57	2260.89	728.86	341.20	429.09	154.47
2015	1954.93	2480.16	773.15	370.10	462.83	161.44

Figure JS-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

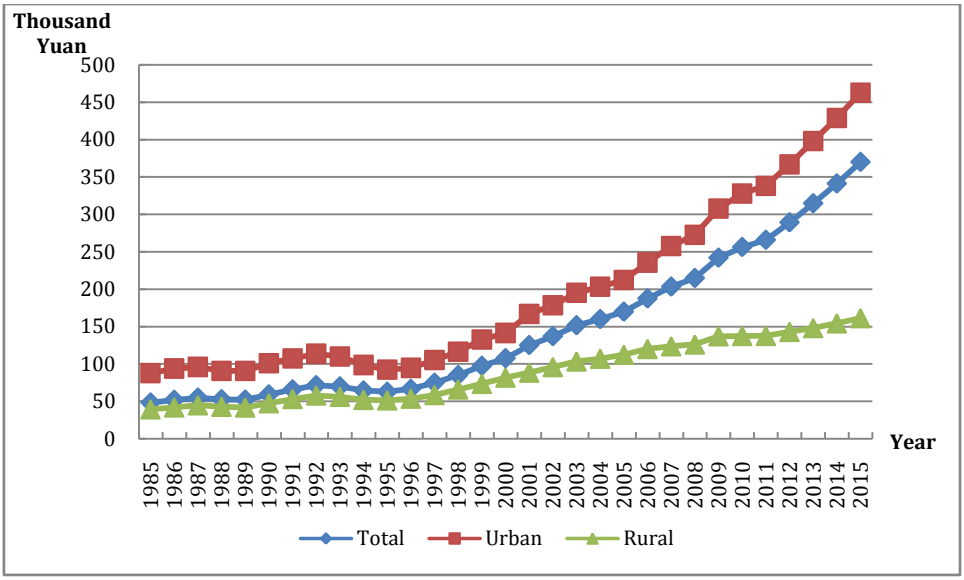

Figure JS-2.2 Real Human Capital Per Capita by Region for Jiangsu，1985-2015

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 2015, the nominal labor force human capital increases from 1,234 billion Yuan to 49,931 billion Yuan, an increase of more than 39 times; and the real labor force human capital increases from 1,234 billion Yuan to 9,517 billion Yuan, an increase of approximately 6 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	1234	1233	1234	1233
1986	1454	1453	1356	1354
1987	1708	1707	1466	1465
1988	2020	2019	1424	1423
1989	2355	2353	1410	1409
1990	2757	2754	1601	1599
1991	3161	3158	1769	1768
1992	3603	3601	1906	1905
1993	4113	4110	1846	1845
1994	4699	4695	1713	1712
1995	5351	5348	1684	1683
1996	6092	6089	1757	1756
1997	6921	6925	1951	1952
1998	7899	7910	2227	2230
1999	8986	8999	2550	2553
2000	10388	10279	2925	2897
2001	11328	11256	3145	3127
2002	12273	12232	3418	3408
2003	13654	13661	3742	3744
2004	14622	14761	3838	3873
2005	15772	15949	4038	4081
2006	18007	18245	4541	4599
2007	20528	20840	4964	5037
2008	23843	24250	5463	5553
2009	28109	28654	6453	6574
2010	32719	33434	7218	7372

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	35457	36310	7419	7593
2012	38155	39152	7774	7973
2013	41443	42587	8241	8464
2014	45649	46966	8863	9114
2015	49931	51453	9517	9802

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 2015, the nominal average labor force human capital increases from 33,870 Yuan to 1,106,510 Yuan, an increase of more than 31 times; and the Real average labor force human capital from 33,870 Yuan to 210,910 Yuan, an increase of approximately 5 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	33.87	57.92	28.26	33.87	57.92	28.26
1986	39.03	65.29	32.73	36.38	61.36	30.39
1987	44.94	73.67	37.85	38.58	62.66	32.63
1988	51.72	81.95	44.14	36.46	56.86	31.34
1989	59.32	91.50	51.03	35.53	54.72	30.58

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	68.64	103.40	59.25	39.86	59.81	34.47
1991	77.99	114.85	67.38	43.66	61.68	38.47
1992	88.11	127.59	76.22	46.61	62.98	41.68
1993	99.85	143.57	86.01	44.81	59.70	40.10
1994	113.08	162.39	96.52	41.23	53.90	36.98
1995	127.70	183.10	107.88	40.18	52.29	35.85
1996	145.10	203.26	120.54	41.85	52.39	37.40
1997	163.90	223.34	134.76	46.20	56.83	40.99
1998	184.80	246.09	150.28	52.10	62.62	46.17
1999	207.50	272.34	165.69	58.88	70.28	51.53
2000	234.05	304.21	182.08	65.90	78.51	56.56
2001	256.97	325.17	197.56	71.35	83.84	60.47
2002	277.58	344.19	211.03	77.31	90.18	64.46
2003	308.69	382.40	224.87	84.59	99.30	67.88
2004	333.68	410.31	237.76	87.58	102.75	68.61
2005	363.68	444.05	251.85	93.11	109.01	70.97
2006	407.04	493.59	288.02	102.65	119.27	79.81
2007	457.32	552.13	326.62	110.58	128.16	86.36
2008	520.76	632.46	360.97	119.32	139.55	90.38
2009	600.35	735.41	398.90	137.81	162.92	100.38
2010	683.40	843.97	432.73	150.77	180.47	104.40
2011	750.92	926.08	466.35	157.12	188.46	106.21
2012	820.73	1007.35	502.66	167.22	199.87	111.58
2013	901.37	1105.41	538.21	179.23	214.44	116.56
2014	1001.18	1228.57	570.91	194.38	233.17	121.00
2015	1106.51	1359.18	598.93	210.91	253.64	125.06

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	2399	2398	2399	2398	13
1986	2728	2728	2570	2570	15
1987	3126	3126	2720	2720	17
1988	3611	3612	2591	2592	19
1989	4150	4152	2514	2515	22
1990	4877	4880	2894	2895	26
1991	5609	5615	3221	3224	30
1992	6423	6429	3457	3460	35
1993	7429	7440	3353	3357	61
1994	8451	8466	3053	3058	95
1995	9448	9467	2925	2931	136
1996	11175	11212	3163	3173	183
1997	13088	13148	3558	3573	229
1998	15217	15308	4107	4130	278

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	17437	17577	4719	4755	330
2000	19914	20134	5305	5359	389
2001	22911	23332	6077	6180	457
2002	24811	25332	6632	6760	541
2003	28304	28966	7445	7610	657
2004	31609	32541	8020	8244	792
2005	34477	35569	8614	8874	941
2006	39501	40958	9729	10071	1103
2007	44670	46460	10545	10950	1274
2008	50240	52370	11274	11731	1435
2009	56390	58880	12809	13350	1631
2010	62700	65550	13675	14273	1848
2011	69860	73170	14428	15087	2083
2012	76700	81250	15464	16353	2323
2013	84700	89750	16662	17631	2583
2014	93110	98610	17928	18948	2848
2015	101950	107880	19327	20426	3135

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 2015, the nominal human capital per capita increases from 68,020 Yuan to 2,208,480 Yuan, an increase of more than 31 times; and the real human capital per capita increases from 68,020

Yuan to 418,670 Yuan, an increase of approximately 5 times.

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 2015, 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.

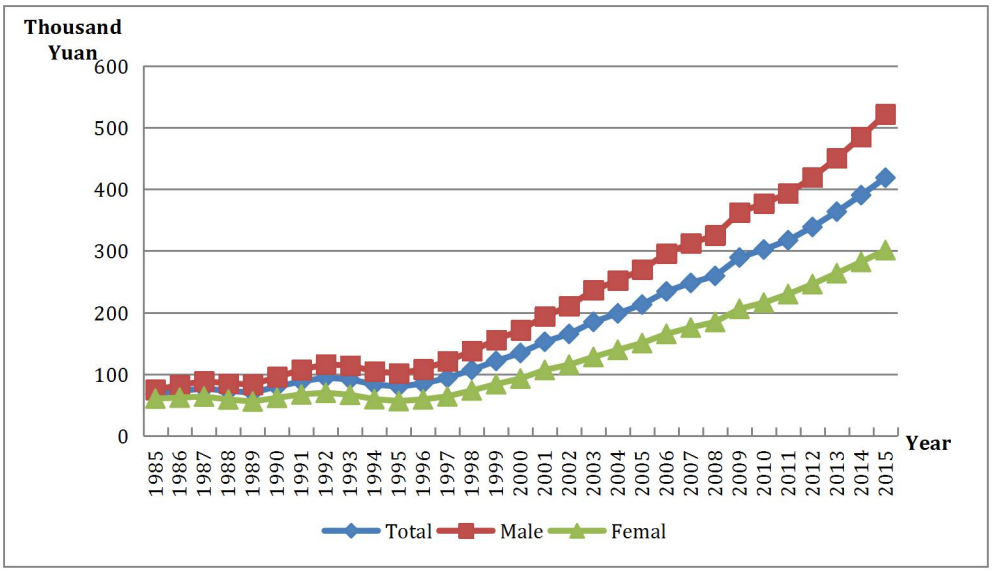

Figure ZJ-2.1 Human Capital Per Capita by Gender for Zhejiang，1985-2015

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	68.02	102.93	54.82	68.02	102.93	54.82
1986	77.12	114.67	62.44	72.65	107.87	58.85
1987	88.10	127.96	72.00	76.66	108.54	63.77
1988	101.28	143.71	83.61	72.67	98.79	61.82
1989	115.78	162.18	95.93	70.14	95.45	59.31

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	134.22	185.48	110.92	79.65	106.92	67.23
1991	153.62	217.16	124.24	88.21	118.54	74.19
1992	175.25	248.27	140.98	94.32	124.11	80.33
1993	202.37	290.79	160.39	91.34	119.74	77.84
1994	230.14	332.21	181.24	83.14	109.70	70.43
1995	257.50	370.79	202.90	79.72	104.65	67.74
1996	298.94	426.16	224.45	84.61	109.54	70.03
1997	345.09	484.62	248.53	93.81	119.66	75.95
1998	396.09	545.28	277.41	106.90	133.97	85.37
1999	448.40	604.70	308.13	121.35	149.31	96.27
2000	503.96	666.21	340.96	134.25	163.03	105.36
2001	574.84	766.22	368.18	152.47	188.26	113.78
2002	618.14	809.33	397.03	165.23	201.27	123.56
2003	702.23	911.33	444.94	184.71	225.50	134.57
2004	782.33	1011.74	483.72	198.50	243.53	139.86
2005	851.67	1085.65	529.96	212.79	257.46	151.41
2006	950.90	1212.62	568.58	234.20	284.44	160.84
2007	1050.37	1335.22	609.71	247.96	301.44	165.20
2008	1155.82	1465.87	650.05	259.37	315.78	167.27
2009	1273.14	1604.55	700.60	289.19	350.21	183.58
2010	1385.40	1741.30	741.06	302.16	365.44	187.25
2011	1535.91	1939.25	786.40	317.21	386.50	188.18
2012	1680.09	2124.32	835.02	338.73	414.27	195.32
2013	1848.23	2342.21	879.85	363.58	446.49	200.98
2014	2027.70	2568.98	932.59	390.43	480.11	208.44
2015	2208.48	2800.89	986.08	418.67	516.23	217.35

Figure ZJ-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

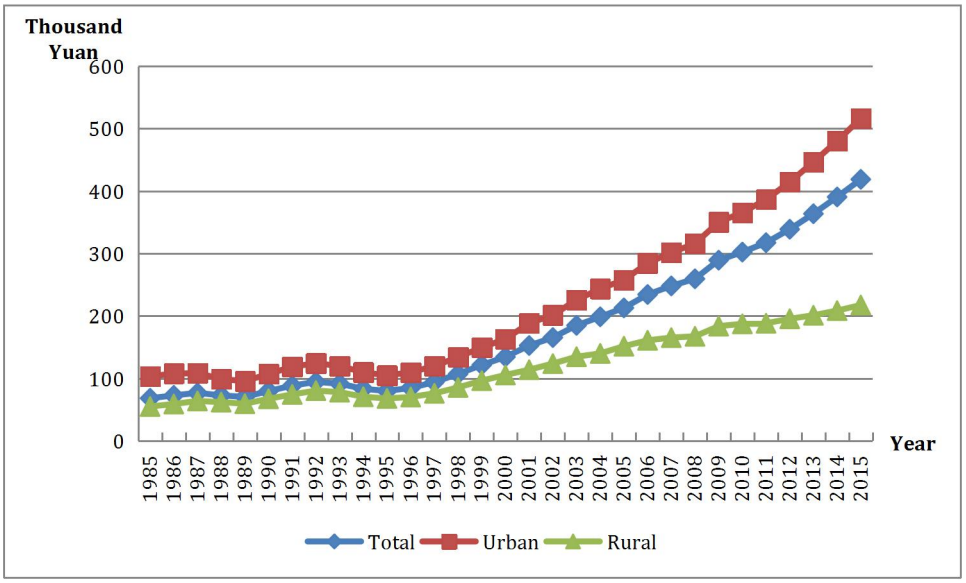

Figure ZJ-2.2 Real Human Capital Per Capita by Region for Zhejiang，1985-2015

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 2015, the nominal labor force human capital increases

from 1002 billion Yuan to 37,915 billion Yuan, an increase of more than 36 times; and the real labor force human capital increases from 1002 billion Yuan to 7,292 billion Yuan, an increase of approximately 6 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	1002	1001	1002	1001
1986	1172	1171	1104	1103
1987	1372	1371	1195	1195
1988	1606	1605	1155	1155
1989	1867	1866	1133	1132
1990	2186	2184	1300	1299
1991	2456	2455	1419	1419
1992	2725	2724	1485	1485
1993	3019	3019	1391	1390
1994	3351	3350	1238	1238
1995	3745	3745	1188	1188
1996	4303	4303	1256	1256
1997	4957	4960	1396	1396
1998	5797	5800	1621	1622
1999	6738	6742	1884	1886
2000	7959	7920	2176	2167
2001	8589	8566	2348	2342
2002	9178	9169	2532	2529
2003	10148	10157	2745	2747
2004	11123	11195	2894	2911
2005	12261	12351	3134	3156

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)
2006	14136	14271	3566	3599
2007	16213	16403	3915	3960
2008	18889	19166	4327	4387
2009	22333	22729	5163	5250
2010	25856	26370	5724	5834
2011	27754	28350	5822	5940
2012	29694	30363	6085	6218
2013	32062	32812	6409	6555
2014	35103	35945	6862	7021
2015	37915	38879	7292	7471

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 2015, the nominal average labor force human capital increases from 43,880 Yuan to 1,133,630 Yuan, an increase of more than 24 times; and the Real average labor force human capital from 43,880 Yuan to 218,030 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	43.88	60.90	37.43	43.88	60.90	37.43
1986	50.21	68.48	43.12	47.29	64.42	40.64
1987	57.71	77.29	49.81	50.29	65.57	44.13
1988	66.45	86.39	58.09	47.81	59.39	42.96
1989	76.07	96.70	67.12	46.15	56.91	41.50
1990	87.57	108.49	77.90	52.07	62.53	47.22
1991	97.96	118.62	88.65	56.60	64.75	52.94
1992	109.03	129.21	100.46	59.44	64.59	57.24
1993	121.57	141.25	113.55	56.00	58.16	55.11
1994	135.14	153.97	127.59	49.94	50.84	49.58
1995	149.99	168.43	142.54	47.57	47.54	47.58
1996	170.14	192.41	159.43	49.65	49.46	49.74
1997	193.01	219.12	178.25	54.34	54.10	54.47
1998	219.46	249.55	199.48	61.36	61.31	61.39
1999	247.74	283.35	220.11	69.27	69.96	68.77
2000	283.01	329.21	241.00	77.37	80.56	74.48
2001	305.15	350.58	261.63	83.42	86.14	80.85
2002	324.69	366.37	282.65	89.57	91.11	87.96
2003	356.06	400.99	308.22	96.31	99.22	93.22
2004	387.90	436.49	332.74	100.92	105.06	96.21
2005	423.04	476.29	357.91	108.13	112.95	102.26
2006	472.73	533.13	395.35	119.25	125.06	111.84
2007	527.32	599.03	430.72	127.33	135.24	116.71
2008	594.81	685.39	466.41	136.26	147.65	120.01
2009	679.49	793.73	504.02	157.09	173.24	132.07
2010	759.50	897.37	534.41	168.14	188.33	135.04
2011	819.68	972.80	566.72	171.95	193.88	135.61

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
2012	879.94	1045.56	602.56	180.32	203.90	140.94
2013	953.86	1138.29	636.80	190.67	216.99	145.46
2014	1047.75	1258.58	672.99	204.82	235.21	150.42
2015	1133.63	1373.44	704.46	218.03	253.14	155.28

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	1715	1715	1715	1715	38
1986	1956	1956	1842	1842	44
1987	2225	2225	1922	1923	50
1988	2596	2597	1869	1869	56
1989	3027	3029	1854	1856	61
1990	3557	3561	2122	2124	66
1991	4068	4073	2300	2303	71
1992	4631	4637	2417	2420	76
1993	5305	5314	2408	2412	84
1994	6020	6034	2155	2160	94
1995	6805	6822	2126	2131	107
1996	7841	7872	2226	2234	121
1997	8947	8991	2504	2516	136
1998	10112	10166	2823	2837	152
1999	11350	11420	3235	3254	167

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	12879	12982	3639	3667	182
2001	14938	15095	4186	4229	200
2002	16642	16841	4708	4762	220
2003	19049	19324	5285	5359	243
2004	21276	21612	5641	5728	277
2005	23603	23969	6171	6264	316
2006	26396	26871	6813	6934	363
2007	29265	29835	7171	7308	420
2008	32288	32982	7450	7608	487
2009	35568	36472	8282	8489	566
2010	39229	40340	8854	9101	664
2011	44903	46158	9594	9859	778
2012	50605	52073	10567	10871	908
2013	57487	59166	11715	12054	1049
2014	65252	67128	13079	13452	1202
2015	73589	75658	14438	14844	1359

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 2015, the nominal human capital per capita increases from 36,740 Yuan to 1,460,880 Yuan, an increase of more than 38 times; and the real human capital per capita increases from 36,740 Yuan to 286,620 Yuan, an increase of approximately 7 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 2015, 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.

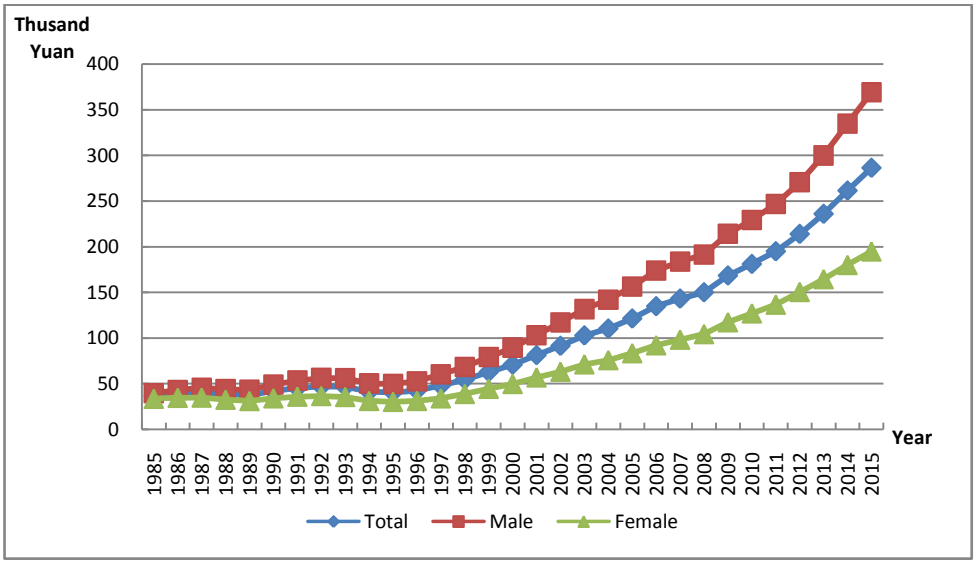

Figure AH-2.1 Human Capital Per Capita by Gender for Anhui，1985-2015

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	36.74	95.56	25.66	36.74	95.56	25.66
1986	41.55	105.78	29.12	39.12	99.98	27.34
1987	46.85	115.84	33.19	40.49	99.63	28.78
1988	53.54	129.45	37.97	38.55	91.70	27.64
1989	61.24	146.63	43.16	37.51	89.78	26.45
1990	70.52	166.11	49.63	42.05	99.13	29.59
1991	79.84	186.21	56.23	45.14	103.47	32.19

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	90.04	207.45	63.59	47.00	105.95	33.71
1993	102.31	235.19	71.98	46.44	105.00	33.07
1994	115.24	263.44	81.01	41.26	92.32	29.47
1995	129.38	292.55	91.24	40.42	88.45	29.19
1996	149.45	332.93	102.10	42.42	91.43	29.78
1997	171.14	373.75	113.69	47.90	100.72	32.93
1998	195.07	415.27	126.44	54.46	111.58	36.66
1999	220.19	455.54	140.06	62.76	125.41	41.43
2000	250.52	507.66	155.15	70.79	138.51	45.67
2001	289.95	565.76	172.81	81.26	154.36	50.21
2002	323.19	599.43	189.81	91.42	165.03	55.88
2003	370.84	666.69	209.72	102.88	180.30	60.71
2004	416.22	719.04	231.66	110.36	186.45	63.99
2005	464.35	770.84	255.86	121.40	197.90	69.36
2006	522.48	861.41	284.08	134.86	218.09	76.32
2007	584.56	960.92	310.09	143.23	231.04	79.19
2008	650.69	1065.69	338.27	150.14	241.73	81.19
2009	723.76	1179.82	369.61	168.52	270.65	89.22
2010	802.79	1305.54	400.56	181.18	290.76	93.52
2011	913.19	1469.38	436.05	195.11	310.48	96.13
2012	1025.44	1624.01	476.51	214.14	335.77	102.59
2013	1158.83	1816.32	517.14	236.16	366.73	108.73
2014	1305.51	2020.74	563.04	261.68	401.62	116.40
2015	1460.88	2230.98	612.90	286.62	437.72	120.25

Figure AH-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

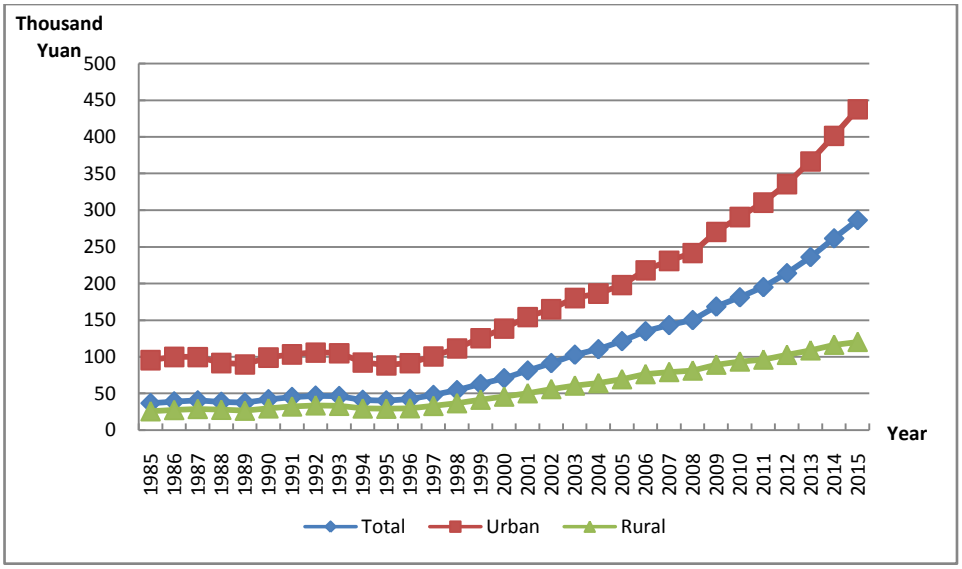

Figure AH-2.2 Real Human Capital Per Capita by Region for Anhui，1985-2015

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 2015, the nominal labor force human capital increases from 645 billion Yuan to 27,205 billion Yuan, an increase of more than 42 times; and the real labor force human capital increases from 645 billion Yuan to 5,338 billion Yuan, an increase of approximately 8 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	645	644	645	644
1986	761	761	717	716
1987	902	902	780	779
1988	1078	1077	776	776
1989	1278	1277	783	782
1990	1507	1505	899	898
1991	1726	1724	977	976
1992	1959	1958	1024	1024
1993	2207	2206	1003	1003
1994	2495	2494	895	895
1995	2809	2808	880	880
1996	3150	3151	898	898
1997	3540	3543	997	998
1998	3981	3985	1118	1119
1999	4484	4488	1285	1286
2000	5097	5061	1447	1437
2001	5466	5442	1540	1533
2002	5840	5823	1662	1657
2003	6391	6390	1784	1784
2004	6987	7022	1862	1871
2005	7784	7826	2042	2052
2006	8739	8795	2267	2281
2007	9934	10007	2449	2467
2008	11235	11332	2608	2630
2009	12939	13076	3028	3060
2010	14825	15016	3359	3402

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	16596	16824	3560	3608
2012	18383	18656	3854	3911
2013	20713	21036	4239	4304
2014	23966	24349	4821	4898
2015	27205	27659	5338	5427

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 2015, the nominal average labor force human capital increases from 24,220 Yuan to 794,690 Yuan, an increase of more than 32 times; and the real average labor force human capital increases from 24,220 Yuan to 155,920 Yuan, an increase of approximately 6 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	24.22	55.54	17.53	24.22	55.54	17.53
1986	27.68	62.00	20.20	26.06	58.60	18.97
1987	31.84	69.58	23.31	27.51	59.84	20.21
1988	36.33	77.13	26.95	26.17	54.64	19.62
1989	41.40	86.09	30.95	25.36	52.71	18.97

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	47.61	97.04	35.65	28.39	57.91	21.25
1991	53.23	106.07	40.41	30.13	58.94	23.14
1992	59.15	115.17	45.57	30.92	58.82	24.16
1993	65.90	125.97	51.37	29.96	56.24	23.60
1994	73.65	138.43	57.82	26.43	48.51	21.03
1995	82.35	152.51	64.96	25.81	46.11	20.78
1996	92.79	167.80	72.60	26.45	46.08	21.17
1997	104.44	184.86	80.92	29.41	49.82	23.44
1998	118.05	205.27	89.87	33.16	55.15	26.05
1999	133.03	228.58	98.86	38.12	62.93	29.24
2000	150.98	257.53	108.75	42.87	70.26	32.01
2001	164.54	269.68	117.97	46.34	73.58	34.28
2002	176.79	278.09	127.04	50.30	76.56	37.40
2003	194.54	299.07	137.48	54.30	80.88	39.80
2004	214.36	322.56	147.54	57.13	83.64	40.75
2005	240.08	354.60	158.97	62.97	91.04	43.09
2006	269.16	389.82	184.21	69.82	98.70	49.49
2007	303.27	438.42	209.75	74.77	105.41	53.57
2008	340.80	492.13	234.05	79.11	111.63	56.17
2009	389.11	566.73	259.55	91.06	130.00	62.66
2010	443.13	653.72	281.68	100.41	145.59	65.76
2011	496.02	727.35	310.94	106.39	153.69	68.55
2012	549.00	794.13	343.65	115.10	164.19	73.98
2013	614.90	885.06	377.58	125.83	178.70	79.38
2014	704.06	1014.77	413.36	141.64	201.68	85.46
2015	794.69	1142.92	447.58	155.92	224.24	87.81

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	1331	1330	1331	1330	25
1986	1538	1538	1452	1452	29
1987	1780	1780	1544	1544	33
1988	2095	2095	1439	1439	36
1989	2460	2462	1421	1422	39
1990	2903	2906	1693	1694	41
1991	3442	3446	1940	1942	44
1992	4043	4048	2152	2155	48
1993	4719	4725	2171	2173	55
1994	5476	5484	2003	2006	65
1995	6332	6343	2002	2005	78
1996	7284	7302	2162	2167	92
1997	8341	8371	2421	2429	108
1998	9385	9421	2723	2732	127
1999	10518	10569	3076	3090	146

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	11964	12061	3408	3434	165
2001	13703	13902	3927	3979	184
2002	14804	15058	4254	4322	204
2003	16395	16717	4655	4740	228
2004	17894	18289	4871	4973	261
2005	19371	19827	5148	5263	303
2006	21754	22316	5719	5858	354
2007	24454	25197	6091	6267	419
2008	27216	28110	6468	6671	503
2009	30379	31457	7335	7584	600
2010	34093	35510	7953	8270	701
2011	38324	40323	8470	8896	815
2012	42287	45757	9106	9827	941
2013	46734	50659	9796	10590	1083
2014	51488	55841	10558	11421	1235
2015	56541	61235	11384	12298	1401

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 2015, the nominal human capital per capita increases from 54,390 Yuan to 1,740,450 Yuan, an increase of more than 30 times; and the real human capital per capita increases from 54,390 Yuan to 350,410 Yuan, an increase of approximately 5 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 2015, 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

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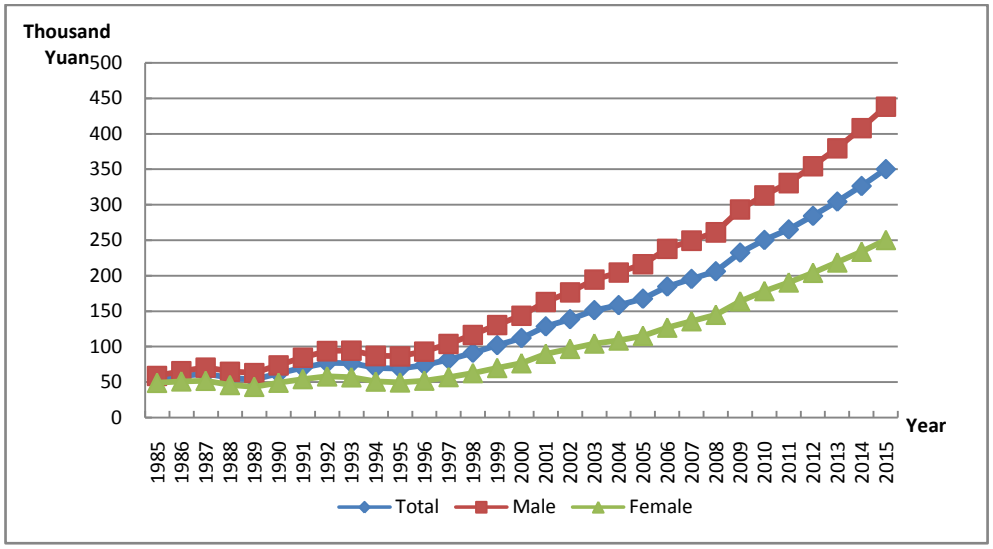


Figure FJ-2.1 Human Capital Per Capita by Gender for Fujian，1985-2015

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	54.39	90.97	44.52	54.39	90.97	44.52
1986	62.21	103.67	51.03	58.73	96.97	48.42
1987	71.23	117.79	58.70	61.80	99.62	51.61
1988	81.48	133.68	67.39	55.96	89.03	47.03
1989	93.03	152.60	76.95	53.75	85.55	45.16
1990	106.84	173.93	88.77	62.30	97.40	52.84

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	124.95	199.02	101.50	70.44	106.55	59.00
1992	144.87	225.83	115.36	77.12	111.95	64.42
1993	167.02	256.34	130.17	76.84	108.80	63.65
1994	191.52	286.77	147.64	70.07	97.29	57.52
1995	218.94	322.55	166.24	69.23	94.02	56.62
1996	249.13	363.46	185.56	73.95	99.10	59.96
1997	282.32	407.96	206.56	81.93	108.52	65.89
1998	314.64	446.68	228.95	91.28	118.82	73.40
1999	349.22	488.33	252.85	102.14	131.61	81.71
2000	393.72	547.59	280.25	112.16	143.01	89.41
2001	448.68	628.50	303.97	128.57	166.98	97.66
2002	482.83	662.34	326.13	138.73	177.39	104.99
2003	533.45	726.13	352.11	151.45	193.12	112.23
2004	582.41	783.95	379.35	158.56	200.86	115.93
2005	630.75	836.90	409.13	167.63	210.43	121.62
2006	702.97	925.41	448.25	184.80	230.16	132.85
2007	785.01	1031.54	485.17	195.52	244.10	136.43
2008	868.00	1134.71	525.25	206.30	256.95	141.20
2009	963.51	1255.88	567.93	232.63	289.31	155.95
2010	1073.85	1403.30	606.07	250.49	313.55	160.95
2011	1200.60	1571.12	647.92	265.35	333.70	163.40
2012	1321.07	1719.27	696.98	284.48	356.52	171.58
2013	1453.50	1882.28	747.65	304.65	380.43	179.91
2014	1592.82	2047.68	807.51	326.62	405.34	190.70
2015	1740.45	2221.01	870.96	350.41	432.31	202.24

Figure FJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

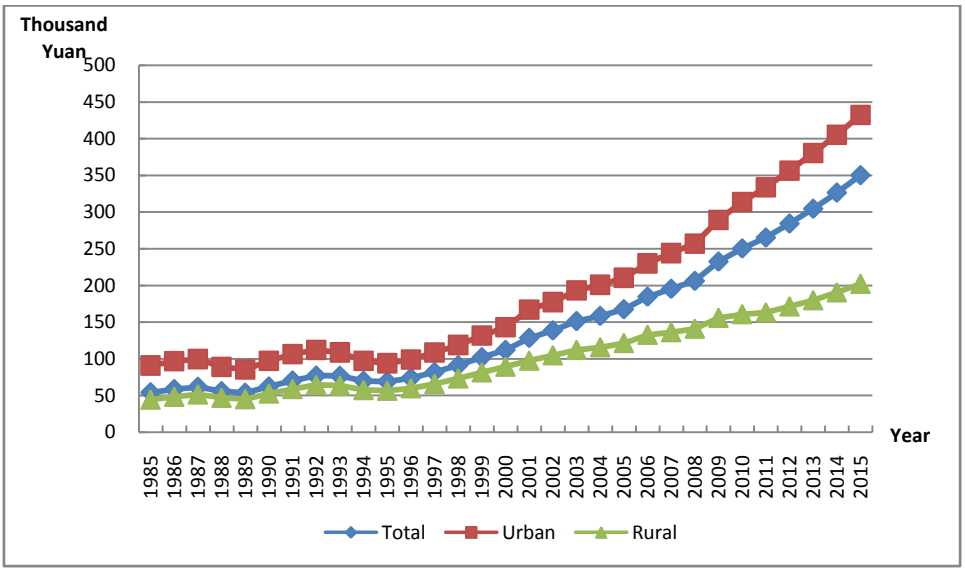


Figure FJ-2.2 Real Human Capital Per Capita by Region for Fujian，1985-2015

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-3.1From 1985 to 2015, the nominal labor force human capital increases from 457 billion Yuan to 21,333 billion Yuan, an increase of more than 45 times; and the real labor force human capital increases from 457 billionYuan

to 4,338 billion Yuan, an increase of approximately 8 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	457	456	457	456
1986	534	533	504	503
1987	618	617	536	536
1988	760	759	522	522
1989	929	928	537	536
1990	1141	1139	666	665
1991	1357	1355	767	766
1992	1585	1584	848	847
1993	1846	1845	856	856
1994	2137	2135	789	788
1995	2473	2471	790	790
1996	2819	2818	847	847
1997	3229	3229	949	950
1998	3752	3754	1102	1103
1999	4323	4328	1278	1279
2000	4946	4931	1426	1421
2001	5431	5426	1579	1578
2002	5889	5892	1716	1717
2003	6536	6541	1880	1881
2004	7128	7172	1962	1973
2005	7753	7807	2077	2091
2006	8867	8938	2357	2375
2007	10025	10121	2530	2553

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	11354	11481	2732	2761
2009	13047	13217	3184	3224
2010	14896	15119	3509	3559
2011	16011	16268	3579	3634
2012	17092	17386	3724	3786
2013	18435	18762	3910	3977
2014	19916	20282	4129	4202
2015	21333	21755	4338	4421

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 2015, the nominal average labor force human capital increases from 33,930 Yuan to 947,190 Yuan, an increase of more than 26 times; and the real average labor force human capital increases from 33,930 Yuan to 192,590 Yuan, an increase of approximately 4 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	33.93	54.05	27.88	33.93	54.05	27.88
1986	38.64	60.53	32.19	36.48	56.62	30.55

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
1987	43.96	67.67	37.10	38.15	57.24	32.63
1988	51.12	77.12	43.67	35.12	51.36	30.48
1989	59.37	88.49	51.02	34.33	49.61	29.95
1990	69.29	101.76	59.92	40.44	56.99	35.67
1991	80.47	115.18	68.88	45.45	61.67	40.04
1992	92.39	129.16	78.97	49.43	64.03	44.10
1993	105.86	145.28	90.27	49.11	61.66	44.14
1994	120.98	163.76	102.71	44.67	55.56	40.02
1995	137.89	185.83	115.67	44.07	54.16	39.40
1996	155.26	208.27	128.61	46.65	56.79	41.56
1997	174.83	232.77	143.06	51.40	61.92	45.64
1998	196.37	257.36	159.80	57.69	68.46	51.23
1999	218.66	282.05	176.78	64.65	76.02	57.13
2000	243.19	309.69	195.34	70.09	80.88	62.32
2001	262.72	329.12	210.99	76.39	87.44	67.78
2002	279.44	344.40	224.83	81.45	92.24	72.38
2003	306.11	379.86	239.45	88.05	101.03	76.32
2004	331.81	413.42	252.35	91.33	105.93	77.12
2005	358.83	448.14	264.76	96.14	112.68	78.71
2006	403.35	496.09	302.30	107.21	123.38	89.59
2007	448.99	547.94	337.41	113.31	129.66	94.88
2008	502.09	613.82	368.50	120.81	139.00	99.06
2009	568.48	699.96	400.91	138.75	161.25	110.09
2010	637.25	789.81	430.90	150.10	176.47	114.43
2011	689.53	853.90	460.88	154.12	181.36	116.23
2012	740.47	910.98	492.57	161.34	188.91	121.26
2013	803.71	989.05	522.94	170.45	199.90	125.84
2014	873.93	1075.65	554.05	181.18	212.93	130.84
2015	947.19	1166.42	582.74	192.59	227.04	135.32

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)
	5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1261	1261	1261	1261	34
1986	1445	1445	1353	1353	39
1987	1658	1658	1461	1461	42
1988	1911	1912	1390	1390	44
1989	2184	2185	1338	1339	48
1990	2522	2523	1510	1511	51
1991	2910	2913	1702	1703	54
1992	3368	3370	1875	1877	60
1993	3900	3904	1906	1908	68
1994	4455	4460	1717	1719	76
1995	5073	5079	1669	1671	85
1996	5730	5741	1737	1740	95
1997	6444	6460	1906	1911	108
1998	7270	7291	2127	2133	121
1999	8179	8211	2425	2434	134

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	9229	9280	2723	2737	148
2001	10773	10875	3174	3201	165
2002	12104	12253	3550	3590	190
2003	13509	13696	3919	3969	223
2004	14936	15167	4181	4241	264
2005	16098	16333	4419	4479	312
2006	18370	18701	4967	5052	371
2007	20674	21117	5313	5421	441
2008	22934	23460	5546	5666	523
2009	25712	26380	6250	6403	615
2010	28910	29760	6801	6992	715
2011	32940	33880	7335	7536	822
2012	37410	38520	8080	8311	930
2013	42350	43640	8895	9158	1040
2014	47840	49310	9795	10085	1136
2015	54060	55720	10879	11204	1250

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 2015, the nominal human capital per capita increases from 39,990 Yuan to 1,388,650 Yuan, an increase of more than 33 times; and the real human capital per capita increases from 39,990 Yuan to 279,450 Yuan, an increase of approximately 5 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 2015, 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.

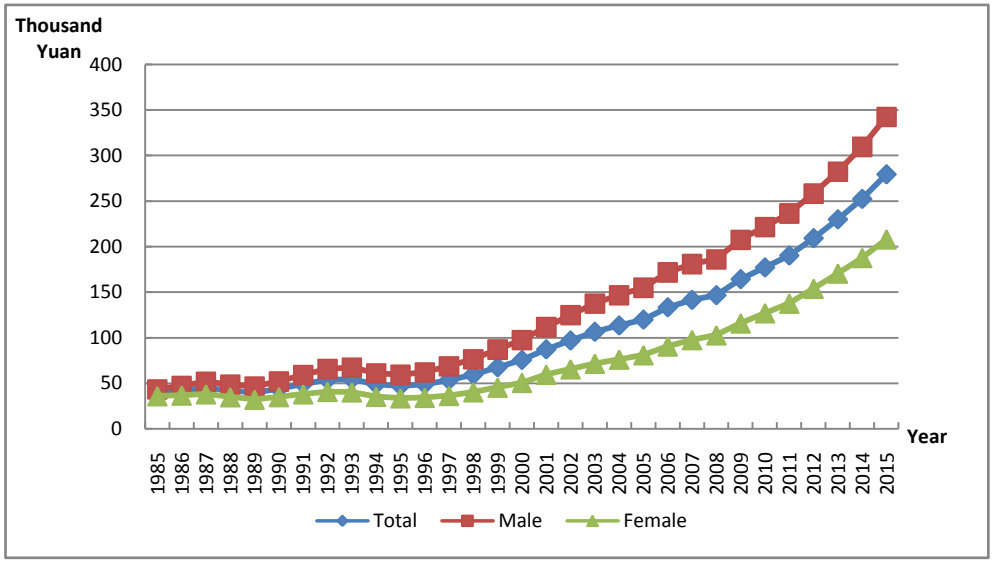


Figure JX-2.1 Human Capital Per Capita by Gender for Jiangxi，1985-2015

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	39.99	80.90	29.87	39.99	80.90	29.87
1986	45.26	90.23	34.08	42.37	85.12	31.73
1987	51.32	100.45	39.01	45.22	87.82	34.56
1988	57.98	110.17	44.79	42.17	77.87	33.15
1989	64.99	118.31	51.40	39.81	71.35	31.78
1990	73.57	129.40	59.26	44.05	76.88	35.64
1991	84.32	146.30	67.64	49.33	83.26	40.16

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	96.97	168.50	76.69	53.99	89.21	43.99
1993	111.69	193.61	87.30	54.59	88.52	44.51
1994	126.91	218.53	98.44	48.91	78.73	39.62
1995	143.80	244.72	111.00	47.32	75.42	38.18
1996	161.72	273.62	123.91	49.03	78.01	39.25
1997	180.99	301.28	138.80	53.54	83.39	43.06
1998	203.37	337.70	154.56	59.50	92.55	47.47
1999	227.99	378.45	171.50	67.60	104.66	53.70
2000	256.14	424.66	190.80	75.57	115.02	60.28
2001	296.20	493.99	209.54	87.27	134.07	66.74
2002	330.57	537.37	229.76	96.95	145.55	73.25
2003	367.21	582.75	251.75	106.53	156.43	79.79
2004	405.27	623.16	278.28	113.45	161.94	85.21
2005	436.73	651.16	301.66	119.89	166.71	90.38
2006	493.27	732.35	333.78	133.37	185.82	98.43
2007	550.76	815.33	365.18	141.54	198.16	101.79
2008	606.81	892.11	397.40	146.74	204.74	104.20
2009	676.12	991.98	434.81	164.35	229.04	114.93
2010	753.13	1111.14	468.71	177.17	249.27	119.92
2011	854.35	1257.80	507.74	190.24	268.48	123.01
2012	969.02	1426.13	546.46	209.29	296.56	128.59
2013	1094.88	1607.49	588.37	229.96	326.58	134.50
2014	1232.77	1802.88	632.74	252.40	357.70	141.53
2015	1388.65	2021.59	682.04	279.45	395.16	150.30

Figure JX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

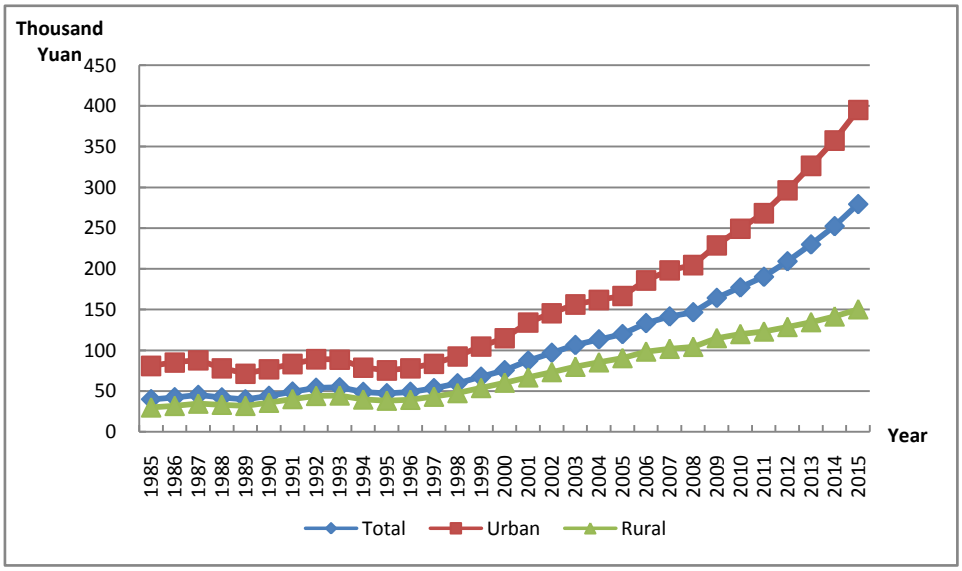


Figure JX-2.2 Real Human Capital Per Capita by Region for Jiangxi，1985-2015

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 2015, the nominal labor force human capital increases from 420 billion Yuan to 17,859 billion Yuan, an increase of more than 41 times; and the real labor force human capital increases from 420 billion Yuan to 3,634 billion Yuan, an increase of approximately 7 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	420	420	420	420
1986	494	494	462	462
1987	579	578	510	510
1988	695	695	506	506
1989	839	838	514	514
1990	1007	1006	603	603
1991	1175	1175	688	687
1992	1362	1362	762	761
1993	1577	1577	778	778
1994	1815	1815	707	706
1995	2065	2064	687	687
1996	2314	2314	710	710
1997	2571	2571	771	771
1998	2878	2878	853	853
1999	3209	3209	966	966
2000	3629	3609	1090	1084
2001	3915	3902	1180	1176
2002	4236	4228	1272	1269
2003	4570	4570	1357	1357
2004	4863	4879	1389	1393
2005	5240	5259	1461	1466
2006	6104	6129	1679	1686
2007	7039	7073	1840	1848
2008	7998	8046	1965	1977

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	9284	9352	2289	2305
2010	10676	10774	2542	2564
2011	11636	11758	2623	2649
2012	12740	12893	2788	2821
2013	14058	14246	2992	3030
2014	15858	16091	3287	3334
2015	17859	18153	3634	3691

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 2015, the nominal average labor force human capital increases from 51,810 Yuan to 915,850 Yuan, an increase of more than 17 times; and the real average labor force human capital increases from 51,810 Yuan to 186,360 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	51.81	47.51	20.00	51.81	47.51	20.00
1986	59.77	53.66	23.03	55.92	50.62	21.44
1987	69.23	60.42	26.52	61.03	52.83	23.49

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	79.96	65.80	30.87	58.22	46.51	22.84
1989	92.21	71.95	36.00	56.51	43.39	22.26
1990	106.39	79.23	42.00	63.71	47.07	25.26
1991	120.11	87.68	48.50	70.29	49.90	28.80
1992	134.38	96.46	55.76	75.12	51.07	31.99
1993	149.82	106.94	64.14	73.91	48.89	32.70
1994	165.76	119.12	72.97	64.55	42.91	29.37
1995	181.63	132.48	82.37	60.45	40.83	28.34
1996	196.99	145.05	91.76	60.47	41.35	29.07
1997	213.75	159.11	101.74	64.05	44.04	31.56
1998	233.55	174.10	112.72	69.24	47.71	34.62
1999	253.29	189.32	124.01	76.21	52.35	38.83
2000	285.17	213.49	137.17	85.61	57.82	43.34
2001	296.04	226.35	147.97	89.19	61.43	47.13
2002	306.66	240.41	158.14	92.06	65.12	50.42
2003	315.45	255.18	168.37	93.67	68.50	53.36
2004	322.05	272.63	177.20	91.99	70.85	54.26
2005	328.11	293.90	186.44	91.48	75.25	55.86
2006	377.45	331.77	215.23	103.84	84.18	63.47
2007	419.10	372.54	243.53	109.54	90.54	67.88
2008	460.48	415.23	270.61	113.16	95.30	70.96
2009	515.76	482.32	298.64	127.16	111.36	78.94
2010	574.95	555.50	324.12	136.90	124.62	82.93
2011	623.53	623.25	349.28	140.56	133.03	84.62
2012	679.51	696.75	377.52	148.70	144.89	88.83
2013	742.91	782.21	407.17	158.12	158.92	93.08
2014	824.87	896.57	437.11	170.98	177.88	97.77
2015	915.85	1025.28	466.47	186.36	200.41	102.79

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-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	3322	3320	3322	3320	101
1986	3856	3853	3691	3688	115
1987	4515	4505	3994	3986	132
1988	5329	5315	3975	3966	148
1989	6225	6199	3952	3936	162
1990	7252	7217	4455	4433	176
1991	8407	8359	4915	4888	193
1992	9702	9639	5322	5289	214
1993	11189	11109	5445	5408	237
1994	12766	12666	5023	4987	261
1995	14447	14314	4835	4794	287
1996	16341	16130	4972	4912	319
1997	18538	18239	5474	5392	356
1998	20997	21047	6224	6238	399

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)	
1999	23564	23654	7014	7038	450
2000	26570	26770	7860	7913	509
2001	30070	30350	8711	8786	574
2002	33760	34170	9818	9929	652
2003	37720	38360	10823	10996	749
2004	41560	42440	11506	11740	875
2005	45790	46940	12458	12761	1041
2006	51780	53370	13932	14346	1240
2007	57280	59160	14768	15240	1455
2008	64380	66790	15782	16355	1689
2009	71690	75930	17565	18570	1980
2010	79440	85170	18892	20228	2302
2011	87460	93160	19793	21059	2647
2012	96930	103290	21476	22863	3012
2013	107300	114270	23272	24759	3397
2014	117960	125430	25071	26649	3792
2015	129490	137620	27158	28826	4234

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 2015, the nominal human capital per capita increases from 47,590 Yuan to 1,634,040 Yuan, an increase of more than 32 times; and the real human capital per capita increases from 47,590

Yuan to 342,710 Yuan, an increase of approximately 6 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 2015, 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.

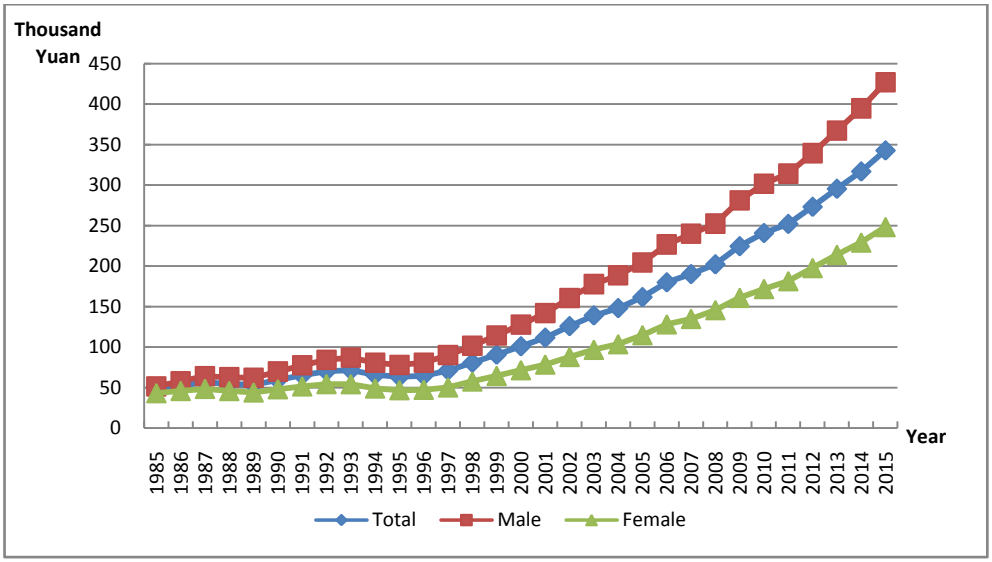


Figure SD-2.1 Human Capital Per Capita by Gender for Shandong，1985-2015

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	47.59	90.04	35.31	47.59	90.04	35.31
1986	54.53	101.83	40.12	52.20	96.98	38.54
1987	64.02	117.50	46.64	56.63	102.57	41.71
1988	73.26	130.69	53.54	54.64	94.59	40.93
1989	84.27	146.51	61.69	53.50	91.66	39.66

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	96.87	164.25	71.02	59.51	100.15	43.91
1991	111.56	186.12	81.07	65.22	106.86	48.19
1992	127.86	210.78	92.05	70.14	111.44	52.31
1993	146.92	239.99	104.27	71.50	110.72	53.53
1994	166.82	269.24	117.48	65.64	99.05	49.55
1995	188.87	303.50	130.96	63.21	95.59	46.86
1996	212.86	340.23	145.35	64.77	96.98	47.71
1997	240.68	383.09	161.47	71.07	105.81	51.76
1998	272.06	431.42	178.64	80.65	119.52	57.84
1999	304.29	481.28	196.37	90.57	133.33	64.49
2000	341.13	537.05	216.22	100.92	147.02	71.51
2001	385.28	598.71	236.48	111.61	162.12	76.37
2002	432.61	665.12	256.08	125.81	182.47	82.78
2003	484.57	737.29	276.77	139.04	200.86	88.15
2004	534.83	804.42	299.81	148.07	213.18	91.29
2005	594.07	883.63	324.44	161.63	231.63	96.47
2006	668.51	995.86	355.95	179.87	258.46	104.80
2007	737.26	1090.58	388.31	190.08	272.68	108.57
2008	824.63	1221.97	423.16	202.15	291.82	111.41
2009	916.27	1356.19	462.06	224.50	324.06	121.55
2010	1012.29	1496.10	500.26	240.74	347.42	127.89
2011	1113.33	1640.17	539.50	251.96	363.77	130.24
2012	1232.71	1817.52	581.01	273.12	394.81	137.51
2013	1361.97	2005.89	625.06	295.39	428.07	143.63
2014	1490.38	2192.80	670.72	316.76	458.29	151.78
2015	1634.04	2393.16	721.95	342.71	493.26	161.92

Figure SD-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

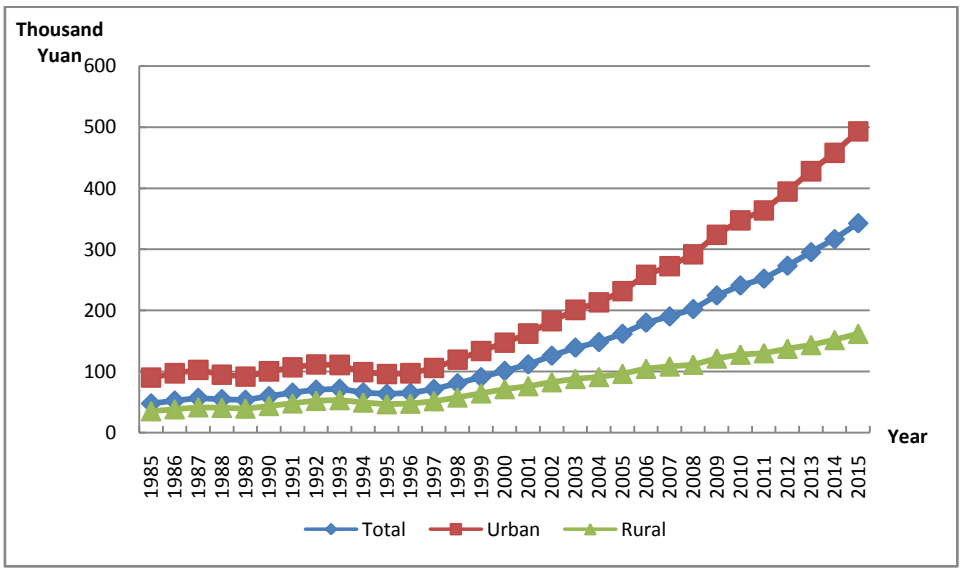


Figure SD-2.2 Real Human Capital Per Capita by Region for Shandong，1985-2015

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 2015, the nominal labor force human capital increases from 1,338 billion Yuan to 59,090 billion Yuan, an increase of more than 43

times; and the real labor force human capital increases from 1,338 billion Yuan to 12,431 billion Yuan, an increase of approximately 8 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	1338	1285	1338	1285
1986	1604	1530	1535	1465
1987	1870	1782	1655	1579
1988	2297	2203	1713	1645
1989	2725	2632	1729	1672
1990	3204	3091	1967	1898
1991	3713	3576	2170	2091
1992	4289	4117	2350	2259
1993	4968	4747	2415	2314
1994	5691	5408	2237	2132
1995	6476	6123	2166	2054
1996	7325	6901	2227	2106
1997	8333	7815	2457	2314
1998	9584	8932	2834	2653
1999	10941	10104	3246	3014
2000	12558	11472	3701	3403
2001	13822	12265	4003	3581
2002	15479	13220	4511	3892
2003	17652	14502	5085	4226
2004	20030	15995	5560	4490
2005	22598	17680	6162	4873
2006	25993	19987	7015	5454
2007	29347	22564	7588	5892

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	32759	25381	8045	6283
2009	36747	28855	9015	7129
2010	40950	32570	9751	7804
2011	43870	34860	9943	7947
2012	47030	37390	10441	8347
2013	50680	39880	11018	8714
2014	54590	42940	11636	9202
2015	59090	46550	12431	9847

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 2015, the nominal average labor force human capital increases from 31,810 Yuan to 1,086,210 Yuan, an increase of more than 33 times; and the real average labor force human capital increases from 31,810 Yuan to 228,510 Yuan, an increase of approximately 6 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	31.81	55.78	24.11	31.81	55.78	24.11
1986	36.83	63.97	27.65	35.25	60.93	26.56

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
1987	43.03	73.52	31.76	38.09	64.18	28.41
1988	49.80	83.11	36.59	37.14	60.16	27.97
1989	57.43	93.71	41.99	36.45	58.63	27.00
1990	66.40	105.34	48.21	40.78	64.23	29.81
1991	76.07	118.67	54.96	44.46	68.14	32.67
1992	86.63	133.54	62.30	47.47	70.60	35.41
1993	99.06	151.32	70.55	48.15	69.81	36.22
1994	112.45	170.17	79.37	44.20	62.60	33.48
1995	127.60	191.51	88.91	42.68	60.32	31.81
1996	143.18	213.40	98.43	43.53	60.83	32.31
1997	161.82	241.49	108.74	47.71	66.70	34.86
1998	184.25	273.37	119.99	54.48	75.73	38.85
1999	206.82	305.81	131.69	61.36	84.72	43.25
2000	232.99	339.28	145.50	68.66	92.88	48.12
2001	256.91	367.72	159.09	74.41	99.57	51.38
2002	285.59	402.12	173.97	83.23	110.32	56.24
2003	321.53	445.22	191.25	92.62	121.29	60.91
2004	360.25	493.54	207.08	100.00	130.80	63.05
2005	404.26	544.96	223.97	110.23	142.85	66.60
2006	460.87	617.84	252.90	124.38	160.35	74.46
2007	517.58	690.99	279.31	133.83	172.77	78.09
2008	575.73	769.32	303.50	141.39	183.72	79.90
2009	642.43	860.75	329.52	157.60	205.67	86.69
2010	712.17	953.30	355.49	169.58	221.37	90.88
2011	775.09	1038.17	382.64	175.67	230.25	92.37
2012	841.32	1128.06	412.62	186.78	245.05	97.66
2013	918.12	1228.92	444.34	199.60	262.26	102.10
2014	994.35	1333.80	476.54	211.95	278.76	107.84
2015	1086.21	1453.40	509.88	228.51	299.57	114.35

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-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	2523	2522	2523	2522	80
1986	2867	2867	2729	2729	90
1987	3320	3320	2981	2981	99
1988	3915	3916	2952	2953	112
1989	4593	4595	2889	2890	122
1990	5433	5436	3391	3393	132
1991	6244	6249	3842	3845	143
1992	7127	7134	4207	4211	155
1993	8098	8107	4330	4335	168
1994	9119	9131	3917	3922	187
1995	10235	10251	3776	3781	212
1996	11978	12008	3978	3987	242
1997	13872	13922	4435	4449	276
1998	15861	15919	5190	5208	315

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	17981	18065	6056	6082	354
2000	20371	20493	6904	6943	396
2001	23718	23942	7951	8021	441
2002	25916	26177	8658	8740	493
2003	29074	29436	9544	9656	554
2004	31998	32445	9953	10084	631
2005	35073	35570	10670	10813	744
2006	39626	40277	11874	12059	899
2007	44455	45257	12611	12827	1101
2008	49557	50533	13100	13347	1340
2009	55246	56459	14657	14968	1654
2010	60383	61875	15063	15432	2021
2011	67976	69676	16420	16819	2417
2012	75633	77515	17794	18225	2865
2013	83452	85526	19053	19514	3354
2014	91886	94074	20575	21052	3861
2015	100350	102642	22167	22661	4376

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 2015, the nominal human capital per capita increases from 35,850 Yuan to 1,263,070 Yuan, an increase of more than 34 times; and the real human capital per capita increases from 35,850 Yuan to

279,010 Yuan, an increase of approximately 6 times.

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 2015, 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.

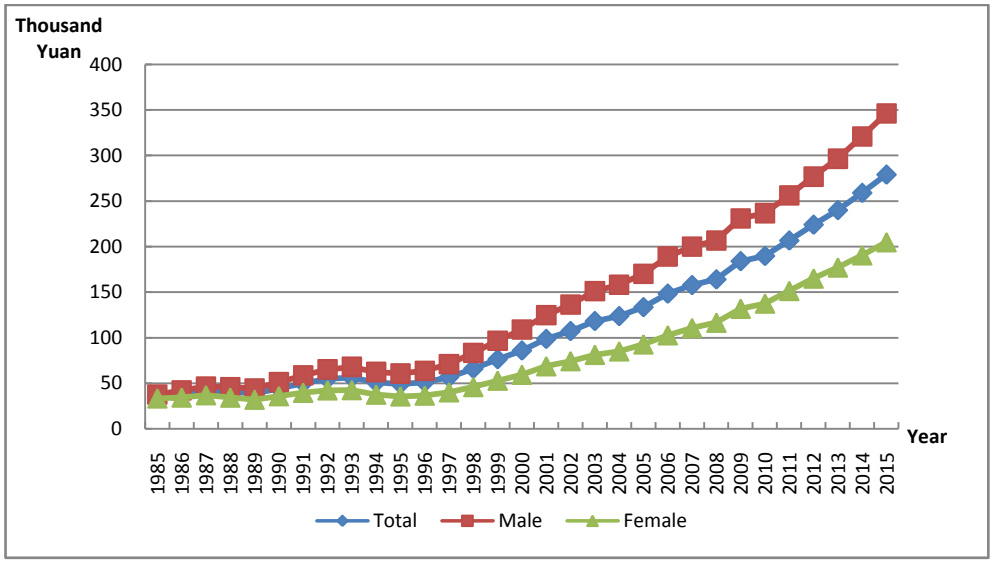


Figure HeN-2.1 Human Capital Per Capita by Gender for Henan，1985-2015

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	35.85	70.28	29.44	35.85	70.28	29.44
1986	40.68	80.11	33.41	38.72	75.01	32.03
1987	47.04	93.48	38.76	42.24	81.20	35.29
1988	53.92	104.92	44.57	40.66	75.01	34.36
1989	61.55	118.68	51.09	38.72	73.84	32.28

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	70.92	134.81	59.19	44.27	83.46	37.07
1991	81.35	156.43	67.67	50.05	92.14	42.38
1992	92.69	180.15	76.89	54.71	98.53	46.80
1993	105.20	206.81	87.06	56.25	102.27	48.04
1994	118.39	233.12	98.19	50.85	90.48	43.87
1995	132.90	262.37	110.39	49.03	87.12	42.41
1996	153.82	304.12	123.49	51.08	92.22	42.78
1997	177.11	348.38	137.64	56.62	103.16	45.89
1998	201.11	386.79	153.20	65.81	117.00	52.61
1999	226.54	425.13	169.96	76.30	133.12	60.11
2000	253.36	461.69	188.33	85.87	145.88	67.14
2001	294.07	532.43	211.21	98.58	167.06	74.77
2002	320.96	550.66	232.94	107.23	173.13	81.97
2003	360.14	606.18	257.47	118.22	187.40	89.35
2004	397.58	649.70	284.21	123.66	190.56	93.58
2005	438.67	700.32	312.72	133.45	201.18	100.85
2006	494.90	776.46	349.60	148.29	220.41	111.08
2007	555.86	862.12	386.43	157.69	232.16	116.49
2008	620.26	949.93	426.60	163.96	240.19	119.18
2009	693.32	1046.50	473.89	183.94	267.76	131.87
2010	760.38	1133.64	516.33	189.68	280.51	130.29
2011	855.31	1262.79	564.70	206.60	296.50	142.49
2012	952.16	1385.18	617.47	224.01	316.97	152.16
2103	1051.13	1513.91	666.67	239.98	336.69	159.63
2014	1156.46	1637.55	728.61	258.95	357.03	171.73
2015	1263.07	1763.62	788.53	279.01	379.60	183.63

Figure HeN-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

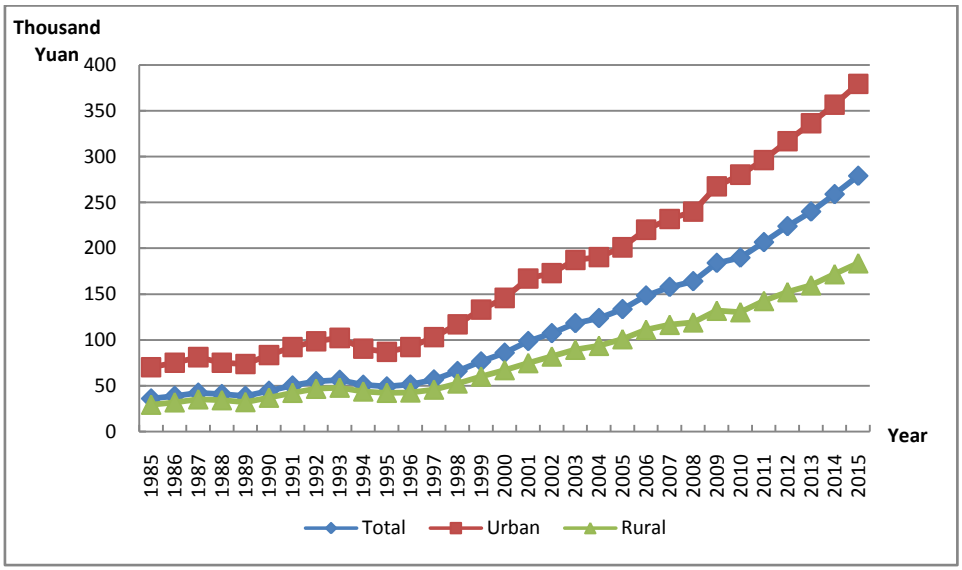


Figure HeN-2.2 Real Human Capital Per Capita by Region for Henan，1985-2015

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 2015, the nominal labor force human capital increases from 944 billion Yuan to 35,646 billion Yuan, an increase of more than 36 times; and the real labor force human capital increases from 944

billion Yuan to 7,925 billion Yuan, an increase of approximately 7 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	944	944	944	944
1986	1094	1094	1042	1041
1987	1260	1259	1132	1131
1988	1539	1539	1161	1161
1989	1854	1854	1166	1166
1990	2231	2230	1392	1392
1991	2509	2508	1545	1545
1992	2809	2809	1663	1663
1993	3150	3150	1693	1693
1994	3542	3541	1531	1531
1995	3995	3994	1485	1485
1996	4569	4571	1531	1532
1997	5254	5261	1696	1698
1998	6008	6017	1987	1990
1999	6881	6891	2339	2342
2000	7919	7907	2704	2700
2001	8633	8632	2920	2920
2002	9392	9398	3164	3166
2003	10404	10413	3448	3451
2004	11404	11456	3581	3596
2005	12902	12965	3958	3977
2006	14131	14211	4278	4301
2007	15725	15820	4512	4538
2008	17478	17595	4665	4695

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	19551	19701	5224	5262
2010	22106	22309	5521	5571
2011	23944	24181	5814	5871
2012	25719	25984	6090	6151
2013	28309	28612	6508	6576
2014	31646	31979	7136	7209
2015	35646	36042	7925	8010

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 2015, the nominal average labor force human capital increases from 23,510 Yuan to 719,860 Yuan, an increase of more than 29 times; and the real average labor force human capital increases from 23,510 Yuan to 160,040 Yuan, an increase of approximately 5 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	23.51	44.29	19.64	23.51	44.29	19.64
1986	26.76	50.68	22.38	25.48	47.45	21.45
1987	30.59	58.62	25.57	27.48	50.91	23.28

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	35.41	66.18	29.64	26.71	47.31	22.85
1989	40.70	74.69	34.21	25.60	46.47	21.62
1990	47.14	84.61	39.77	29.42	52.38	24.91
1991	52.93	93.61	45.21	32.59	55.14	28.32
1992	58.96	102.79	51.04	34.91	56.22	31.06
1993	65.81	113.55	57.55	35.35	56.15	31.76
1994	73.61	125.98	64.79	31.82	48.90	28.95
1995	82.52	140.40	73.06	30.68	46.62	28.07
1996	93.59	157.91	81.80	31.37	47.88	28.34
1997	106.53	179.35	91.56	34.38	53.11	30.53
1998	120.32	198.97	102.24	39.79	60.18	35.11
1999	135.50	221.95	112.87	46.05	69.50	39.92
2000	152.82	248.25	124.46	52.17	78.44	44.37
2001	168.08	264.23	136.24	56.86	82.91	48.23
2002	182.36	275.66	148.60	61.43	86.67	52.29
2003	200.23	295.11	163.33	66.36	91.23	56.68
2004	218.74	315.19	178.44	68.68	92.45	58.75
2005	245.49	348.89	198.35	75.32	100.23	63.97
2006	271.97	375.89	223.06	82.34	106.70	70.87
2007	304.96	419.58	248.95	87.50	112.98	75.04
2008	341.34	469.49	274.91	91.11	118.71	76.80
2009	384.49	530.04	302.97	102.73	135.61	84.31
2010	433.26	601.89	329.62	108.21	148.94	83.17
2011	477.80	660.38	360.14	116.03	155.05	90.88
2012	523.06	713.94	394.97	123.85	163.37	97.33
2013	577.34	782.53	432.65	132.72	174.03	103.60
2014	643.17	870.08	474.63	145.04	189.70	111.87
2015	719.86	976.69	516.90	160.04	210.22	120.38

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)
	Year5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1985	1665	1664	1665	1664	56
1986	1957	1956	1867	1867	62
1987	2300	2301	2041	2042	69
1988	2715	2717	2026	2027	75
1989	3187	3191	2048	2050	80
1990	3773	3778	2356	2359	85
1991	4390	4398	2610	2615	91
1992	5081	5093	2760	2766	98
1993	5863	5879	2691	2698	108
1994	6701	6722	2445	2452	123
1995	7618	7642	2315	2322	145
1996	8766	8809	2435	2447	171
1997	10027	10092	2700	2717	199
1998	11341	11399	3101	3117	229

Year	Nominal Human Capital (Billions of Yuan)		Real Human Capital (Billions of 1985 Yuan)		Real Physical Capital (Billions of 1985 Yuan) (5)
	Year5-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	
1999	12888	12971	3606	3628	261
2000	14639	14736	4118	4145	294
2001	16379	16536	4594	4636	330
2002	17483	17672	4915	4967	367
2003	19639	19923	5397	5472	406
2004	21317	21692	5578	5674	453
2005	22957	23397	5835	5944	509
2006	25618	26202	6402	6545	583
2007	28162	28872	6707	6873	672
2008	30972	31858	6950	7146	772
2009	34249	35356	7720	7966	900
2010	38134	39558	8349	8657	1053
2011	42640	44302	8826	9167	1243
2012	48487	50659	9752	10185	1445
2013	54313	56772	10624	11102	1671
2014	60522	63239	11603	12120	1917
2015	67220	70195	12698	13256	2178

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 2015, the nominal human capital per capita increases from 37,050 Yuan to 1,418,160Yuan, an increase of more than 27 times; and the real human capital per capita increases from 37,050 Yuan to

267,880Yuan Yuan, an increase of approximately 6.23 times.

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 2015, 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.

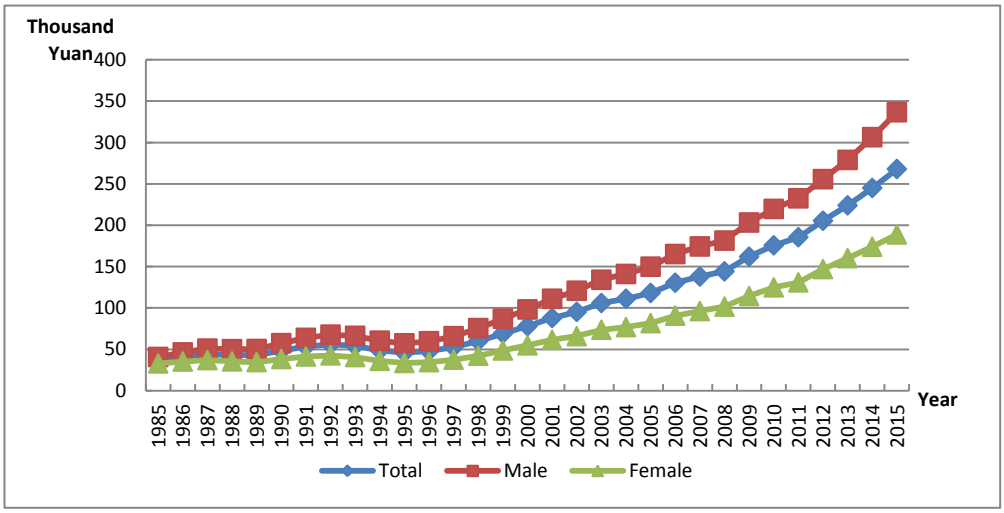


Figure HuB-2.1 Human Capital Per Capita by Gender for Hubei，1985-2015

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	37.05	79.31	24.94	37.05	79.31	24.94
1986	42.98	89.14	28.66	41.02	84.57	27.51
1987	49.89	100.56	33.01	44.27	87.77	29.77
1988	57.85	113.04	38.06	43.17	81.88	29.29
1989	66.75	126.94	43.70	42.89	80.59	28.45
1990	77.63	143.84	50.64	48.48	89.26	31.85

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	89.60	162.53	57.88	53.28	94.97	35.15
1992	102.97	183.32	65.84	55.93	96.94	36.98
1993	118.06	206.78	74.78	54.19	92.04	35.72
1994	134.05	229.65	84.99	48.92	80.49	32.71
1995	151.46	254.43	96.04	46.02	74.25	30.83
1996	172.17	285.84	107.50	47.83	75.70	31.98
1997	195.16	321.10	119.69	52.55	82.88	34.37
1998	219.20	355.97	132.78	59.94	93.85	38.52
1999	246.76	397.33	146.83	69.04	107.77	43.33
2000	277.11	443.63	161.72	77.96	120.33	48.60
2001	313.42	499.14	179.81	87.91	134.85	54.14
2002	338.80	527.71	197.63	95.25	143.71	59.03
2003	385.55	602.50	217.36	105.94	159.93	64.09
2004	424.82	656.73	238.52	111.17	166.81	66.48
2005	464.69	713.75	258.14	118.10	176.53	69.65
2006	522.08	799.81	280.46	130.47	195.09	74.26
2007	579.23	881.06	304.03	137.96	205.25	76.59
2008	642.61	973.35	327.58	144.21	214.93	76.84
2009	718.34	1083.13	355.89	161.92	240.86	83.48
2010	802.27	1206.50	382.84	175.65	260.99	87.10
2011	895.84	1331.27	411.78	185.44	272.97	88.14
2012	1021.07	1506.35	444.91	205.36	300.45	92.45
2013	1144.90	1675.11	477.21	223.95	325.33	96.28
2014	1277.79	1847.61	515.80	244.97	351.80	102.12
2015	1418.16	2029.34	554.65	267.88	381.06	107.98

Figure HuB-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

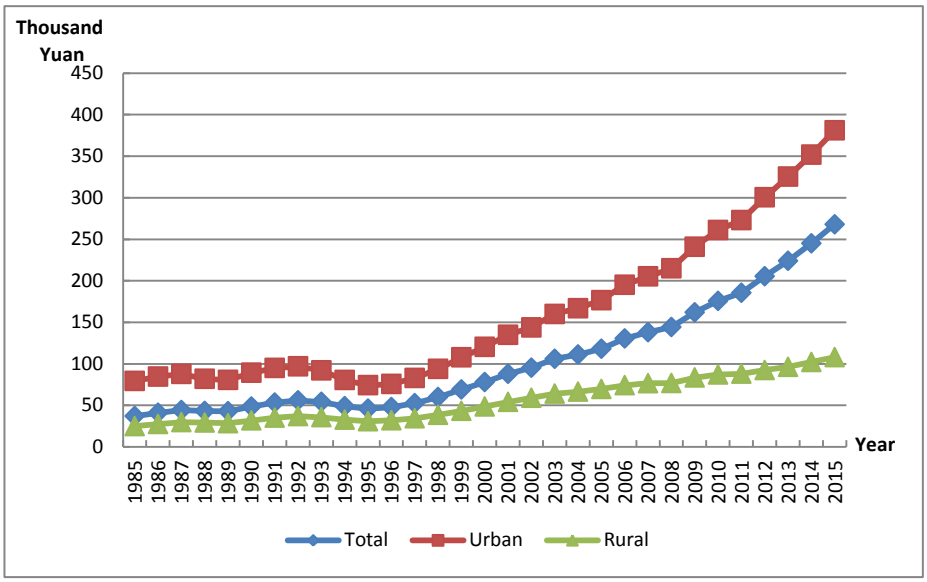


Figure HuB-2.2 Real Human Capital Per Capita by Region for Hubei，1985-2015

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 2015, the nominal labor force human capital increases from 672 billion Yuan to 26,696 billion Yuan, an increase of more than 27 times; and the real labor force human capital increases from 672billion Yuan to 5,056 billion Yuan, an increase of approximately 7 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	672	672	672	672
1986	801	801	765	764
1987	957	956	850	849
1988	1148	1147	858	858
1989	1361	1360	875	875
1990	1614	1611	1008	1007
1991	1841	1839	1096	1095
1992	2081	2079	1133	1132
1993	2338	2337	1077	1076
1994	2613	2612	958	957
1995	2911	2909	889	888
1996	3337	3338	933	933
1997	3908	3910	1059	1060
1998	4613	4614	1269	1269
1999	5394	5397	1516	1517
2000	6363	6297	1800	1782
2001	6834	6776	1931	1916
2002	7250	7207	2054	2042
2003	7937	7916	2205	2199
2004	8530	8595	2256	2272
2005	9282	9364	2382	2402
2006	10317	10424	2604	2630
2007	11301	11437	2716	2748
2008	12529	12703	2831	2869
2009	14027	14249	3180	3229
2010	15782	16062	3472	3533

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	17281	17610	3592	3660
2012	18959	19346	3829	3906
2013	21141	21597	4151	4239
2014	23876	24414	4593	4696
2015	26696	27332	5056	5176

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 2015, the nominal average labor force human capital increases from 25,250Yuan to793,430 Yuan, an increase of more than 30 times; and the real average labor force human capital increases from 25,250 Yuan to 150,280 Yuan, an increase of approximately 5 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	25.25	48.26	18.25	25.25	48.26	18.25
1986	29.35	54.59	21.05	28.02	51.79	20.20
1987	34.12	61.80	24.27	30.30	53.94	21.89
1988	39.44	68.80	28.15	29.49	49.84	21.66
1989	45.47	76.99	32.39	29.24	48.88	21.09

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						
1991	59.43	94.97	42.52	35.39	55.49	25.82
1992	66.43	103.41	47.92	36.18	54.68	26.92
1993	74.26	113.22	53.87	34.20	50.40	25.73
1994	82.84	123.81	60.23	30.37	43.39	23.18
1995	92.22	135.39	67.10	28.15	39.51	21.54
1996	104.11	150.69	75.86	29.11	39.90	22.57
1997	118.27	169.64	85.99	32.06	43.79	24.69
1998	135.15	192.72	97.02	37.17	50.81	28.14
1999	153.09	217.38	108.10	43.04	58.96	31.90
2000	174.22	247.67	120.38	49.29	67.18	36.18
2001	190.27	267.10	133.42	53.78	72.16	40.17
2002	204.18	281.37	147.15	57.84	76.63	43.96
2003	225.08	308.87	163.39	62.52	81.99	48.18
2004	245.12	333.68	179.71	64.82	84.76	50.09
2005	268.78	366.28	195.40	68.98	90.59	52.72
2006	297.78	405.25	214.20	75.15	98.85	56.71
2007	328.08	446.14	231.69	78.85	103.93	58.37
2008	363.29	494.57	250.73	82.08	109.21	58.81
2009	406.96	555.06	273.27	92.25	123.43	64.10
2010	455.72	624.43	293.75	100.26	135.08	66.83
2011	504.63	691.83	317.39	104.90	141.85	67.93
2012	558.44	761.13	344.24	112.78	151.81	71.53
2013	625.04	851.61	372.12	122.71	165.39	75.07
2014	707.71	964.14	401.00	136.14	183.58	79.39
2015	793.43	1081.03	425.84	150.28	202.99	82.90

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	1574	1573	1574	1573	39
1986	1817	1817	1725	1725	43
1987	2100	2100	1817	1817	49
1988	2452	2453	1690	1691	54
1989	2840	2841	1653	1654	57
1990	3340	3343	1937	1938	58
1991	3828	3832	2128	2130	61
1992	4400	4407	2220	2223	66
1993	5040	5049	2174	2178	71
1994	5727	5738	1971	1975	76
1995	6461	6476	1869	1873	83
1996	7362	7386	1974	1980	91
1997	8321	8356	2169	2178	100
1998	9387	9438	2437	2450	110

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)	
1999	10628	10709	2742	2763	121
2000	12001	12100	3053	3078	134
2001	13846	14003	3550	3589	148
2002	15331	15541	3947	4000	164
2003	17204	17453	4318	4380	182
2004	19168	19489	4593	4670	205
2005	21028	21383	4923	5006	234
2006	23224	23701	5359	5469	270
2007	25416	26010	5545	5675	318
2008	27890	28659	5725	5884	377
2009	30555	31515	6295	6494	448
2010	33770	34925	6749	6982	537
2011	38174	39524	7234	7492	633
2012	42420	43920	7881	8161	742
2013	47456	49127	8473	8773	859
2014	52776	54596	9186	9504	983
2015	58314	60278	10011	10349	1096

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 2015, the nominal human capital per capita increases from 31,120 Yuan to 1,053,320 Yuan, an increase of more than 232 times; and the real human capital per capita increases from 31,120 Yuan

to 180,820 Yuan, an increase of approximately 4 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.

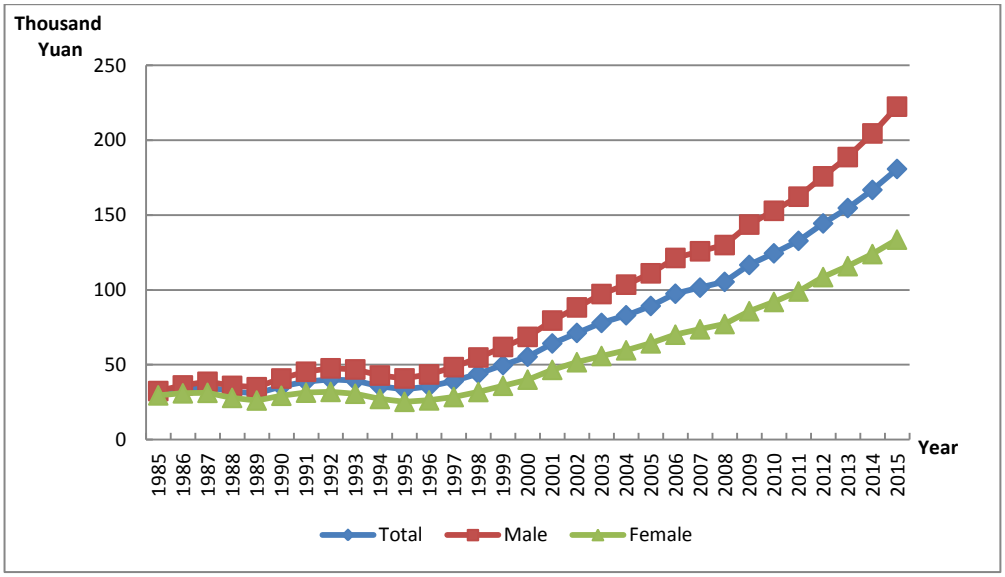


Figure HuN-2.1 Human Capital Per Capita by Gender for Hunan，1985-2015

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	31.12	72.23	23.37	31.12	72.23	23.37
1986	35.56	81.31	26.64	33.76	77.15	25.30
1987	40.68	91.48	30.46	35.20	77.98	26.58
1988	46.68	103.41	34.81	32.17	70.13	24.23

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	53.09	115.56	39.59	30.90	66.81	23.14
1990	61.20	129.80	45.54	35.49	74.59	26.56
1991	69.88	146.44	51.61	38.84	80.07	29.00
1992	79.88	164.83	58.28	40.30	79.41	30.35
1993	91.13	185.53	65.71	39.31	76.14	29.40
1994	103.15	205.50	74.13	35.50	67.57	26.40
1995	115.97	225.62	83.28	33.55	62.82	24.82
1996	132.12	256.46	92.73	35.43	66.61	25.55
1997	149.95	289.36	103.00	39.09	72.96	27.68
1998	169.87	327.31	113.96	44.10	82.12	30.60
1999	193.17	373.09	125.92	49.84	93.98	33.34
2000	217.75	419.94	138.77	55.39	104.43	36.24
2001	250.65	476.09	153.57	64.26	119.71	40.39
2002	276.95	505.80	168.49	71.30	127.69	44.58
2003	310.69	552.25	185.35	77.98	137.49	47.11
2004	346.81	600.93	203.35	83.11	143.72	48.89
2005	381.48	647.25	220.56	89.31	151.61	51.59
2006	422.47	707.87	239.72	97.48	163.20	55.40
2007	465.50	768.26	260.37	101.56	168.37	56.29
2008	513.45	838.69	281.54	105.40	173.73	56.68
2009	566.52	913.31	306.63	116.71	189.76	61.98
2010	622.82	986.10	330.83	124.47	198.72	64.79
2011	700.89	1102.03	356.16	132.82	210.50	66.05
2012	777.54	1205.58	384.86	144.45	225.33	70.25
2013	866.60	1330.36	413.69	154.73	238.81	72.61
2014	958.44	1450.95	447.42	166.82	253.62	76.77
2015	1053.32	1572.72	482.27	180.82	270.84	81.85

Figure HuN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

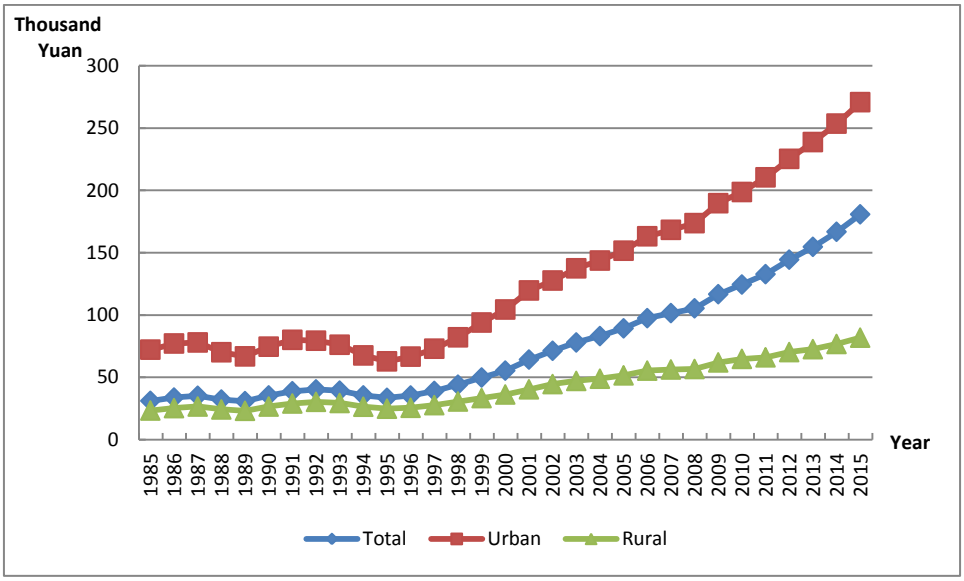


Figure HuN-2.2 Real Human Capital Per Capita by Region for Hunan，1985-2015

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 2015, the nominal labor force human capital increases from 679 billion Yuan to 22,647 billion Yuan, an increase of more than 32 times; and the real labor force human capital increases from 679 billion Yuan to 3,883billion Yuan, an increase of approximately 4 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	679	679	679	679
1986	797	797	757	757
1987	939	938	813	812
1988	1110	1109	766	765
1989	1305	1304	760	759
1990	1554	1553	902	901
1991	1771	1769	985	985
1992	2013	2013	1020	1020
1993	2278	2278	988	988
1994	2557	2557	884	884
1995	2877	2876	835	835
1996	3204	3205	863	863
1997	3600	3605	944	946
1998	4093	4100	1071	1073
1999	4657	4667	1209	1211
2000	5328	5296	1363	1355
2001	5898	5874	1521	1515

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	6510	6494	1687	1683
2003	7357	7344	1852	1849
2004	8065	8104	1934	1944
2005	8917	8968	2087	2099
2006	9938	10005	2294	2310
2007	10855	10938	2364	2382
2008	11872	11974	2428	2449
2009	13016	13142	2673	2699
2010	14467	14632	2883	2916
2011	15663	15864	2959	2997
2012	17025	17268	3155	3201
2013	18613	18896	3316	3366
2014	20630	20964	3584	3643
2015	22647	23045	3883	3951

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 2015, the nominal average labor force human capital increases from 2,760 Yuan to 613,390 Yuan, an increase of more than 23 times; and the real average labor force human capital increases from 22,760Yuan to 105,170 Yuan, an increase of approximately 3 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	22.76	47.53	17.85	22.76	47.53	17.85
1986	26.08	53.68	20.49	24.76	50.93	19.46
1987	30.01	60.81	23.54	25.98	51.84	20.55
1988	34.18	66.95	27.13	23.58	45.40	18.89
1989	38.89	74.07	31.08	22.64	42.83	18.17
1990	44.99	83.06	35.88	26.11	47.73	20.93
1991	50.61	91.32	40.63	28.17	49.93	22.83
1992	56.78	99.75	45.72	28.77	48.06	23.81
1993	63.69	109.57	51.29	27.63	44.96	22.95
1994	71.36	120.53	57.20	24.68	39.63	20.38
1995	79.90	132.90	63.68	23.20	37.00	18.98
1996	89.10	146.52	71.36	24.00	38.05	19.66
1997	99.74	162.60	80.07	26.16	41.00	21.52
1998	111.99	181.09	89.88	29.30	45.44	24.13
1999	125.76	203.26	99.63	32.64	51.20	26.38
2000	141.43	230.17	109.88	36.18	57.24	28.69
2001	156.89	248.82	121.44	40.46	62.56	31.94
2002	172.16	265.24	133.47	44.60	66.96	35.31
2003	192.71	293.70	147.66	48.51	73.12	37.53
2004	211.25	314.57	162.39	50.66	75.23	39.05
2005	232.41	343.93	176.79	54.40	80.56	41.35
2006	256.66	376.59	193.60	59.25	86.82	44.75
2007	281.83	410.04	209.12	61.37	89.86	45.21
2008	309.07	446.78	224.75	63.21	92.55	45.24
2009	340.47	488.80	242.17	69.91	101.56	48.95
2010	376.94	538.16	258.04	75.12	108.45	50.54
2011	412.70	588.41	276.58	77.97	112.39	51.29
2012	453.93	643.80	298.08	84.13	120.33	54.41
2013	500.66	709.14	320.73	89.18	127.30	56.29

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
2014	556.45	787.40	344.81	96.69	137.63	59.16
2015	613.39	865.60	367.40	105.17	149.07	62.35

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-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	3141	3140	3141	3140	78
1986	3647	3647	3472	3472	89
1987	4219	4220	3617	3617	99
1988	5146	5149	3407	3408	112
1989	6170	6173	3340	3342	122
1990	7285	7292	4043	4047	134
1991	8361	8373	4583	4590	149
1992	9606	9625	4908	4917	174
1993	11109	11138	4673	4685	218
1994	12510	12543	4326	4337	272
1995	14062	14102	4264	4275	332
1996	17308	17374	4900	4918	393
1997	20818	20921	5773	5801	453
1998	25345	25605	7139	7211	524

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)	
1999	29909	30286	8566	8672	607
2000	34264	34753	9647	9781	685
2001	39359	40704	11145	11517	772
2002	43657	44964	12523	12890	875
2003	49289	50772	14032	14446	1005
2004	54349	56031	15031	15489	1151
2005	58948	60711	15949	16419	1336
2006	66770	68914	17741	18303	1542
2007	74762	77165	19152	19759	1777
2008	80722	82731	19587	20068	2016
2009	89782	92083	22300	22864	2326
2010	98867	101535	23801	24436	2684
2011	109025	112519	24898	25688	3081
2012	119723	123675	26579	27448	3516
2013	132164	136522	28618	29553	3998
2014	146018	150706	30905	31889	4520
2015	160347	165366	33404	34441	5057

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 2015, the nominal human capital per capita increases from 6,810 Yuan to 1,635,130 Yuan, an increase of more than 25 times; and the real human capital per capita increases from 61,810 Yuan to 340,630 Yuan, an increase of approximately 4.15 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 2015, 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.

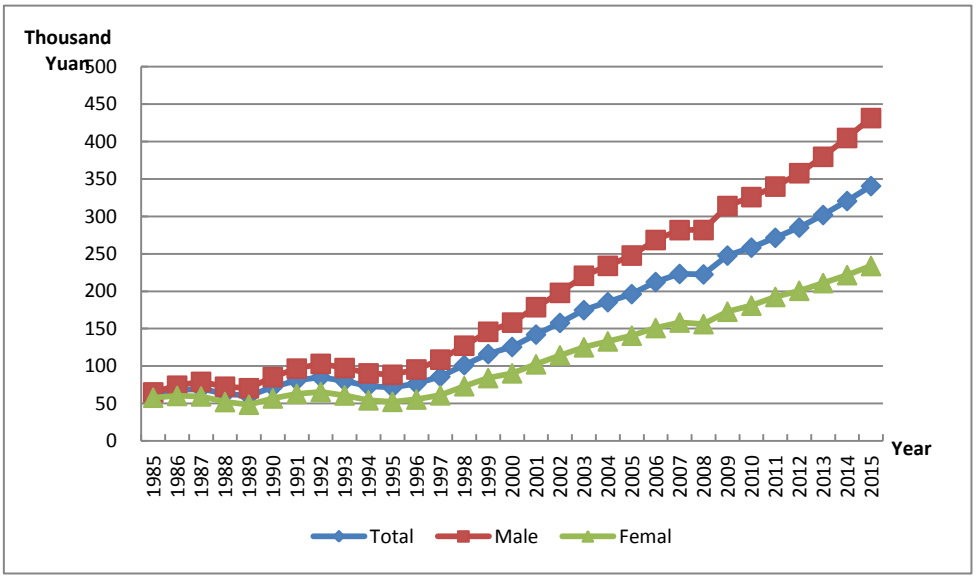


Figure GD-2.1 Human Capital Per Capita by Gender for Guangdong，1985-2015

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	61.81	110.57	46.67	61.81	110.57	46.67
1986	71.03	123.86	53.43	67.62	118.30	50.74
1987	81.54	138.38	61.27	69.90	117.17	53.04
1988	95.04	155.36	69.67	62.91	101.58	46.64
1989	111.16	175.72	79.12	60.18	94.25	43.28
1990	129.80	195.47	91.21	72.04	107.64	51.12

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	147.55	220.59	103.30	80.89	118.75	57.95
1992	167.06	248.19	116.89	85.36	123.25	61.92
1993	190.62	284.35	131.58	80.19	115.74	57.80
1994	211.98	311.80	147.98	73.31	104.89	53.06
1995	235.34	343.53	164.84	71.35	102.18	51.27
1996	270.18	384.88	183.59	76.49	106.79	53.61
1997	309.96	429.97	203.72	85.96	116.85	58.61
1998	360.12	493.13	224.90	101.43	136.33	65.96
1999	405.99	544.14	247.13	116.27	152.88	74.18
2000	446.64	581.26	270.68	125.75	159.79	81.25
2001	502.34	654.31	295.20	142.24	181.32	88.97
2002	550.28	711.21	317.32	157.85	199.89	97.00
2003	614.22	791.29	342.75	174.86	220.85	104.35
2004	670.86	856.52	370.18	185.54	233.00	108.68
2005	725.60	914.32	398.80	196.31	243.84	114.00
2006	799.61	1003.39	431.24	212.46	262.87	121.34
2007	871.52	1089.27	462.24	223.26	275.18	125.66
2008	917.51	1135.99	491.96	222.63	272.03	126.41
2009	997.68	1232.83	523.67	247.80	302.47	137.58
2010	1073.20	1325.02	550.13	258.36	315.32	140.05
2011	1189.10	1480.07	578.95	271.55	334.49	139.57
2012	1284.51	1591.93	611.79	285.16	349.98	143.32
2013	1394.65	1723.37	644.71	301.99	369.91	147.02
2014	1514.93	1860.03	695.88	320.64	390.26	155.41
2015	1635.13	1999.76	736.07	340.63	412.97	162.28

Figure GD-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

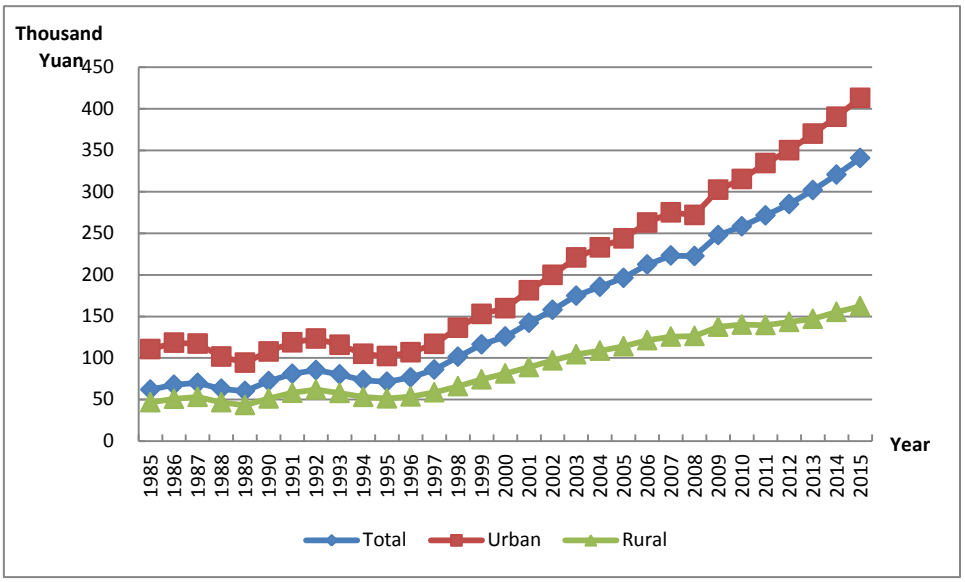


Figure GD-2.2 Real Human Capital Per Capita by Region for Guangdong, 1985-2015

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 2015, the nominal labor force human capital increases from 1,249billion Yuan to 70,757 billion Yuan, an increase of more than 55 times; and the real labor force human capital increases from 1,249 billion

Yuan to 14,772 billion Yuan, an increase of approximately 10.83 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	1249	1248	1249	1248
1986	1456	1455	1386	1385
1987	1704	1703	1460	1459
1988	2138	2138	1415	1414
1989	2603	2602	1409	1408
1990	3142	3140	1743	1742
1991	3562	3559	1951	1949
1992	3993	3992	2038	2037
1993	4474	4472	1881	1880
1994	4986	4986	1723	1723
1995	5574	5577	1689	1690
1996	7037	7042	1991	1992
1997	8785	8795	2433	2436
1998	10932	10945	3076	3079
1999	13296	13312	3802	3807
2000	16166	16158	4539	4536
2001	17515	17527	4952	4955
2002	18902	18943	5419	5430
2003	21371	21428	6082	6098
2004	23436	23580	6480	6519
2005	25680	25860	6944	6992
2006	28874	29120	7673	7737
2007	32312	32630	8283	8363
2008	36719	37126	8913	9011

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	42186	42711	10483	10612
2010	48327	49000	11638	11799
2011	50593	51316	11569	11732
2012	54754	55562	12177	12354
2013	59893	60799	12994	13189
2014	65177	66174	13824	14033
2015	70757	71871	14772	15003

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 2015, the nominal average labor force human capital increases from 42,540 Yuan to 102,104 Yuan, an increase of more than 23 times; and the real average labor force human capital increases from 42,540 Yuan to 213,170 Yuan, an increase of approximately 4 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	42.54	70.61	32.78	42.54	70.61	32.78
1986	49.00	79.02	37.60	46.65	75.47	35.71
1987	56.61	88.82	43.23	48.51	75.21	37.42
1988	66.38	100.83	49.47	43.92	65.92	33.12

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	77.84	114.90	56.19	42.13	61.63	30.74
1990	92.01	130.84	64.43	51.04	72.06	36.11
1991	102.88	144.24	72.75	56.34	77.65	40.81
1992	113.73	157.83	81.48	58.04	78.38	43.17
1993	126.16	173.92	90.99	53.04	70.79	39.97
1994	139.72	191.13	101.21	48.29	64.30	36.29
1995	154.88	210.84	112.07	46.93	62.71	34.85
1996	180.34	241.60	126.04	51.01	67.04	36.81
1997	210.75	276.63	141.33	58.37	75.18	40.66
1998	242.90	311.78	157.62	68.34	86.19	46.23
1999	274.40	344.29	174.23	78.47	96.73	52.30
2000	311.68	383.68	191.90	87.50	105.47	57.61
2001	332.96	407.59	207.05	94.14	112.95	62.40
2002	354.03	430.30	221.46	101.49	120.94	67.69
2003	392.10	477.50	238.33	111.59	133.27	72.56
2004	425.69	516.74	254.67	117.71	140.57	74.77
2005	464.61	560.06	272.15	125.64	149.36	77.80
2006	507.37	608.06	300.30	134.82	159.30	84.49
2007	553.00	661.84	327.79	141.76	167.20	89.11
2008	608.14	728.47	354.48	147.62	174.44	91.08
2009	671.86	805.27	383.40	166.95	197.57	100.73
2010	738.17	885.09	409.66	177.77	210.63	104.29
2011	783.47	942.12	438.96	179.15	212.91	105.82
2012	830.41	991.96	471.16	184.67	218.08	110.38
2013	889.36	1058.82	503.54	192.95	227.27	114.82
2014	952.55	1130.84	536.24	202.03	237.27	119.76
2015	1021.04	1210.62	564.56	213.17	250.00	124.47

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-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	1363	1363	1363	1363	35
1986	1579	1579	1487	1487	38
1987	1834	1834	1610	1611	41
1988	2128	2129	1558	1558	42
1989	2450	2451	1468	1469	44
1990	2841	2843	1664	1665	44
1991	3262	3265	1857	1858	46
1992	3742	3746	2010	2012	50
1993	4296	4302	1913	1916	56
1994	4898	4907	1730	1733	63
1995	5538	5550	1652	1655	71
1996	6310	6327	1764	1768	79
1997	7171	7199	1989	1997	87
1998	8108	8140	2319	2328	97

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)	
1999	9041	9082	2647	2659	108
2000	10157	10216	2981	2998	119
2001	11402	11478	3329	3351	131
2002	12475	12579	3675	3705	145
2003	14320	14502	4172	4224	162
2004	15820	16078	4413	4484	184
2005	17270	17575	4702	4784	215
2006	19046	19353	5115	5197	255
2007	21156	21511	5356	5445	306
2008	23281	23699	5461	5559	371
2009	25595	26145	6140	6272	476
2010	27704	28392	6448	6608	619
2011	31134	31947	6845	7024	783
2012	34466	35311	7343	7523	952
2013	38466	39387	8014	8207	1088
2014	42806	43773	8734	8932	1224
2015	47282	48295	9505	9709	1368

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 2015, the nominal human capital per capita increases from 39,130 Yuan to 1,164,320 Yuan, an increase of more than 28.75 times; and the real human capital per capita increases from 39,130 Yuan to 234,060Yuan, an increase of approximately 4.98 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 2015, 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.

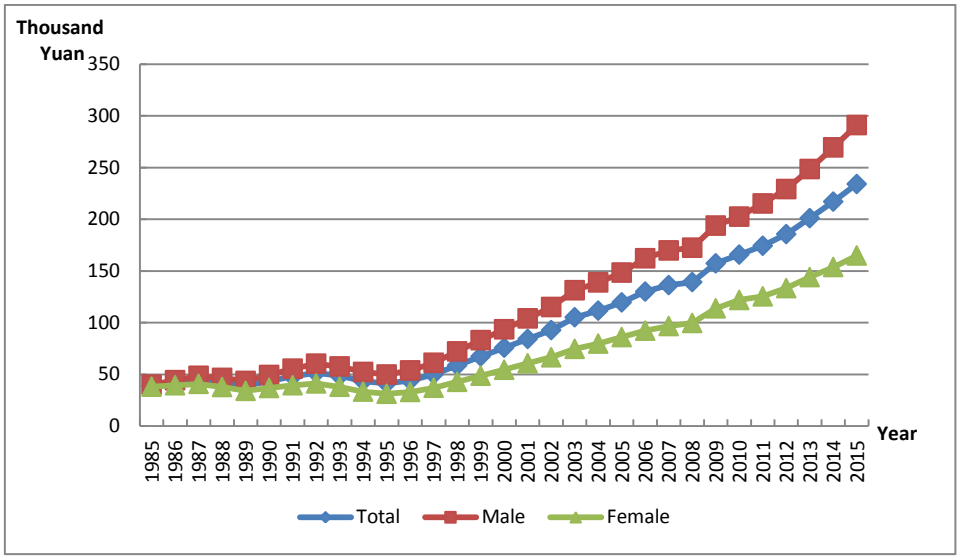


Figure GX-2.1 Human Capital Per Capita by Gender for Guangxi，1985-2015

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	39.13	92.27	31.05	39.13	92.27	31.05
1986	44.69	106.25	35.04	42.08	100.05	32.99
1987	51.17	122.35	39.69	44.94	104.54	35.33
1988	58.01	135.32	45.14	42.47	93.78	33.93
1989	65.38	149.61	50.97	39.19	86.62	31.07
1990	74.46	166.05	58.33	43.60	97.79	34.06

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	84.50	185.98	65.57	48.10	106.66	37.17
1992	95.92	208.28	73.77	51.53	111.63	39.68
1993	109.13	233.78	83.28	48.61	101.62	37.61
1994	123.37	259.87	93.64	43.56	90.08	33.43
1995	138.38	287.27	104.42	41.27	84.39	31.43
1996	158.22	320.60	115.64	44.22	89.27	32.41
1997	180.68	358.41	127.99	50.11	99.10	35.59
1998	205.26	398.60	141.31	58.72	113.51	40.59
1999	230.22	433.79	155.90	67.40	127.09	45.61
2000	258.24	473.78	171.69	75.78	138.80	50.48
2001	288.69	524.10	187.90	84.27	151.57	55.46
2002	315.03	561.51	202.94	92.80	164.20	60.32
2003	361.23	653.09	220.79	105.23	189.28	64.79
2004	400.28	717.45	240.07	111.65	199.74	67.16
2005	439.40	776.87	261.32	119.63	209.98	71.95
2006	484.22	837.47	284.15	130.04	222.77	77.52
2007	538.51	918.93	308.57	136.33	231.48	78.83
2008	593.68	1000.40	333.63	139.26	234.20	78.55
2009	655.93	1094.46	361.72	157.36	261.71	87.35
2010	712.40	1176.72	387.76	165.82	273.46	90.56
2011	793.13	1293.72	418.13	174.38	284.43	91.93
2012	871.42	1394.33	453.13	185.65	297.05	96.53
2013	965.06	1523.89	489.29	201.07	318.00	101.53
2014	1063.79	1655.17	530.91	217.05	337.96	108.11
2015	1164.32	1785.34	574.03	234.06	359.15	115.16

Figure GX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

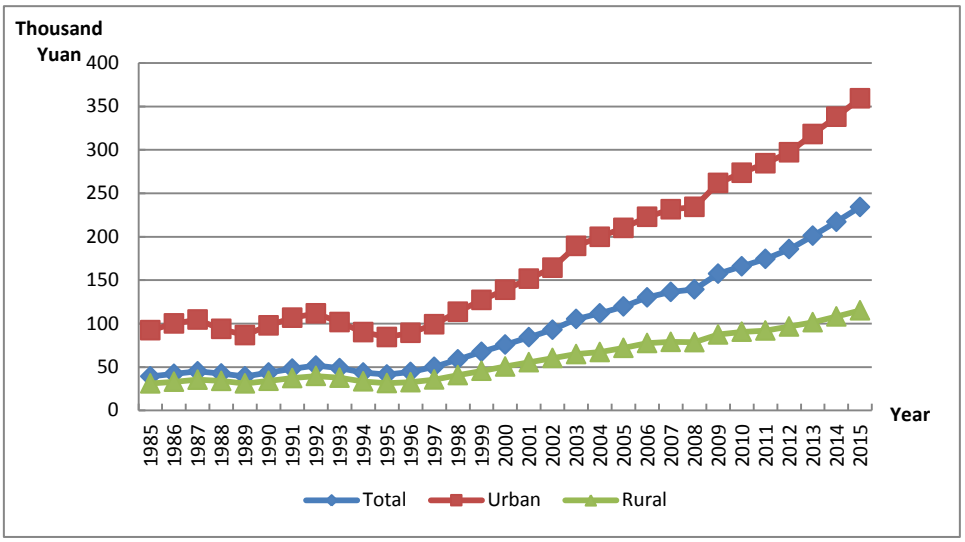


Figure GX-2.2 Real Human Capital Per Capita by Region for Guangxi，1985-2015

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 2015, the nominal labor force human capital increases from 483billion Yuan to 15,431 billion Yuan, an increase of more than 30 times; and the real labor force human capital increases from 483 billion Yuan to 2,101 billion Yuan, an increase of approximately 5 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	483	483	483	483
1986	565	565	532	532
1987	661	661	581	581
1988	790	789	579	578
1989	930	929	558	557
1990	1107	1106	648	648
1991	1286	1286	732	732
1992	1471	1471	791	790
1993	1668	1668	744	743
1994	1897	1896	670	670
1995	2165	2164	646	646
1996	2508	2507	701	701
1997	2868	2871	796	796
1998	3259	3262	932	933
1999	3681	3686	1078	1079
2000	4234	4222	1242	1239
2001	4555	4547	1331	1329
2002	4821	4821	1422	1422
2003	5192	5196	1514	1516
2004	5577	5606	1556	1564
2005	6143	6178	1675	1685
2006	6695	6738	1803	1815
2007	7327	7380	1858	1871
2008	8018	8081	1882	1897
2009	8919	9000	2142	2162
2010	9990	10092	2326	2350

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	10833	10946	2382	2407
2012	11622	11745	2476	2502
2013	12497	12629	2602	2630
2014	13869	14006	2829	2857
2015	15431	15588	3101	3133

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 2015, the nominal average labor force human capital increases from 26,190 Yuan to 626,960 Yuan, an increase of more than 22 times; and the real average labor force human capital increases from 26,190 Yuan to 126,000 Yuan, an increase of approximately 4 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	26.19	56.29	21.04	26.19	56.29	21.04
1986	29.78	64.10	23.86	28.04	60.35	22.47
1987	34.01	73.16	27.14	29.88	62.51	24.15
1988	38.63	80.29	31.00	28.31	55.64	23.31
1989	43.79	88.71	35.23	26.26	51.36	21.48

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	50.54	100.04	40.59	29.60	58.92	23.70
1991	56.93	110.45	45.65	32.40	63.34	25.88
1992	63.79	120.94	51.23	34.27	64.82	27.56
1993	71.66	133.40	57.53	31.94	57.99	25.98
1994	80.69	147.80	64.52	28.51	51.23	23.03
1995	91.10	164.73	72.31	27.18	48.39	21.77
1996	103.90	183.50	80.97	29.05	51.09	22.69
1997	117.91	203.89	90.30	32.71	56.38	25.11
1998	133.13	225.55	100.19	38.09	64.23	28.78
1999	149.88	249.42	110.17	43.88	73.07	32.23
2000	169.82	277.56	121.65	49.84	81.32	35.76
2001	182.09	293.55	132.53	53.21	84.90	39.12
2002	191.42	302.48	142.72	56.45	88.45	42.42
2003	205.81	323.71	154.04	60.04	93.82	45.20
2004	221.34	345.38	163.97	61.77	96.15	45.87
2005	243.70	379.02	176.39	66.46	102.45	48.57
2006	266.82	408.86	195.25	71.86	108.76	53.27
2007	293.96	447.76	214.54	74.55	112.79	54.81
2008	323.34	490.44	233.61	75.90	114.81	55.00
2009	358.36	541.72	252.88	86.07	129.54	61.07
2010	397.47	600.75	270.08	92.56	139.61	63.08
2011	432.93	649.21	290.31	95.18	142.73	63.83
2012	468.74	695.39	313.23	99.86	148.14	66.73
2013	508.32	749.73	337.76	105.84	156.45	70.08
2014	564.16	836.66	363.63	115.08	170.83	74.04
2015	626.96	933.76	387.92	126.00	187.84	77.82

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	261	261	261	261	6
1986	299	299	286	286	8
1987	331	332	289	289	9
1988	384	384	262	262	10
1989	451	451	242	243	12
1990	528	529	274	274	14
1991	625	626	312	313	17
1992	767	768	361	362	22
1993	879	880	344	344	25
1994	1038	1040	320	321	30
1995	1191	1193	323	324	35
1996	1344	1348	350	351	38
1997	1521	1526	392	393	41
1998	1723	1728	457	458	44

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)	
1999	1935	1946	521	524	47
2000	2191	2210	583	588	50
2001	2410	2427	650	655	54
2002	2696	2724	732	740	57
2003	3122	3166	849	862	62
2004	3423	3477	895	910	67
2005	3730	3790	962	978	74
2006	4248	4331	1081	1102	82
2007	4815	5056	1168	1228	92
2008	5520	5944	1258	1356	104
2009	6144	6987	1410	1607	118
2010	6777	7533	1487	1656	138
2011	7288	7597	1510	1576	160
2012	7965	8270	1601	1664	191
2013	8742	9053	1718	1780	227
2014	9522	9843	1830	1893	266
2015	10278	10606	1955	2019	297

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 2015, the nominal human capital per capita increases from 47,880 Yuan to 1,309,380 Yuan, an increase of more than 26 times; and the real human capital per capita increases from 47,880 Yuan to 249,100 Yuan, an increase of approximately 4.2 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 2015, 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.

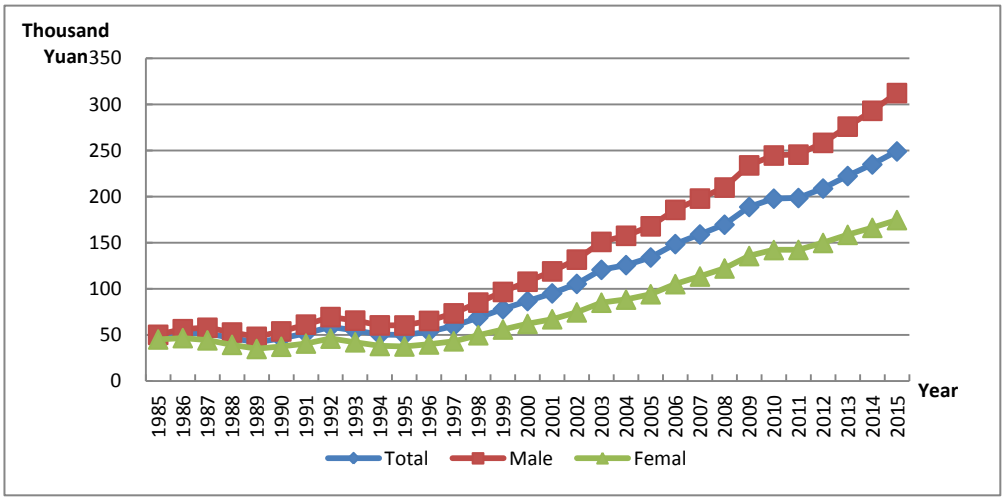


Figure HaN-2.1 Human Capital Per Capita by Gender for Hainan，1985-2015

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	47.88	97.13	37.25	47.88	97.13	37.25
1986	54.23	108.78	41.25	51.86	104.90	39.25
1987	59.26	121.11	42.82	51.65	106.37	37.11
1988	68.23	137.74	48.40	46.58	93.56	33.18
1989	78.09	156.29	54.24	41.99	84.05	29.17
1990	89.28	175.08	61.45	46.23	94.54	30.57
1991	103.53	198.72	68.91	51.78	103.17	33.08
1992	124.54	241.80	77.25	58.66	115.17	35.87

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1993	140.16	261.09	86.68	54.78	100.53	34.55
1994	162.63	299.54	96.85	50.14	91.83	30.11
1995	183.52	330.59	107.23	49.84	91.64	28.16
1996	205.66	362.37	118.48	53.54	95.84	30.00
1997	230.96	399.72	130.79	59.52	104.16	33.02
1998	259.76	443.66	143.89	68.86	118.46	37.60
1999	289.76	487.69	157.70	77.99	131.39	42.36
2000	325.99	544.50	172.13	86.80	144.53	46.14
2001	352.49	577.90	187.29	95.14	155.26	51.07
2002	388.21	632.87	201.42	105.44	171.75	54.82
2003	443.46	727.30	218.56	120.67	198.56	58.95
2004	481.01	779.99	236.55	125.81	206.35	59.96
2005	519.54	828.80	255.40	134.04	216.45	63.66
2006	583.98	934.71	275.09	148.59	241.21	67.03
2007	655.28	1047.97	294.21	159.02	258.54	67.50
2008	744.36	1196.05	312.87	169.62	278.11	65.98
2009	822.96	1317.78	332.91	188.86	307.96	70.91
2010	901.90	1440.99	349.58	197.84	322.25	70.38
2011	958.11	1517.48	368.34	198.57	321.66	68.79
2012	1039.09	1633.29	390.24	208.85	335.42	70.64
2013	1131.78	1767.61	413.68	222.41	354.88	72.80
2014	1222.18	1891.72	441.10	234.95	371.61	75.51
2015	1309.38	2007.72	469.57	249.10	389.72	79.99

Figure HaN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

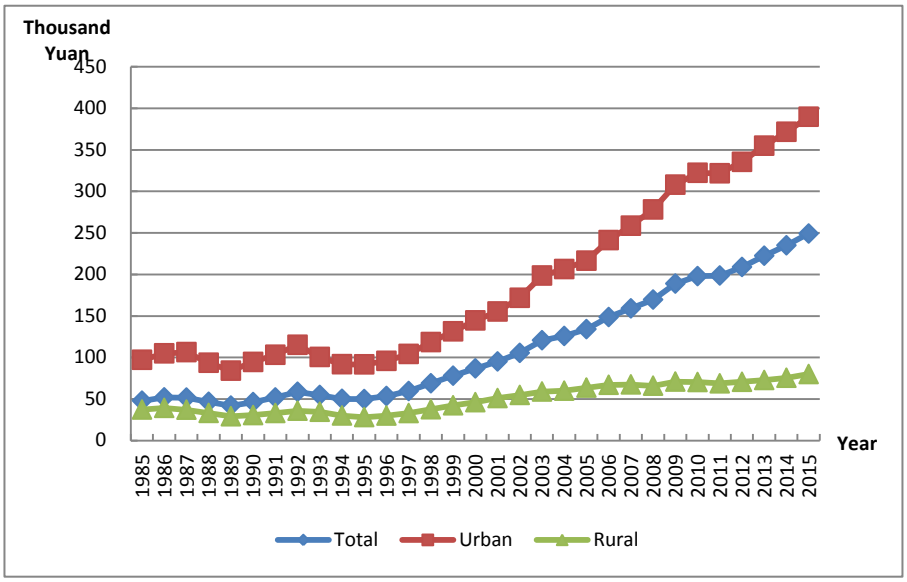


Figure HaN-2.2 Real Human Capital Per Capita by Region for Hainan，1985-2015

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 2015, the nominal labor force human capital increases from 73 billion Yuan to 3,395 billion Yuan, an increase of more than 45 times; and the real labor force human capital increases from 73 billion Yuan to 639 billion Yuan, an increase of approximately 7.7 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	73	73	73	73
1986	92	92	88	88
1987	132	132	115	115
1988	151	151	103	103
1989	177	178	95	95
1990	210	210	109	109
1991	248	247	124	124
1992	291	291	137	137
1993	341	341	133	133
1994	396	395	122	122
1995	457	457	124	124
1996	522	522	136	136
1997	594	594	153	153
1998	679	680	180	180
1999	777	778	209	209
2000	893	892	238	237
2001	967	967	261	261
2002	1024	1024	278	278
2003	1116	1118	303	304
2004	1239	1246	323	325
2005	1380	1389	355	357
2006	1511	1522	382	385
2007	1670	1683	402	405
2008	1887	1904	425	429
2009	2163	2186	492	497
2010	2425	2454	527	533

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	2557	2589	523	529
2012	2686	2720	531	538
2013	2844	2882	549	557
2014	3115	3157	588	597
2015	3395	3442	636	645

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 2015, the nominal average labor force human capital increases from 32,620 Yuan to 681,480 Yuan, an increase of more than 13 times; and the real average labor force human capital increases from 32,620 Yuan to 127,640 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	32.62	57.00	24.63	32.62	57.00	24.63
1986	37.77	65.94	28.00	36.16	63.59	26.64
1987	42.43	76.23	31.96	36.98	66.95	27.69
1988	48.17	84.58	36.24	32.89	57.45	24.84
1989	54.70	94.99	40.69	29.42	51.09	21.88
1990	62.95	107.81	46.24	32.55	58.21	23.00
1991	72.13	121.38	51.99	36.01	63.02	24.96

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	83.05	138.40	58.18	39.07	65.92	27.02
1993	95.36	157.19	65.10	37.31	60.53	25.95
1994	108.01	175.02	72.84	33.32	53.66	22.65
1995	122.53	195.37	81.24	33.21	54.16	21.33
1996	137.48	215.52	89.89	35.73	57.00	22.76
1997	154.45	237.79	99.23	39.76	61.96	25.05
1998	172.96	260.98	109.63	45.82	69.68	28.65
1999	192.39	285.56	120.20	51.78	76.94	32.29
2000	214.64	314.64	132.01	57.16	83.52	35.39
2001	228.24	333.06	143.28	61.64	89.48	39.07
2002	237.32	343.39	154.56	64.47	93.19	42.06
2003	254.77	368.24	167.86	69.24	100.54	45.27
2004	275.95	396.65	180.82	71.89	104.93	45.84
2005	301.58	429.06	194.87	77.50	112.05	48.57
2006	328.74	470.44	211.54	83.17	121.40	51.54
2007	359.06	515.94	227.43	86.45	127.29	52.18
2008	397.37	574.56	243.26	89.58	133.60	51.30
2009	443.52	644.82	260.51	100.82	150.69	55.49
2010	486.04	706.53	276.73	105.53	158.00	55.71
2011	511.48	745.77	296.47	104.52	158.08	55.37
2012	538.92	781.75	318.18	106.62	160.54	57.60
2013	574.01	832.52	340.15	110.82	167.14	59.86
2014	627.43	912.96	362.46	118.51	179.34	62.05
2015	681.48	990.98	383.51	127.64	192.36	65.33

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	867	867	867	867	37
1986	997	997	957	957	39
1987	1155	1155	1009	1009	44
1988	1331	1332	948	949	48
1989	1526	1527	928	929	47
1990	1771	1773	1062	1063	48
1991	2055	2058	1152	1154	50
1992	2375	2378	1197	1199	54
1993	2724	2728	1157	1159	60
1994	3099	3103	1015	1016	69
1995	3514	3520	964	965	78
1996	3992	4002	998	1001	87
1997	4724	4758	1143	1152	98
1998	5338	5388	1340	1353	115

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)	
1999	6122	6196	1548	1567	132
2000	6633	6715	1735	1756	149
2001	7365	7460	1894	1918	171
2002	8058	8179	2080	2111	198
2003	9215	9429	2365	2420	234
2004	10377	10773	2568	2666	278
2005	11073	11503	2718	2824	330
2006	12172	12593	2918	3019	387
2007	13900	14412	3183	3300	451
2008	15724	16347	3409	3545	520
2009	17626	18385	3884	4051	603
2010	19452	20343	4153	4344	700
2011	22262	23260	4514	4717	817
2012	24900	26031	4921	5145	941
2013	27850	29106	5360	5601	1070
2014	31059	32421	5871	6129	1214
2015	34338	35799	6408	6681	1364

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 2015, the nominal human capital per capita increases from 34,960 Yuan to 1,457,760 Yuan, an increase of more than 40 times; and the real human capital per capita increases from 34,960Yuan to 225,270 Yuan, an increase of approximately 6.78 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 2015, 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.

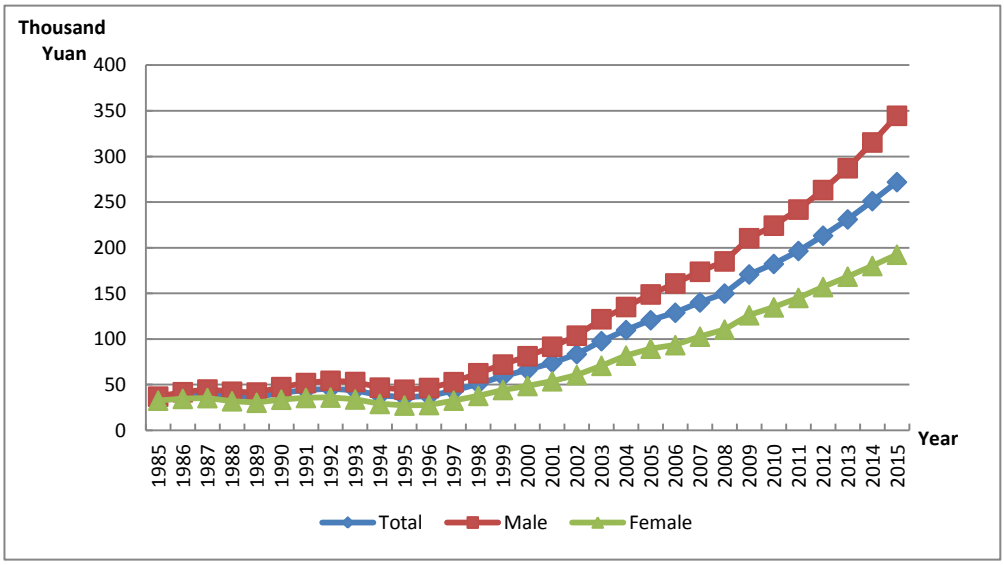


Figure CQ-2.1 Human Capital Per Capita by Gender for Chongqing，1985-2015

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	34.96	85.26	24.83	34.96	85.26	24.83
1986	40.06	96.50	28.15	38.45	92.61	27.01
1987	46.25	110.41	32.11	40.43	96.50	28.07
1988	52.68	121.79	36.69	37.53	86.75	26.14
1989	59.65	133.95	41.70	36.29	81.48	25.37
1990	68.38	150.09	47.83	41.02	90.04	28.69
1991	78.90	169.93	53.94	44.24	95.27	30.25

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	90.64	190.90	60.89	45.70	96.25	30.70
1993	103.49	211.93	68.99	43.96	90.02	29.30
1994	117.17	233.30	77.81	38.37	76.41	25.48
1995	132.31	256.87	87.53	36.29	70.46	24.01
1996	150.36	286.34	97.67	37.60	71.60	24.42
1997	178.87	346.33	109.08	43.30	83.83	26.40
1998	203.00	383.58	122.54	50.97	96.31	30.77
1999	233.98	440.86	135.79	59.16	111.47	34.34
2000	253.05	458.63	149.74	66.17	119.92	39.16
2001	287.99	499.46	165.25	74.05	128.42	42.49
2002	323.69	540.97	180.55	83.56	139.65	46.61
2003	381.12	627.41	199.28	97.80	161.00	51.14
2004	444.33	718.79	219.49	109.95	177.87	54.31
2005	491.61	769.10	241.41	120.68	188.81	59.26
2006	537.76	817.57	265.36	128.92	196.00	63.62
2007	612.22	918.61	290.36	140.18	210.34	66.49
2008	691.47	1025.18	316.99	149.93	222.29	68.73
2009	775.40	1133.95	347.85	170.86	249.87	76.65
2010	853.98	1237.74	370.17	182.35	264.29	79.04
2011	969.32	1386.69	398.39	196.55	281.19	80.78
2012	1079.34	1518.78	432.07	213.32	300.17	85.39
2013	1201.10	1669.17	463.97	231.14	321.22	89.29
2014	1328.76	1821.41	502.47	251.19	344.32	94.99
2015	1457.76	1973.95	540.37	272.04	368.36	100.84

Figure CQ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

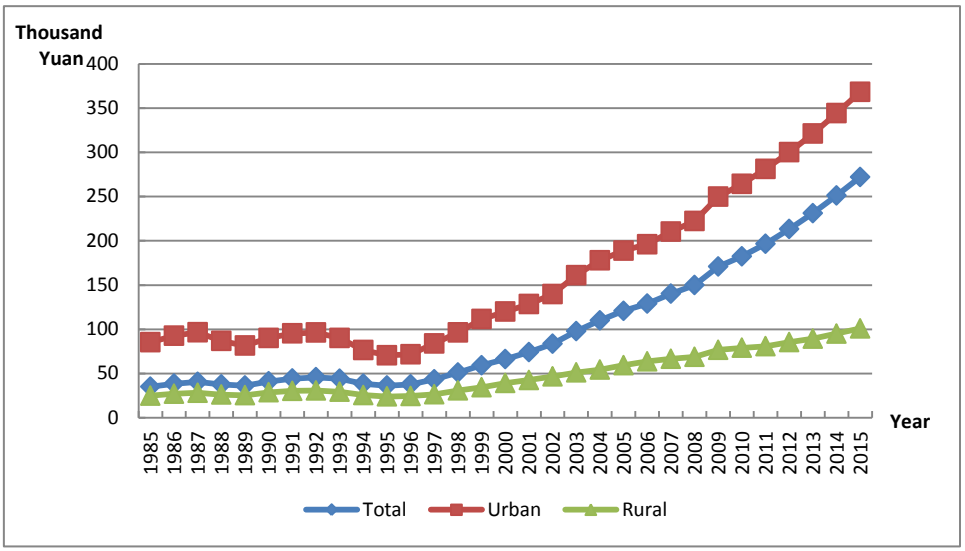


Figure CQ-2.2 Real Human Capital Per Capita by Region for Chongqing，1985-2015

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 2015, the nominal labor force human capital increases from 346 billion Yuan to 12,751 billion Yuan, an increase of more than 35 times; and the real labor force human capital increases from 346 billion Yuan to 2,378 billion Yuan, an increase of approximately 7.88 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	346	346	346	346
1986	408	408	391	391
1987	484	484	423	423
1988	592	591	422	421
1989	711	710	432	432
1990	855	854	513	512
1991	998	997	559	559
1992	1137	1136	573	573
1993	1279	1279	543	543
1994	1425	1425	467	467
1995	1590	1590	436	436
1996	1772	1772	443	443
1997	2009	2010	486	486
1998	2308	2308	580	579
1999	2615	2614	661	661
2000	2918	2910	763	761
2001	3001	2995	772	770
2002	3060	3060	790	790
2003	3222	3219	827	826
2004	3339	3362	826	832
2005	3562	3591	874	881
2006	3997	4038	958	968
2007	4559	4613	1044	1056
2008	5164	5235	1120	1135
2009	6029	6127	1329	1350
2010	7088	7221	1514	1542

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	7947	8107	1611	1644
2012	8814	9005	1742	1780
2013	9861	10084	1898	1941
2014	11317	11579	2139	2189
2015	12751	13063	2379	2438

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 2015, the nominal average labor force human capital increases from 23,580 Yuan to 797,470 Yuan, an increase of more than 32 times; and the real average labor force human capital increases from 23,580 Yuan to 148,820 Yuan, an increase of approximately 5.31times.

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	23.58	52.13	17.52	23.58	52.13	17.52
1986	27.02	58.74	20.19	25.93	56.37	19.38
1987	31.24	67.01	23.34	27.31	58.57	20.40
1988	36.33	75.23	27.17	25.88	53.59	19.35
1989	41.87	83.87	31.42	25.47	51.02	19.11
1990	48.54	93.83	36.62	29.12	56.29	21.97

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	55.13	103.22	41.71	30.91	57.87	23.38
1992	61.84	112.49	47.04	31.18	56.72	23.72
1993	69.21	123.11	52.71	29.40	52.30	22.39
1994	77.18	134.39	58.47	25.28	44.01	19.15
1995	86.11	146.99	64.63	23.62	40.32	17.73
1996	96.54	161.87	71.78	24.14	40.47	17.95
1997	109.29	180.07	80.10	26.45	43.58	19.39
1998	124.71	203.32	89.30	31.31	51.05	22.42
1999	141.04	228.31	98.25	35.66	57.73	24.84
2000	157.22	252.28	107.47	41.11	65.97	28.10
2001	169.41	262.54	115.67	43.56	67.50	29.74
2002	179.96	268.22	124.51	46.46	69.24	32.14
2003	196.94	287.62	133.54	50.54	73.81	34.27
2004	213.79	305.94	139.52	52.90	75.71	34.52
2005	238.16	337.62	144.82	58.47	82.88	35.55
2006	266.97	372.82	161.42	64.00	89.38	38.70
2007	304.43	422.16	184.06	69.71	96.66	42.15
2008	344.92	474.64	207.39	74.79	102.92	44.97
2009	398.88	546.82	230.40	87.90	120.49	50.77
2010	458.85	629.34	251.18	97.97	134.38	53.63
2011	513.91	697.84	279.99	104.21	141.50	56.78
2012	568.39	758.92	312.58	112.34	149.99	61.78
2013	631.87	834.84	346.00	121.60	160.66	66.59
2014	714.76	938.84	380.45	135.12	177.48	71.92
2015	797.47	1042.34	411.79	148.82	194.51	76.84

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	2318	2318	2318	2318	60
1986	2655	2655	2535	2535	67
1987	3069	3070	2728	2728	74
1988	3536	3537	2613	2614	79
1989	4050	4052	2496	2498	84
1990	4698	4702	2796	2799	88
1991	5442	5449	3142	3145	94
1992	6279	6288	3388	3392	101
1993	7193	7204	3319	3324	106
1994	8192	8203	3022	3026	116
1995	9287	9302	2885	2889	129
1996	10440	10463	2962	2968	145
1997	12097	12163	3258	3274	162
1998	13504	13591	3648	3670	185

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)	
1999	15233	15361	4170	4203	207
2000	16456	16577	4505	4536	233
2001	18312	18484	4893	4937	261
2002	19923	20160	5331	5391	293
2003	22102	22469	5818	5910	330
2004	24060	24560	6032	6151	375
2005	25734	26259	6343	6466	428
2006	29123	29748	6988	7131	495
2007	33279	34062	7509	7678	577
2008	37129	38058	7957	8148	669
2009	41184	42321	8743	8976	778
2010	44852	46202	9209	9476	901
2011	51172	52694	9948	10235	1036
2012	57096	58818	10802	11118	1183
2013	63686	65575	11699	12036	1337
2014	70780	72814	12781	13138	1491
2015	78192	80359	13900	14275	1649

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 2015, the nominal human capital per capita increases from 34,630 Yuan to 1,197,510 yuan per capita increases from 34,630 Yuan to 212,870 Yuan, an increase of approximately 5.1 times.

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 2015, 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.

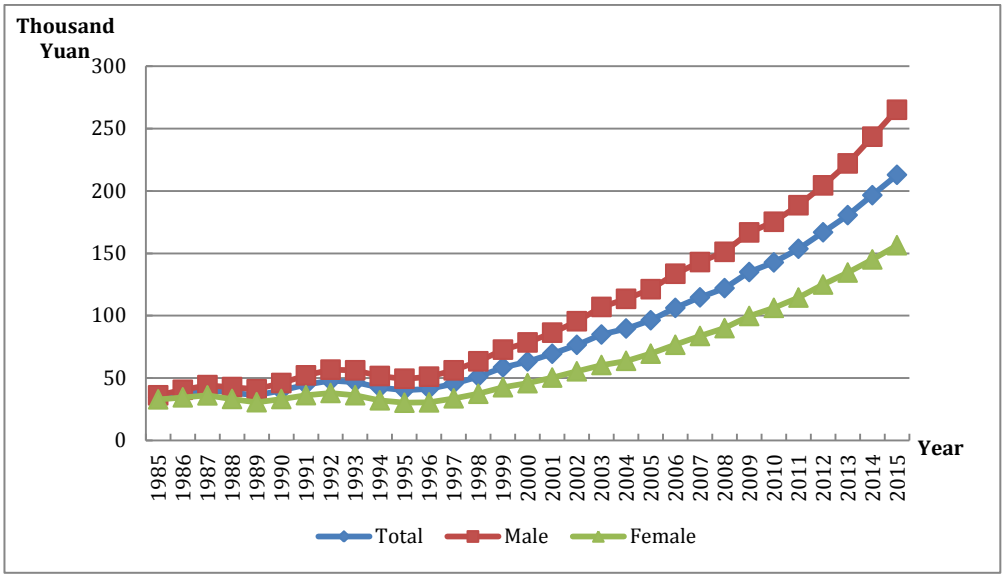


Figure SC-2.1 Human Capital Per Capita by Gender for Sichuan，1985-2015

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	34.63	80.57	25.38	34.63	80.57	25.38
1986	39.53	91.30	28.60	37.74	87.12	27.32
1987	45.56	104.62	32.54	40.49	90.67	29.43
1988	51.86	115.57	37.11	38.32	81.50	28.33
1989	58.67	127.25	42.11	36.16	76.17	26.49
1990	67.21	142.75	48.21	40.00	84.19	28.89

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	77.41	161.75	54.29	44.69	91.46	31.86
1992	88.81	181.83	61.20	47.91	93.64	34.34
1993	101.26	201.80	69.27	46.73	88.90	33.31
1994	114.78	222.32	78.33	42.35	76.58	30.75
1995	129.57	244.84	88.13	40.25	70.87	29.24
1996	145.50	274.78	98.44	41.28	72.44	29.94
1997	169.11	329.08	110.10	45.54	82.54	31.89
1998	189.23	366.80	122.97	51.12	92.19	35.80
1999	214.13	418.16	137.05	58.62	107.13	40.30
2000	231.18	441.87	151.37	63.28	113.55	44.24
2001	259.93	492.65	167.17	69.46	124.35	47.58
2002	286.24	533.56	182.54	76.59	135.36	51.95
2003	322.37	600.71	200.22	84.86	149.55	56.47
2004	357.78	659.54	219.73	89.69	156.98	58.91
2005	390.69	706.37	240.37	96.30	165.31	63.43
2006	442.66	782.52	262.37	106.21	178.84	67.68
2007	508.10	886.90	286.99	114.65	191.40	69.84
2008	569.55	976.06	312.36	122.05	201.19	71.98
2009	635.75	1068.76	341.66	134.96	218.84	77.99
2010	694.76	1147.55	367.87	142.64	227.37	81.47
2011	790.06	1292.71	397.85	153.59	243.70	83.28
2012	881.78	1420.37	430.78	166.83	260.48	88.41
2013	982.92	1563.78	464.56	180.56	278.97	92.74
2014	1088.52	1705.24	504.63	196.55	299.12	99.45
2015	1197.51	1849.54	545.27	212.87	319.95	105.76

Figure SC-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

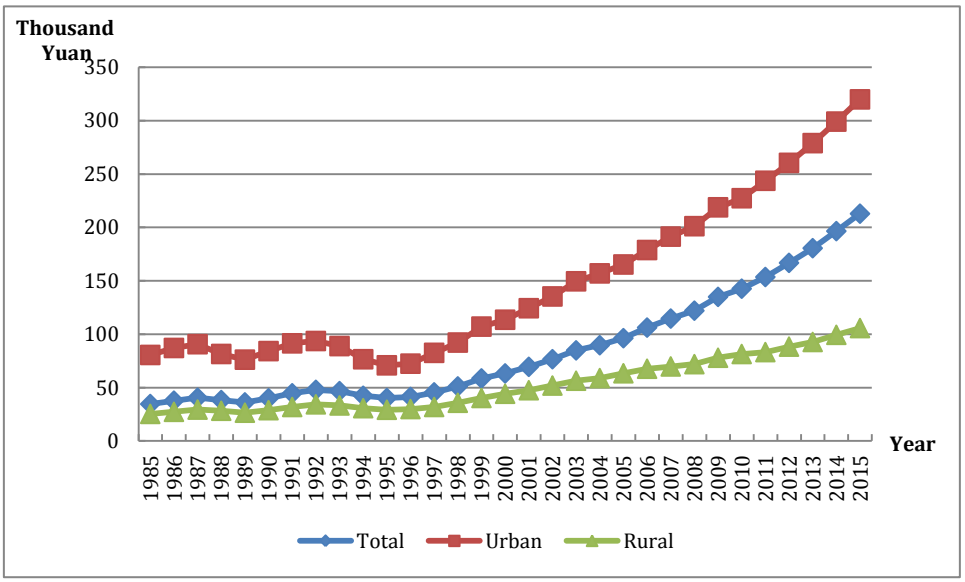


Figure SC-2.2 Real Human Capital Per Capita by Region for Sichuan，1985-2015

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 2015, the nominal labor force human capital increases from 909 billion Yuan to 31,733 billion Yuan, an increase of more than 33 times; and the real labor force human capital increases from 909 billion

Yuan to 5,694 billion Yuan, an increase of approximately 5.26 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	909	909	909	909
1986	1079	1078	1030	1029
1987	1282	1281	1142	1140
1988	1565	1563	1160	1159
1989	1879	1877	1160	1159
1990	2259	2257	1345	1344
1991	2634	2632	1524	1523
1992	2998	2997	1627	1627
1993	3372	3371	1566	1566
1994	3752	3752	1397	1397
1995	4181	4181	1310	1310
1996	4607	4608	1320	1320
1997	5169	5172	1409	1410
1998	5881	5883	1607	1608
1999	6635	6636	1834	1835
2000	7371	7340	2032	2024
2001	7583	7561	2043	2038
2002	7811	7805	2111	2109
2003	8235	8235	2194	2194
2004	8516	8561	2159	2170
2005	9070	9124	2257	2269
2006	10287	10358	2499	2516
2007	11739	11832	2688	2708
2008	13467	13591	2925	2951

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	15557	15729	3343	3378
2010	17933	18164	3721	3767
2011	19898	20167	3911	3962
2012	22265	22578	4262	4320
2013	25053	25409	4655	4719
2014	28400	28808	5183	5255
2015	31733	32209	5694	5777

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 2015, the nominal average labor force human capital increases from 23,200 Yuan to 698,430 Yuan, an increase of more than 29 times; and the real average labor force human capital increases from 23,920 Yuan to 125,330 Yuan, an increase of approximately 4.4 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	23.20	49.03	17.65	23.20	49.03	17.65
1986	26.52	55.35	20.30	25.32	52.81	19.39
1987	30.64	63.24	23.43	27.28	54.81	21.20
1988	35.60	71.11	27.24	26.38	50.15	20.79

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	41.01	79.39	31.45	25.32	47.52	19.79
1990	47.51	88.93	36.62	28.30	52.45	21.94
1991	53.92	97.92	41.64	31.19	55.37	24.44
1992	60.45	106.82	46.90	32.80	55.01	26.31
1993	67.60	117.01	52.47	31.40	51.55	25.23
1994	75.31	127.81	58.13	28.05	44.02	22.82
1995	83.92	139.88	64.18	26.30	40.49	21.29
1996	93.17	154.57	71.45	26.70	40.75	21.73
1997	104.44	172.41	79.93	28.48	43.25	23.15
1998	118.00	195.31	89.29	32.24	49.09	25.99
1999	132.76	222.13	98.47	36.71	56.91	28.95
2000	147.62	249.73	108.14	40.69	64.17	31.61
2001	156.85	260.41	115.89	42.26	65.73	32.98
2002	165.29	268.30	123.91	44.67	68.06	35.26
2003	177.69	285.81	132.72	47.34	71.15	37.43
2004	189.29	300.70	140.62	48.00	71.57	37.70
2005	206.67	327.38	150.27	51.43	76.62	39.65
2006	234.39	364.98	170.83	56.95	83.41	44.07
2007	268.44	414.81	193.83	61.47	89.52	47.17
2008	306.86	472.13	216.48	66.66	97.32	49.89
2009	350.94	536.60	240.70	75.41	109.87	54.94
2010	398.10	607.08	262.61	82.59	120.28	58.16
2011	444.32	674.84	287.72	87.33	127.22	60.23
2012	497.47	747.39	316.01	95.23	137.06	64.85
2013	558.35	834.36	345.17	103.74	148.84	68.91
2014	627.58	932.35	375.76	114.54	163.54	74.05
2015	698.43	1033.01	403.94	125.33	178.70	78.35

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	874	874	874	874	23
1986	993	993	941	941	25
1987	1139	1139	1002	1002	27
1988	1312	1312	967	968	29
1989	1499	1500	934	934	30
1990	1748	1749	1067	1068	32
1991	2055	2057	1200	1201	34
1992	2385	2389	1290	1292	35
1993	2773	2778	1291	1294	37
1994	3219	3227	1221	1224	39
1995	3705	3716	1155	1158	42
1996	4206	4227	1197	1203	45
1997	4721	4748	1299	1307	49
1998	5316	5357	1461	1472	55

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)	
1999	5811	5853	1610	1621	62
2000	6509	6576	1810	1829	70
2001	7748	7895	2112	2152	80
2002	8245	8383	2270	2307	92
2003	9090	9250	2470	2513	105
2004	10090	10297	2632	2686	120
2005	10916	11141	2817	2875	136
2006	12187	12428	3092	3153	155
2007	13458	13720	3211	3274	178
2008	14793	15108	3284	3355	204
2009	16270	16685	3662	3756	234
2010	17444	17939	3814	3923	274
2011	19526	19970	4061	4154	316
2012	21505	21948	4355	4446	371
2013	23954	24422	4735	4828	433
2014	26417	26896	5101	5194	498
2015	28890	29374	5476	5568	571

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 2015, the nominal human capital per capita increases from 31,890 Yuan to 968,120 Yuan, an increase of more than 29 times; and the real human capital per capita increases from 31,890

Yuan to 183,510 Yuan, an increase of approximately 5 times.

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 2015, 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.

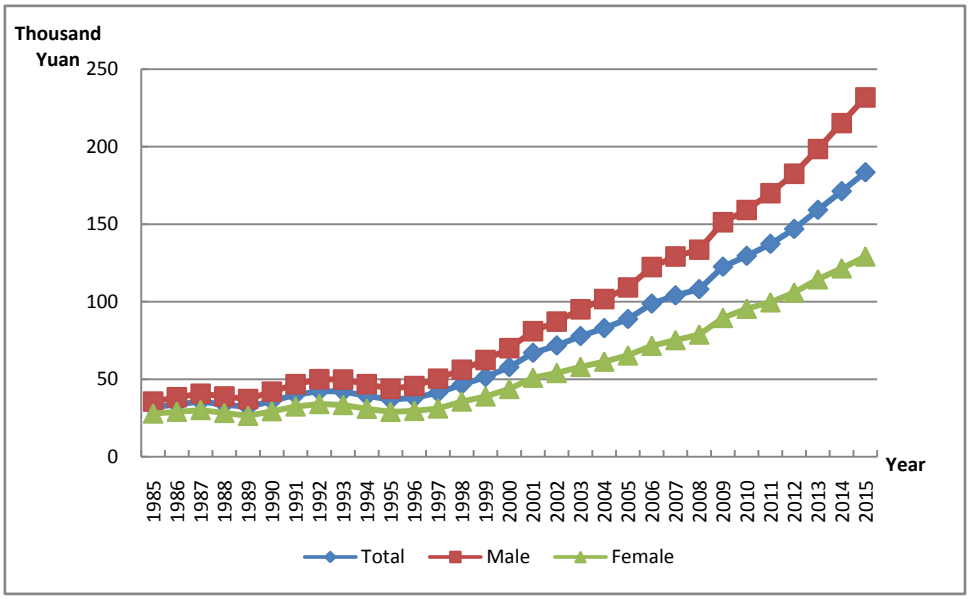


Figure GZ-2.1 Human Capital Per Capita by Gender for Guizhou，1985-2015

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	31.89	84.55	19.53	31.89	84.55	19.53
1986	35.76	94.79	21.84	33.90	89.09	20.88
1987	40.50	107.79	24.58	35.63	92.35	22.21
1988	45.84	122.06	27.76	33.80	86.07	21.40

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	51.47	137.14	31.14	32.06	82.02	20.21
1990	58.97	158.78	35.23	36.01	93.93	22.24
1991	68.50	182.92	39.53	39.99	104.15	23.74
1992	78.53	205.85	44.38	42.47	107.82	24.94
1993	90.32	233.34	49.82	42.07	105.55	24.09
1994	103.72	264.24	55.89	39.34	97.97	21.87
1995	118.08	295.87	62.55	36.80	91.80	19.62
1996	133.74	338.49	69.54	38.07	94.96	20.24
1997	150.16	383.07	76.98	41.33	103.93	21.67
1998	169.32	435.90	85.28	46.53	117.67	24.10
1999	185.65	473.57	94.16	51.42	129.26	26.69
2000	207.80	535.05	103.77	57.79	147.22	29.35
2001	245.85	645.82	114.14	67.02	173.54	31.94
2002	260.56	660.84	124.00	71.73	179.55	34.94
2003	286.42	714.86	135.34	77.82	192.49	37.39
2004	317.89	788.31	147.40	82.94	205.09	38.67
2005	344.17	839.44	160.02	88.81	217.09	41.12
2006	389.26	915.36	175.28	98.76	233.00	44.16
2007	436.31	990.64	191.21	104.10	238.11	44.85
2008	486.86	1074.70	207.47	108.09	241.42	44.73
2009	544.69	1171.77	226.81	122.58	266.96	49.39
2010	592.71	1238.73	246.27	129.57	273.73	52.27
2011	660.27	1327.80	269.18	137.32	278.64	54.52
2012	725.54	1404.87	294.29	146.94	287.07	57.98
2013	805.58	1513.05	320.83	159.23	301.63	61.66
2014	887.21	1614.23	351.88	171.31	314.26	66.05
2015	968.12	1710.39	382.84	183.51	326.45	70.80

Figure GZ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

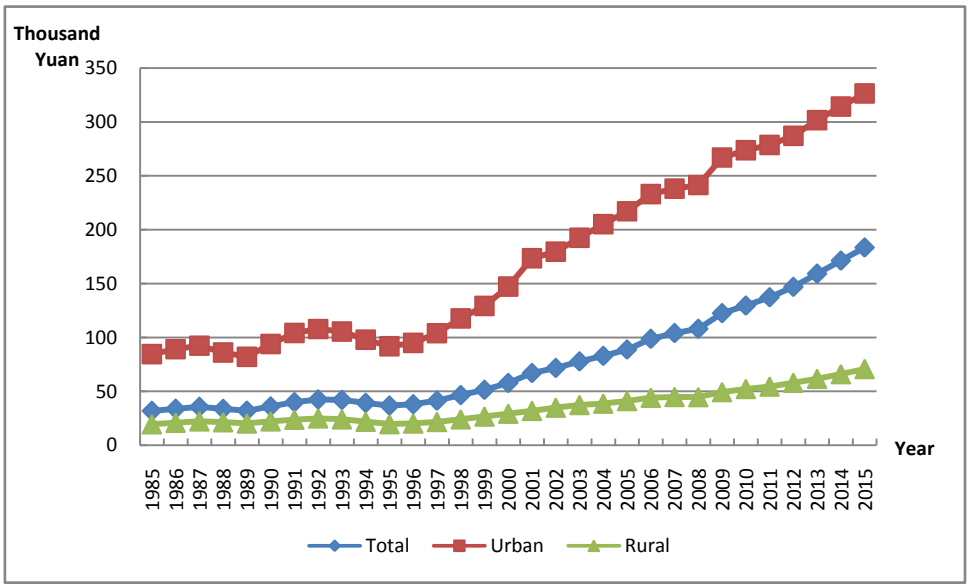


Figure GZ-2.2 Real Human Capital Per Capita by Region for Guizhou，1985-2015

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 2015, the nominal labor force human capital increases

from 292 billion Yuan to 9,510 billion Yuan, an increase of more than 31 times; and the real labor force human capital increases from 292 billion Yuan to 1,795 billion Yuan, an increase of approximately 5 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	292	292	292	292
1986	348	347	330	329
1987	417	416	366	366
1988	492	492	363	363
1989	581	580	362	362
1990	692	691	423	422
1991	826	825	483	483
1992	968	967	525	524
1993	1125	1124	525	525
1994	1297	1297	493	493
1995	1482	1483	462	462
1996	1639	1639	467	468
1997	1815	1817	501	501
1998	2013	2015	555	555
1999	2220	2224	616	617
2000	2462	2452	686	683
2001	2615	2612	716	715
2002	2761	2759	763	762
2003	2990	2996	815	816
2004	3195	3213	834	839
2005	3458	3481	892	898
2006	3755	3782	951	958
2007	4094	4126	973	981

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	4460	4500	984	993
2009	5013	5065	1121	1133
2010	5675	5743	1235	1250
2011	6240	6315	1293	1308
2012	6740	6821	1359	1376
2013	7344	7431	1444	1462
2014	8467	8558	1627	1645
2015	9510	9610	1795	1814

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 2015, the nominal average labor force human capital increases from 21,670 Yuan to 521,150 Yuan, an increase of more than 23 times; and the real average labor force human capital increases from 21,670 Yuan to 98,390 Yuan, an increase of approximately 4 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	21.67	49.70	13.62	21.67	49.70	13.62
1986	24.74	56.95	15.48	23.44	53.52	14.80

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
1987	28.50	65.72	17.69	25.06	56.30	15.98
1988	32.30	74.02	20.27	23.81	52.19	15.63
1989	36.48	83.69	23.08	22.73	50.05	14.98
1990	41.63	95.34	26.47	25.45	56.40	16.71
1991	47.52	106.78	30.08	27.78	60.80	18.07
1992	53.85	118.64	33.96	29.20	62.14	19.08
1993	60.92	132.34	38.23	28.46	59.86	18.49
1994	69.02	147.41	42.80	26.25	54.66	16.74
1995	77.93	163.61	47.71	24.30	50.76	14.97
1996	86.40	181.56	52.86	24.65	50.93	15.38
1997	95.78	201.68	58.57	26.43	54.72	16.49
1998	106.41	223.87	64.84	29.33	60.43	18.32
1999	117.86	248.08	71.02	32.72	67.72	20.13
2000	130.90	276.83	77.81	36.46	76.17	22.01
2001	139.31	292.04	84.24	38.12	78.47	23.57
2002	145.96	302.64	90.52	40.33	82.23	25.51
2003	156.78	326.75	97.63	42.72	87.99	26.97
2004	167.24	347.65	104.63	43.68	90.45	27.45
2005	180.68	373.38	111.83	46.59	96.56	28.73
2006	199.68	404.07	124.58	50.59	102.85	31.38
2007	221.69	442.17	137.03	52.71	106.28	32.14
2008	244.99	479.69	149.78	54.07	107.76	32.29
2009	278.13	536.31	163.80	62.22	122.19	35.67
2010	316.70	598.79	177.20	68.95	132.32	37.61
2011	349.62	645.91	195.58	72.43	135.55	39.61
2012	379.63	675.70	217.36	76.54	138.07	42.82
2013	412.46	717.43	241.37	81.12	143.02	46.39
2014	468.23	805.20	268.31	89.98	156.76	50.36
2015	521.15	883.66	294.79	98.39	168.66	54.51

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	904	904	904	904	57
1986	1048	1048	991	991	59
1987	1209	1209	1069	1069	60
1988	1395	1396	1031	1031	63
1989	1605	1606	1000	1001	65
1990	1862	1864	1130	1131	69
1991	2167	2169	1275	1277	76
1992	2542	2546	1366	1368	84
1993	2975	2980	1319	1322	92
1994	3460	3468	1294	1297	100
1995	3981	3991	1231	1235	109
1996	4573	4591	1304	1309	120
1997	5155	5169	1410	1414	132
1998	6154	6199	1656	1668	148

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)	
1999	6938	7004	1875	1894	163
2000	7538	7628	2080	2105	177
2001	8949	9080	2499	2537	192
2002	9894	10054	2773	2819	208
2003	11265	11486	3126	3190	230
2004	12542	12815	3286	3360	256
2005	13825	14133	3573	3655	284
2006	15139	15496	3843	3937	317
2007	16531	16957	3966	4071	352
2008	18096	18632	4115	4241	387
2009	19426	20001	4399	4534	451
2010	21010	21667	4588	4736	550
2011	23029	23702	4801	4946	671
2012	24744	25415	5019	5159	811
2013	26664	27348	5243	5380	969
2014	28746	29422	5520	5653	1151
2015	30816	31479	5806	5933	1348

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 2015, the nominal human capital per capita increases from 29,720 Yuan to 751,940 Yuan, an increase of more than 24 times; and the real human capital per capita increases from 29,720 Yuan to 141,660 Yuan, an increase of approximately 4 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 2015, 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.

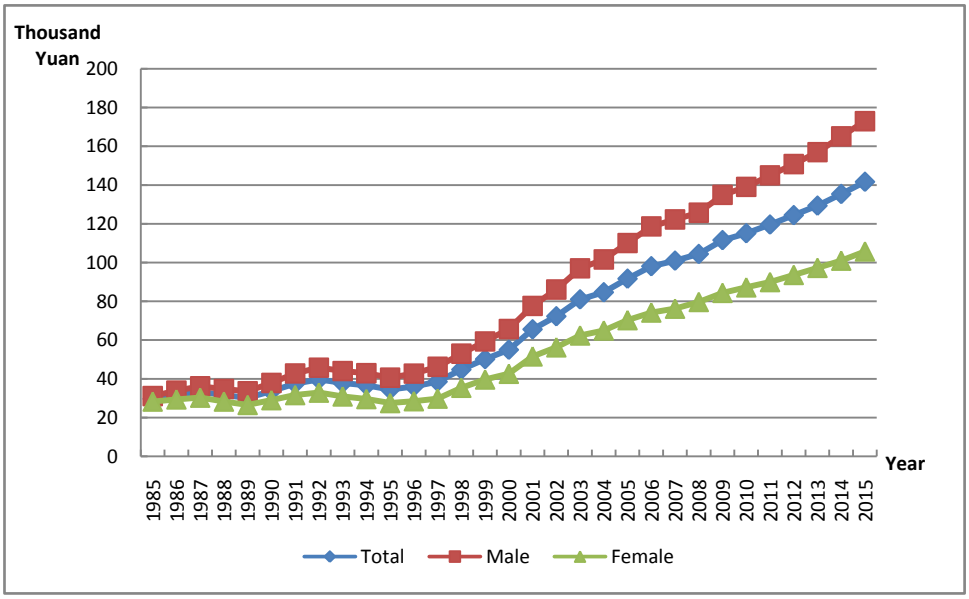


Figure YN-2.1 Human Capital Per Capita by Gender for Yunnan，1985-2015

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	29.72	78.29	21.63	29.72	78.29	21.63
1986	33.55	88.99	24.24	31.72	84.91	22.79
1987	37.69	98.84	27.37	33.33	87.82	24.13
1988	42.83	112.96	30.82	31.65	82.88	22.87
1989	48.53	129.41	34.53	30.24	80.53	21.53
1990	55.48	149.71	38.98	33.67	91.69	23.51

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	63.78	169.18	43.83	37.53	99.82	25.74
1992	73.89	195.41	49.14	39.71	104.44	26.52
1993	85.41	224.35	55.17	37.88	100.93	24.15
1994	98.06	254.96	61.76	36.68	97.79	22.55
1995	111.44	285.34	68.86	34.47	90.97	20.64
1996	126.54	321.45	76.23	36.07	94.46	21.00
1997	141.03	349.81	84.46	38.57	98.27	22.40
1998	166.49	424.24	93.44	44.80	116.38	24.51
1999	185.69	465.18	103.00	50.19	129.16	26.83
2000	199.42	478.95	113.34	55.02	136.26	30.00
2001	234.77	567.34	124.94	65.56	164.53	32.88
2002	257.96	600.96	136.47	72.29	175.51	35.73
2003	291.93	668.73	149.54	81.01	192.79	38.76
2004	323.22	720.69	163.77	84.68	195.83	40.09
2005	354.78	774.07	177.77	91.69	206.82	43.09
2006	386.45	821.40	192.84	98.11	215.37	45.91
2007	420.86	874.46	208.45	100.97	216.51	46.86
2008	459.22	936.76	225.04	104.43	220.05	47.73
2009	492.63	978.99	243.66	111.57	228.79	51.56
2010	527.09	1019.99	262.12	115.11	229.64	53.54
2011	573.67	1086.95	283.55	119.60	233.51	55.21
2012	613.58	1130.90	307.42	124.46	235.88	58.52
2013	657.88	1184.57	331.94	129.35	238.94	61.52
2014	704.95	1236.68	360.92	135.37	243.14	65.65
2015	751.94	1286.20	390.93	141.66	247.43	70.19

Figure YN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

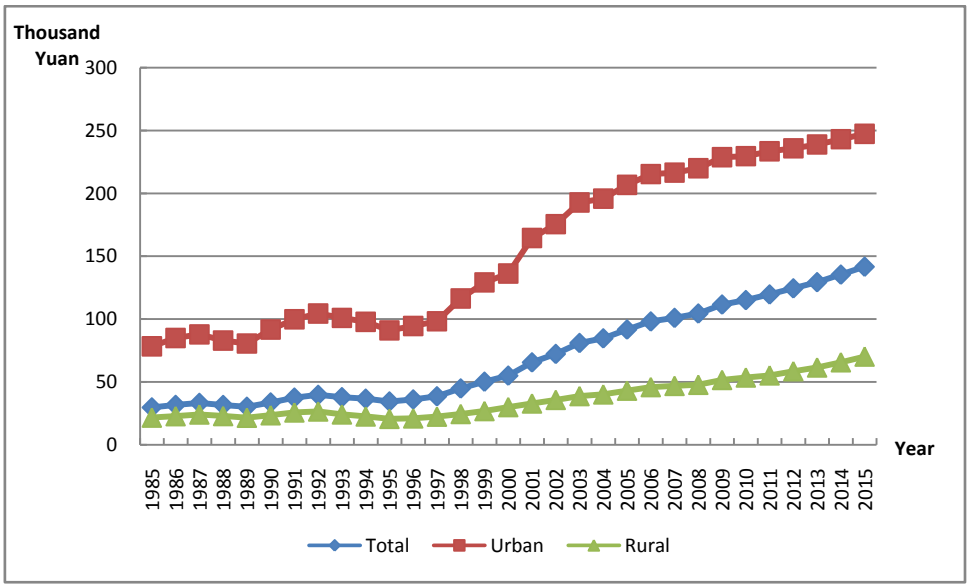


Figure YN-2.2 Real Human Capital Per Capita by Region for Yunnan，1985-2015

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 2015, the nominal labor force human capital increases from 328 billion Yuan to 12,951 billion Yuan, an increase of more than 38 times; and the real labor force human capital increases from 328 billion

Yuan to 2,423 billion Yuan, an increase of approximately 6 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	328	328	328	328
1986	401	400	379	379
1987	496	496	439	439
1988	584	584	431	431
1989	682	682	425	425
1990	804	803	488	487
1991	960	959	565	564
1992	1122	1122	603	603
1993	1316	1315	583	583
1994	1544	1543	576	576
1995	1810	1809	558	558
1996	2089	2089	593	594
1997	2394	2395	653	653
1998	2748	2750	737	738
1999	3110	3114	837	838
2000	3506	3525	964	970
2001	3798	3806	1052	1054
2002	4122	4122	1143	1143
2003	4557	4563	1249	1251
2004	4998	5018	1292	1298
2005	5529	5560	1412	1420
2006	6093	6137	1529	1540
2007	6649	6704	1577	1590
2008	7277	7345	1635	1651
2009	8043	8126	1803	1822

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	8923	9026	1932	1955
2011	9519	9627	1966	1989
2012	10112	10226	2032	2056
2013	10903	11024	2123	2148
2014	11958	12083	2277	2302
2015	12951	13089	2423	2449

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 2015, the nominal average labor force human capital increases from 21,000 Yuan to 463,990 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 21,000 Yuan to 86,790 Yuan, an increase of approximately 3 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	21.00	51.49	14.87	21.00	51.49	14.87
1986	24.44	60.04	17.12	23.11	57.29	16.09
1987	28.75	69.88	19.80	25.43	62.09	17.46
1988	32.33	77.21	22.68	23.88	56.65	16.83

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	36.21	85.79	25.79	22.56	53.39	16.09
1990	41.21	97.07	29.58	25.01	59.45	17.84
1991	47.38	110.40	33.61	27.88	65.14	19.74
1992	53.70	124.15	38.03	28.87	66.35	20.53
1993	61.09	140.19	43.06	27.06	63.07	18.85
1994	69.60	158.67	48.50	25.97	60.86	17.71
1995	79.46	180.30	54.28	24.51	57.48	16.27
1996	89.74	201.69	60.21	25.50	59.26	16.59
1997	101.34	224.14	66.76	27.65	62.96	17.70
1998	113.89	246.24	74.10	30.56	67.55	19.44
1999	126.37	267.17	81.54	34.03	74.18	21.24
2000	140.03	289.63	89.62	38.51	82.40	23.72
2001	151.78	307.54	98.41	42.05	89.19	25.89
2002	163.53	324.33	107.55	45.35	94.72	28.16
2003	178.47	348.91	118.18	48.91	100.59	30.64
2004	194.22	373.03	129.09	50.22	101.36	31.60
2005	212.86	406.56	139.98	54.35	108.63	33.93
2006	232.41	437.78	151.96	58.31	114.78	36.18
2007	252.85	469.43	163.55	59.97	116.23	36.77
2008	274.79	502.44	175.74	61.76	118.03	37.27
2009	300.55	540.43	189.66	67.37	126.30	40.13
2010	327.50	576.29	202.87	70.91	129.75	41.44
2011	350.46	609.18	218.86	72.37	130.87	42.62
2012	372.02	630.54	237.32	74.75	131.51	45.17
2013	396.84	659.21	257.97	77.29	132.97	47.81
2014	430.60	705.74	279.73	82.00	138.75	50.88
2015	463.99	749.21	301.63	86.79	144.13	54.16

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	62	62	62	62	6
1986	73	73	68	68	7
1987	85	85	74	75	7
1988	99	99	75	75	8
1989	115	115	74	74	8
1990	139	139	86	86	8
1991	156	156	88	88	8
1992	179	179	93	93	9
1993	203	204	93	93	10
1994	226	226	80	81	11
1995	258	259	77	77	12
1996	313	315	86	87	13
1997	375	378	98	99	14
1998	429	432	111	112	14
1999	487	490	127	127	15

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	545	548	141	142	16
2001	651	672	169	174	17
2002	729	827	188	212	19
2003	824	886	210	226	22
2004	925	953	230	237	27
2005	1020	1075	251	264	33
2006	1133	1166	273	281	40
2007	1205	1234	281	288	47
2008	1310	1383	289	305	55
2009	1409	1486	307	323	66
2010	1534	1633	327	348	81
2011	1633	1691	331	343	93
2012	1760	1811	345	355	109
2013	1918	1971	363	373	130
2014	2087	2141	383	393	154
2015	2248	2302	405	414	176

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 2015, the nominal human capital per capita increases from 35,110 Yuan to 779,830 Yuan, an increase of more than 21 times; and the real human capital per capita increases from 35,110 Yuan to 140,470 Yuan, an increase of approximately 4 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 2015, 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.

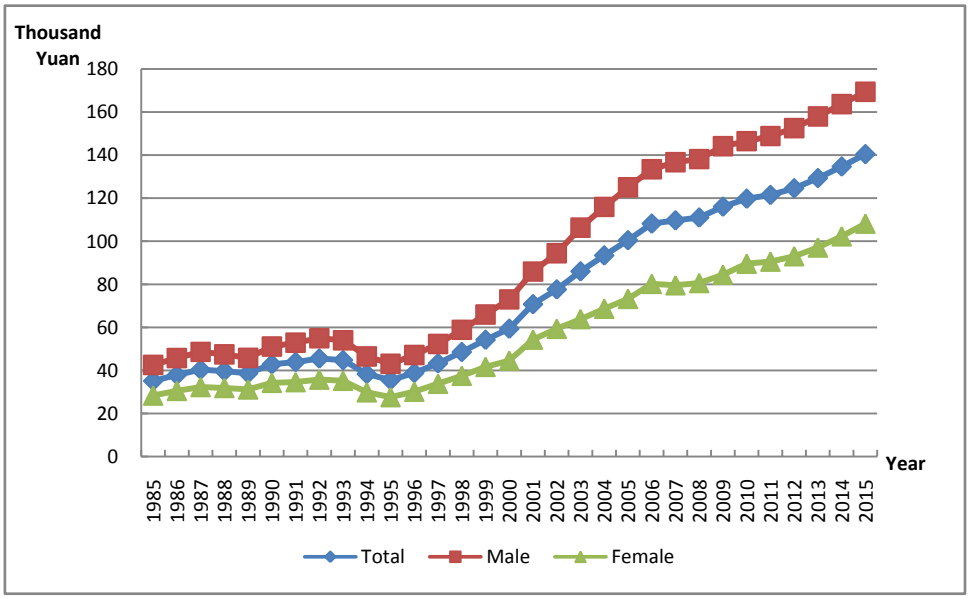


Figure XZ-2.1 Human Capital Per Capita by Gender for Tibet, 1985-2015

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	35.11	192.92	16.47	35.11	192.92	16.47
1986	40.43	221.46	18.47	37.89	206.97	17.38
1987	46.03	248.94	20.77	40.35	214.72	18.65
1988	52.60	282.33	23.35	39.68	206.73	18.40
1989	59.86	318.27	26.27	38.64	201.08	17.52

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	69.74	362.22	29.67	42.84	217.53	18.90
1991	78.04	397.06	33.86	43.91	217.96	19.81
1992	88.02	439.55	38.33	45.52	221.36	20.67
1993	98.40	479.65	43.48	44.77	209.68	21.01
1994	107.43	506.85	48.81	38.34	176.56	18.06
1995	119.01	542.25	55.04	35.50	155.72	17.33
1996	141.21	606.02	61.57	38.84	158.93	18.27
1997	165.94	672.51	69.07	43.31	168.29	19.41
1998	186.92	707.96	77.06	48.53	177.52	21.34
1999	208.61	744.40	85.55	54.24	187.78	23.57
2000	228.79	764.40	94.88	59.37	192.06	26.19
2001	272.75	942.19	104.02	70.77	238.64	28.46
2002	301.29	1027.28	113.16	77.63	257.62	30.99
2003	336.88	1140.13	123.95	86.03	283.65	33.64
2004	374.93	1257.30	134.92	93.42	306.66	35.41
2005	408.66	1352.75	146.35	100.47	325.07	38.07
2006	449.23	1475.76	158.72	108.19	348.01	40.32
2007	470.20	1510.52	171.48	109.71	346.17	41.81
2008	502.91	1594.14	184.64	111.02	345.64	42.59
2009	533.14	1666.06	198.51	116.08	355.96	45.22
2010	562.20	1711.59	211.97	119.78	357.82	47.24
2011	598.95	1809.92	228.49	121.50	359.67	48.64
2012	635.94	1883.54	246.19	124.62	361.30	50.69
2013	683.37	1996.27	265.24	129.35	369.97	52.71
2014	733.39	2105.91	287.67	134.72	377.82	55.77
2015	779.83	2199.06	310.22	140.47	386.42	59.08

Figure XZ-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

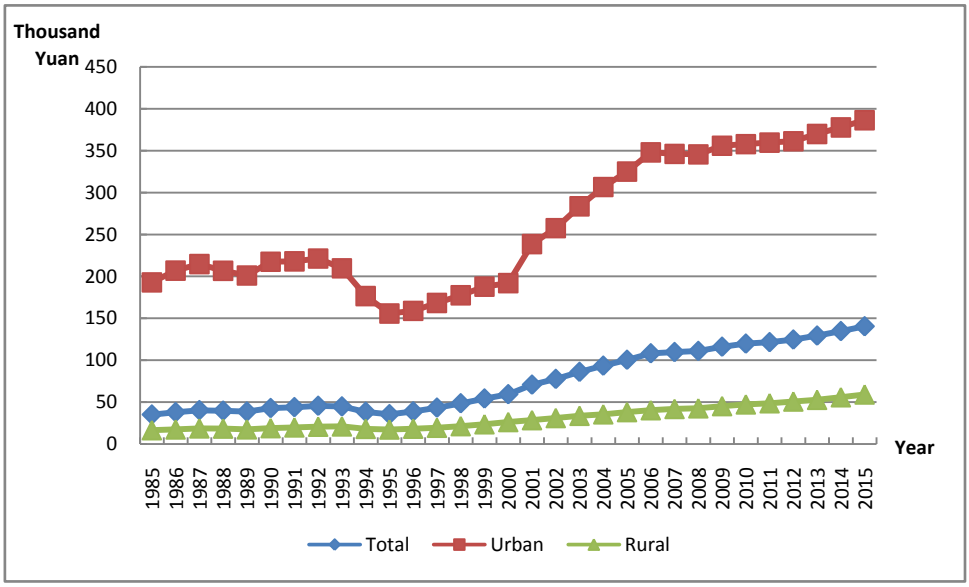


Figure XZ-2.2 Real Human Capital Per Capita by Region for Tibet, 1985-2015

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 2015, the nominal labor force human capital increases

from 20 billion Yuan to 805 billion Yuan, an increase of more than 39 times; and the real labor force human capital increases from 20 billion Yuan to 147 billion Yuan, an increase of approximately 6 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	20	20	20	20
1986	23	23	22	22
1987	27	27	24	24
1988	32	32	24	24
1989	37	37	24	24
1990	45	45	28	28
1991	50	50	28	28
1992	58	58	30	30
1993	68	68	31	31
1994	79	79	28	28
1995	93	93	28	28
1996	108	108	30	30
1997	126	126	33	33
1998	149	149	39	39
1999	175	175	46	46
2000	210	209	55	55
2001	212	211	56	55
2002	224	223	59	58
2003	246	246	64	64
2004	265	267	67	68
2005	290	293	73	73
2006	320	323	78	79
2007	353	357	84	84

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	397	402	89	90
2009	452	459	100	101
2010	534	542	115	117
2011	560	568	115	117
2012	605	614	120	122
2013	655	664	126	127
2014	711	721	133	135
2015	805	817	147	149

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 2015, the nominal average labor force human capital increases from 20,350 Yuan to 428,760 Yuan, an increase of more than 20 times; and the real average labor force human capital increases from 20,350 Yuan to 78,350 Yuan, an increase of approximately 3 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	20.35	91.09	13.32	20.35	91.09	13.32
1986	23.08	103.70	14.89	21.66	96.91	14.01

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
1987	26.30	118.62	16.67	23.21	102.32	14.97
1988	30.13	135.02	18.80	23.01	98.86	14.82
1989	34.19	152.26	21.11	22.27	96.19	14.08
1990	39.53	170.57	23.90	24.52	102.43	15.23
1991	45.01	190.86	26.92	25.57	104.77	15.75
1992	52.07	215.21	30.30	27.18	108.38	16.34
1993	60.09	241.42	34.10	27.64	105.54	16.47
1994	68.72	266.19	38.26	24.65	92.73	14.15
1995	78.30	290.43	42.83	23.50	83.40	13.48
1996	89.04	305.89	48.33	24.75	80.22	14.34
1997	101.38	324.69	54.65	26.76	81.25	15.36
1998	115.82	347.86	61.64	30.35	87.22	17.06
1999	131.04	371.64	69.00	34.33	93.75	19.01
2000	151.31	409.16	77.21	39.50	102.80	21.31
2001	153.98	434.21	84.58	40.38	109.98	23.14
2002	159.56	459.39	92.32	41.75	115.20	25.28
2003	171.01	498.74	101.13	44.43	124.08	27.45
2004	180.97	533.75	109.97	45.84	130.19	28.87
2005	194.88	582.14	119.00	48.80	139.89	30.95
2006	210.63	624.31	129.60	51.65	147.22	32.92
2007	227.56	665.67	140.20	53.86	152.55	34.18
2008	248.96	713.28	151.41	55.71	154.65	34.92
2009	273.67	760.21	163.79	60.36	162.42	37.31
2010	305.18	808.51	176.65	65.75	169.02	39.37
2011	319.67	843.22	190.28	65.69	167.57	40.51
2012	339.09	880.61	205.13	67.36	168.92	42.23
2013	360.88	927.96	221.03	69.26	171.98	43.92
2014	386.83	992.27	238.48	72.17	178.02	46.24
2015	428.76	1107.74	256.33	78.35	194.65	48.82

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	807	809	807	809	33
1986	965	965	911	911	39
1987	1096	1097	961	962	44
1988	1300	1300	963	963	49
1989	1545	1546	958	959	54
1990	1808	1810	1096	1098	57
1991	2124	2128	1211	1213	61
1992	2511	2517	1308	1311	65
1993	2932	2941	1343	1347	69
1994	3373	3385	1218	1222	74
1995	3850	3864	1168	1172	79
1996	4445	4471	1224	1231	85
1997	5099	5140	1339	1349	91
1998	5664	5710	1511	1523	99

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	6429	6491	1753	1770	108
2000	7238	7307	1977	1995	120
2001	8322	9070	2238	2433	132
2002	8965	9199	2434	2496	146
2003	9883	10191	2636	2717	163
2004	10802	11161	2794	2886	184
2005	11606	12090	2966	3088	211
2006	13258	13728	3334	3450	245
2007	15031	15595	3591	3723	292
2008	16938	17631	3802	3956	349
2009	19045	20017	4253	4469	420
2010	21198	22433	4553	4817	507
2011	23610	24648	4798	5008	600
2012	26569	27756	5255	5489	707
2013	29961	31283	5755	6008	819
2014	33429	34881	6318	6593	939
2015	37073	38659	6942	7239	1048

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 2015, the nominal human capital per capita increases from 29,560 Yuan to 1,182,030 Yuan, an increase of more than 38 times; and the real human capital per capita increases from 29,560 Yuan to 221,340 Yuan, an increase of approximately 6 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 2015, 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.

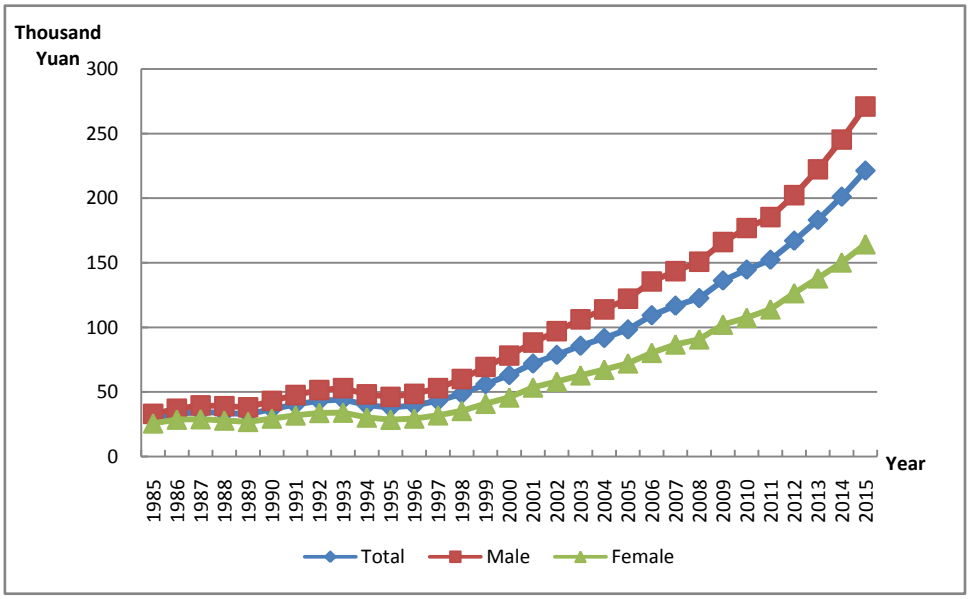


Figure SaX-2.1 Human Capital Per Capita by Gender for Shaanxi，1985-2015

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	29.56	70.81	19.16	29.56	70.81	19.16
1986	34.99	81.93	22.97	33.04	76.86	21.82
1987	39.38	91.86	25.77	34.53	78.92	23.02
1988	45.59	105.01	29.77	33.78	75.11	22.77
1989	52.93	121.37	34.28	32.84	73.82	21.67

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	60.61	136.43	39.51	36.74	80.88	24.46
1991	70.68	157.56	45.03	40.28	87.05	26.48
1992	82.99	184.53	51.23	43.23	91.68	28.07
1993	96.35	212.09	58.14	44.14	92.43	28.20
1994	110.24	238.06	65.87	39.79	80.93	25.51
1995	125.22	264.47	74.53	37.98	76.19	24.08
1996	143.91	302.51	83.53	39.62	79.01	24.62
1997	164.35	343.18	93.31	43.15	85.21	26.44
1998	181.84	369.29	104.32	48.52	93.85	29.77
1999	205.63	414.65	115.96	56.08	108.41	33.63
2000	230.86	460.65	128.90	63.06	120.08	37.77
2001	267.72	531.48	139.93	72.01	138.40	39.84
2002	289.87	550.56	152.70	78.71	146.00	43.30
2003	321.56	594.21	167.02	85.76	156.32	45.76
2004	354.80	639.35	182.24	91.76	163.30	48.38
2005	385.02	676.46	197.08	98.38	171.24	51.40
2006	435.08	749.38	218.00	109.40	185.79	56.63
2007	488.95	829.31	236.98	116.80	195.45	58.57
2008	546.38	914.30	257.04	122.65	202.90	59.54
2009	610.13	1006.23	280.44	136.26	223.30	63.81
2010	673.64	1097.70	301.42	144.69	234.91	65.51
2011	749.81	1203.09	320.14	152.36	243.59	65.89
2012	844.91	1337.13	340.88	167.10	263.84	68.04
2013	953.51	1488.35	364.12	183.14	285.68	70.15
2014	1064.24	1631.95	392.14	201.15	308.34	74.24
2015	1182.03	1779.35	422.68	221.34	333.19	79.16

Figure SaX-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

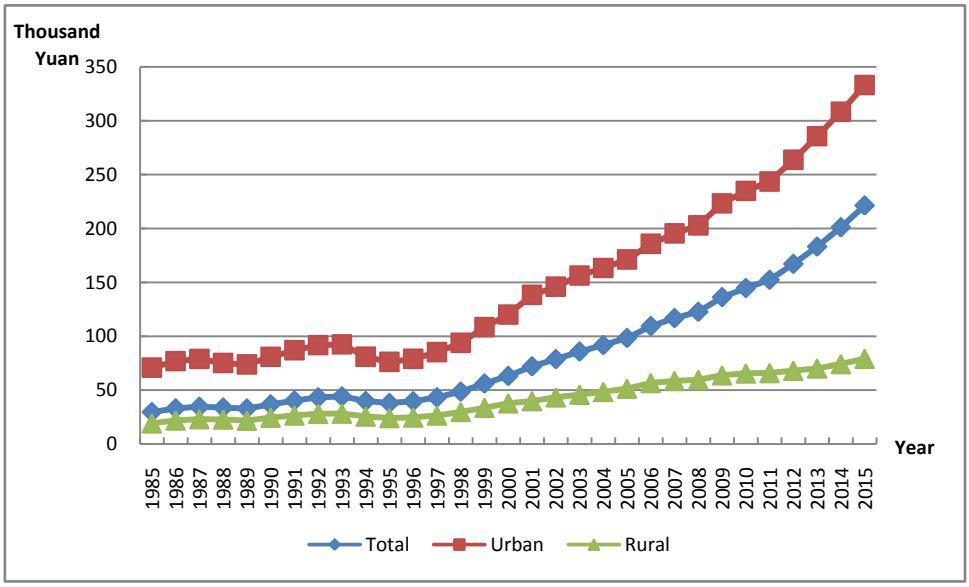


Figure SaX-2.2 Real Human Capital Per Capita by Region for Shaanxi，1985-2015

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 2015, the nominal labor force human capital

increases from 380 billion Yuan to 15,260 billion Yuan, an increase of more than 39 times; and the real labor force human capital increases from 380 billion Yuan to 2,858 billion Yuan, an increase of approximately 7 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	380	380	380	380
1986	433	432	408	408
1987	493	492	433	432
1988	577	576	428	427
1989	668	666	415	414
1990	798	796	484	483
1991	918	916	525	523
1992	1038	1037	544	544
1993	1183	1181	547	546
1994	1334	1332	487	486
1995	1505	1503	461	461
1996	1674	1672	466	466
1997	1870	1869	497	497
1998	2104	2103	567	567
1999	2375	2372	654	653
2000	2717	2671	749	737
2001	2874	2837	781	771
2002	3115	3094	853	847
2003	3445	3441	923	922
2004	3739	3768	971	978
2005	4142	4176	1061	1070
2006	4792	4840	1210	1222

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	5639	5702	1353	1368
2008	6506	6591	1466	1485
2009	7621	7739	1706	1732
2010	9012	9174	1938	1972
2011	9869	10062	2008	2047
2012	10718	10943	2122	2166
2013	11819	12080	2271	2321
2014	13437	13746	2540	2598
2015	15260	15639	2858	2928

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 2015, the nominal average labor force human capital increases from 22,170 Yuan to 698,780 Yuan, an increase of more than 30 times; and the real average labor force human capital increases from 22,170 Yuan to 130,850 Yuan, an increase of approximately 5 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	22.17	50.35	14.61	22.17	50.35	14.61

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
1986	24.92	55.14	16.79	23.53	51.73	15.94
1987	28.14	60.61	19.36	24.69	52.06	17.30
1988	32.12	67.63	22.37	23.85	48.38	17.11
1989	36.47	75.49	25.56	22.66	45.92	16.16
1990	42.30	86.21	29.48	25.67	51.11	18.25
1991	48.04	95.87	33.65	27.46	52.96	19.78
1992	54.24	107.09	38.18	28.45	53.21	20.92
1993	61.35	119.65	43.18	28.35	52.15	20.94
1994	69.05	132.75	48.64	25.22	45.13	18.84
1995	77.85	148.20	54.44	23.85	42.70	17.59
1996	86.91	163.96	60.31	24.21	42.83	17.78
1997	97.22	181.78	66.83	25.86	45.13	18.94
1998	108.75	200.36	74.23	29.32	50.92	21.18
1999	121.57	220.48	81.98	33.46	57.64	23.78
2000	137.63	248.04	90.78	37.94	64.66	26.60
2001	145.60	251.39	98.45	39.57	65.46	28.03
2002	156.81	260.60	106.96	42.91	69.11	30.33
2003	172.21	279.84	115.97	46.14	73.62	31.77
2004	187.22	297.57	124.85	48.62	76.00	33.15
2005	206.59	324.35	134.10	52.93	82.11	34.97
2006	235.47	363.92	152.21	59.47	90.23	39.54
2007	270.72	418.89	170.57	64.97	98.72	42.16
2008	306.60	472.21	188.34	69.11	104.79	43.63
2009	352.05	540.47	208.59	78.79	119.94	47.46
2010	405.21	621.44	227.83	87.13	132.99	49.51
2011	447.14	685.06	247.68	90.98	138.71	50.97
2012	490.22	746.45	268.26	97.06	147.29	53.54
2013	542.62	821.30	291.67	104.26	157.64	56.19
2014	615.26	923.57	315.62	116.31	174.50	59.76
2015	698.78	1037.50	338.61	130.85	194.28	63.41

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	496	496	496	496	27
1986	576	576	541	541	30
1987	666	666	582	582	33
1988	780	780	576	576	35
1989	914	914	572	572	38
1990	1073	1074	650	651	40
1991	1225	1227	707	707	42
1992	1397	1399	754	755	44
1993	1602	1605	748	750	46
1994	1819	1823	685	687	47
1995	2065	2071	651	652	49
1996	2348	2357	672	675	52
1997	2665	2678	742	745	56
1998	3007	3027	845	851	60
1999	3363	3389	968	975	65

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	3746	3775	1082	1090	72
2001	4234	4276	1174	1185	81
2002	4681	4733	1298	1312	91
2003	5298	5375	1453	1474	103
2004	5857	5950	1568	1593	117
2005	6468	6572	1701	1729	133
2006	7091	7224	1842	1877	150
2007	7780	7934	1915	1953	170
2008	8490	8671	1932	1974	193
2009	9192	9407	2065	2114	221
2010	9861	10112	2128	2183	254
2011	10931	11211	2234	2292	292
2012	11892	12186	2359	2418	336
2013	12970	13283	2502	2564	385
2014	14070	14392	2658	2721	439
2015	15171	15500	2825	2888	497

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 2015, the nominal human capital per capita increases from 26,320 Yuan to 692,880 Yuan, an increase of more than 25 times; and the real human capital per capita increases from 26,320 Yuan to 129,020 Yuan, an increase of approximately 4 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 2015, 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.

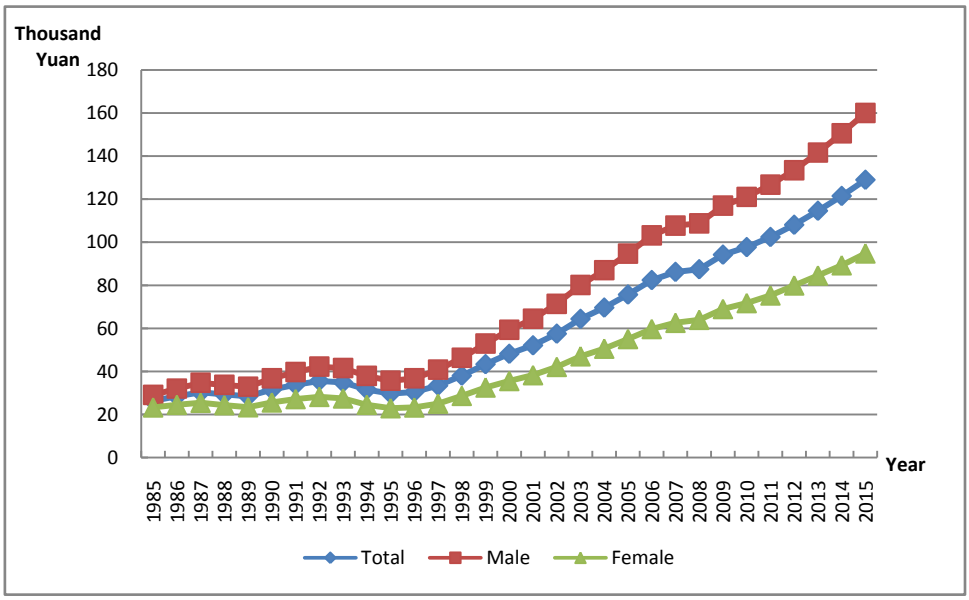


Figure GS-2.1 Human Capital Per Capita by Gender for Gansu，1985-2015

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	26.32	70.83	16.51	26.32	70.83	16.51
1986	30.27	79.51	18.80	28.43	74.30	17.74
1987	34.66	88.59	21.44	30.29	76.37	18.99
1988	39.61	98.38	24.42	29.26	70.33	18.65
1989	45.32	110.21	27.70	28.38	66.66	17.99

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	52.00	123.53	31.67	31.52	73.32	19.64
1991	58.58	137.64	35.87	33.79	77.29	21.29
1992	65.92	153.40	40.52	35.58	80.28	22.60
1993	74.64	172.79	45.88	34.88	78.49	22.10
1994	83.76	191.66	51.84	31.56	69.88	20.22
1995	94.08	213.63	58.41	29.64	65.51	18.94
1996	106.28	241.56	65.54	30.43	67.15	19.37
1997	119.94	273.30	73.28	33.38	73.91	21.05
1998	135.18	308.57	81.74	38.00	84.29	23.74
1999	150.65	342.71	90.82	43.36	96.31	26.86
2000	166.73	376.43	100.75	48.16	106.64	29.77
2001	187.89	410.50	111.38	52.09	112.91	31.19
2002	207.47	437.47	121.44	57.52	121.17	33.70
2003	234.84	487.68	132.77	64.39	133.87	36.34
2004	260.15	525.68	144.88	69.63	142.45	38.02
2005	287.79	552.30	157.68	75.69	147.89	40.17
2006	317.39	610.09	173.77	82.43	161.43	43.66
2007	350.31	661.23	189.69	86.22	166.31	44.84
2008	384.39	714.48	206.11	87.45	166.39	44.82
2009	419.44	767.12	224.34	94.22	177.06	47.73
2010	452.97	815.31	242.76	97.73	180.25	49.86
2011	501.30	881.33	263.96	102.44	184.34	51.29
2012	545.09	933.20	285.70	108.12	189.32	53.84
2013	594.09	997.18	307.75	114.62	197.00	56.09
2014	643.07	1056.54	332.26	121.50	204.23	59.31
2015	692.88	1112.53	360.07	129.02	212.09	63.14

Figure GS-2.2 shows the trend of real human capital per capita by

region. From 1985 to 2015, 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.

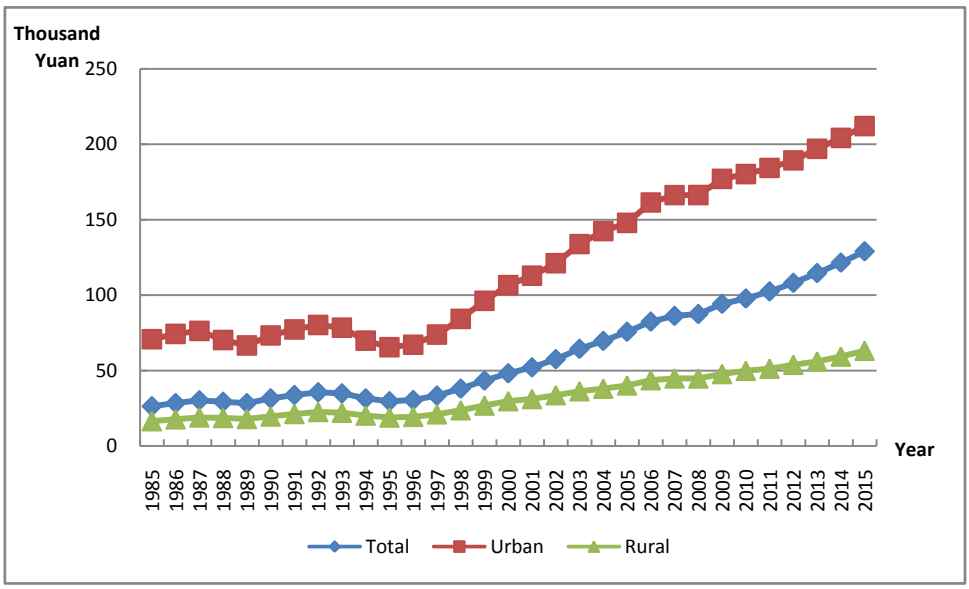


Figure GS-2.2 Real Human Capital Per Capita by Region for Gansu，1985-2015

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 2015, the nominal labor force human capital increases from 204 billion Yuan to 7,294 billion Yuan, an increase of more than 34

times; and the real labor force human capital increases from 204 billion Yuan to 1,352 billion Yuan, an increase of approximately 6 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	204	204	204	204
1986	243	243	228	228
1987	292	292	256	255
1988	355	354	262	262
1989	427	427	268	267
1990	516	515	313	312
1991	595	595	343	343
1992	676	676	365	365
1993	765	765	358	357
1994	865	865	326	326
1995	979	979	308	308
1996	1083	1083	310	310
1997	1207	1208	336	337
1998	1346	1347	379	379
1999	1506	1507	434	434
2000	1693	1684	490	487
2001	1813	1809	503	502
2002	1945	1944	539	539
2003	2116	2119	580	581
2004	2319	2331	620	623
2005	2649	2664	695	699
2006	2854	2873	739	744
2007	3134	3158	768	774

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	3447	3479	780	787
2009	3858	3902	861	871
2010	4340	4400	932	945
2011	4789	4857	973	987
2012	5262	5339	1037	1053
2013	5822	5907	1116	1132
2014	6523	6618	1225	1244
2015	7294	7400	1352	1372

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 2015, the nominal average labor force human capital increases from 19,160 Yuan to 475,680 Yuan, an increase of more than 13 times; and the real average labor force human capital increases from 19,160 Yuan to 88,150 Yuan, an increase of approximately 4 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	19.16	48.69	12.21	19.16	48.69	12.21
1986	22.21	55.05	14.00	20.85	51.45	13.21

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
1987	25.90	62.38	16.11	22.63	53.78	14.27
1988	29.76	69.23	18.58	21.98	49.49	14.19
1989	34.12	77.29	21.31	21.37	46.75	13.84
1990	39.50	87.11	24.56	23.94	51.70	15.23
1991	44.41	96.40	27.80	25.61	54.13	16.50
1992	49.47	105.84	31.25	26.70	55.39	17.43
1993	55.16	116.72	35.10	25.78	53.02	16.91
1994	61.63	128.95	39.37	23.22	47.01	15.35
1995	69.01	142.93	44.07	21.74	43.83	14.29
1996	76.29	157.01	49.32	21.86	43.65	14.58
1997	84.68	173.29	55.27	23.60	46.86	15.87
1998	94.22	191.32	61.79	26.54	52.26	17.94
1999	104.76	211.78	68.49	30.19	59.52	20.26
2000	116.86	235.84	76.05	33.79	66.81	22.47
2001	126.42	248.22	82.59	35.07	68.27	23.13
2002	135.57	260.67	89.06	37.59	72.20	24.72
2003	147.20	279.12	96.13	40.35	76.62	26.31
2004	161.02	300.80	102.99	43.01	81.51	27.03
2005	182.34	329.36	110.18	47.87	88.19	28.07
2006	197.61	354.31	124.04	51.16	93.75	31.17
2007	217.04	383.00	138.05	53.17	96.33	32.63
2008	238.45	414.93	152.40	53.95	96.63	33.14
2009	264.55	454.94	168.65	59.04	105.01	35.88
2010	294.93	503.39	184.52	63.31	111.29	37.90
2011	324.44	544.46	202.63	65.92	113.88	39.37
2012	354.25	582.50	222.03	69.84	118.17	41.84
2013	388.07	628.22	241.70	74.37	124.11	44.05
2014	429.81	685.26	262.49	80.74	132.46	46.86
2015	475.68	745.56	283.72	88.15	142.13	49.75

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	108	109	108	11
1986	126	126	119	119	12
1987	146	146	129	129	13
1988	167	168	126	126	14
1989	191	191	122	122	15
1990	217	217	131	131	16
1991	251	251	142	142	17
1992	290	291	152	152	17
1993	335	335	156	156	19
1994	386	387	147	147	20
1995	440	440	142	142	21
1996	497	499	146	146	24
1997	564	566	158	158	27
1998	633	635	176	176	30

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)	
1999	708	711	197	198	34
2000	795	800	222	223	39
2001	907	915	247	249	46
2002	986	998	263	265	53
2003	1098	1114	286	290	62
2004	1201	1220	302	306	71
2005	1313	1337	326	332	81
2006	1461	1488	357	363	92
2007	1619	1648	370	377	104
2008	1785	1819	370	377	117
2009	1977	2019	399	407	137
2010	2171	2220	415	424	163
2011	2417	2476	435	445	195
2012	2649	2712	462	473	239
2013	2922	2991	490	501	298
2014	3223	3297	525	537	367
2015	3535	3614	560	573	442

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 2015, the nominal human capital per capita increases from 27,920Yuan to 685,720 Yuan, an increase of more than 23 times; and the real human capital per capita increases from 27,920 Yuan

to 108,690 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 2015, 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.

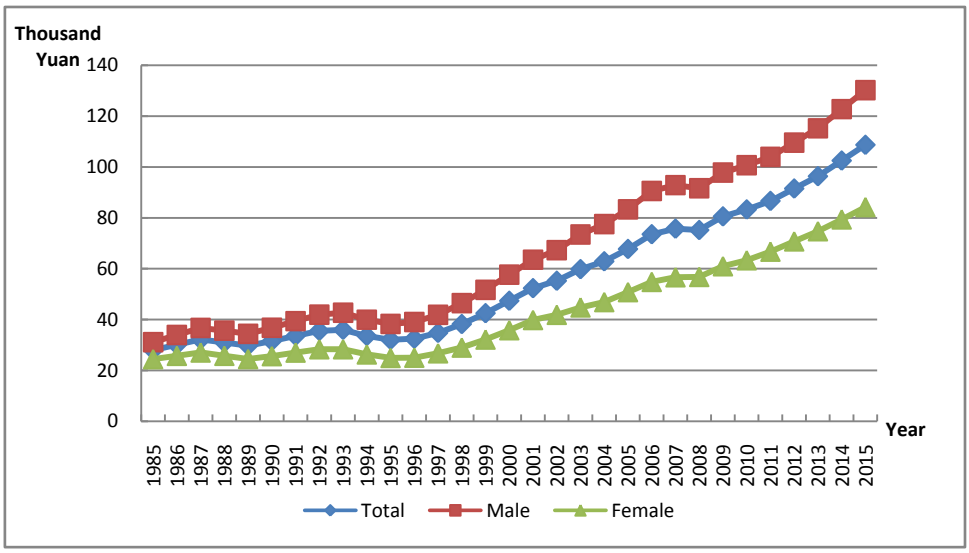


Figure QH-2.1 Human Capital Per Capita by Gender for Qinghai，1985-2015

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	27.92	61.91	17.38	27.92	61.91	17.38
1986	31.85	69.14	19.72	30.03	64.98	18.66
1987	36.32	77.20	22.42	32.13	67.30	20.16
1988	41.11	85.99	25.53	30.96	63.21	19.76

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	46.41	95.72	28.96	29.71	59.99	18.99
1990	52.20	105.86	32.92	31.51	63.36	20.06
1991	59.51	118.10	37.40	33.55	65.03	21.67
1992	67.84	132.25	42.37	35.50	67.06	23.03
1993	77.16	147.75	48.01	35.92	65.72	23.61
1994	87.92	166.19	54.26	33.50	60.00	22.11
1995	98.95	183.95	61.01	31.98	55.48	21.49
1996	110.64	202.19	68.27	32.43	54.74	22.10
1997	124.13	223.92	76.39	34.72	57.68	23.73
1998	137.71	244.17	85.15	38.20	62.52	26.19
1999	152.48	266.38	94.52	42.47	68.55	29.19
2000	169.32	292.61	104.73	47.35	75.61	32.54
2001	191.75	333.26	115.27	52.31	83.60	35.39
2002	207.42	354.18	125.63	55.21	87.02	37.49
2003	229.67	390.00	137.70	59.78	94.13	40.08
2004	250.14	419.61	150.26	62.87	99.19	41.46
2005	272.55	452.81	163.40	67.73	107.36	43.73
2006	300.89	490.80	178.30	73.53	114.31	47.20
2007	331.10	531.60	193.47	75.71	116.48	47.73
2008	362.53	574.45	208.54	75.17	115.58	45.81
2009	399.25	625.44	225.94	80.53	121.94	48.81
2010	435.41	674.42	242.63	83.28	125.11	49.54
2011	481.37	741.36	260.64	86.62	129.74	50.02
2012	524.52	798.99	280.06	91.50	135.71	52.12
2013	574.89	870.25	299.26	96.35	142.04	53.71
2014	629.41	944.08	322.08	102.49	149.74	56.34
2015	685.72	1018.74	345.86	108.69	157.19	59.20

Figure QH-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

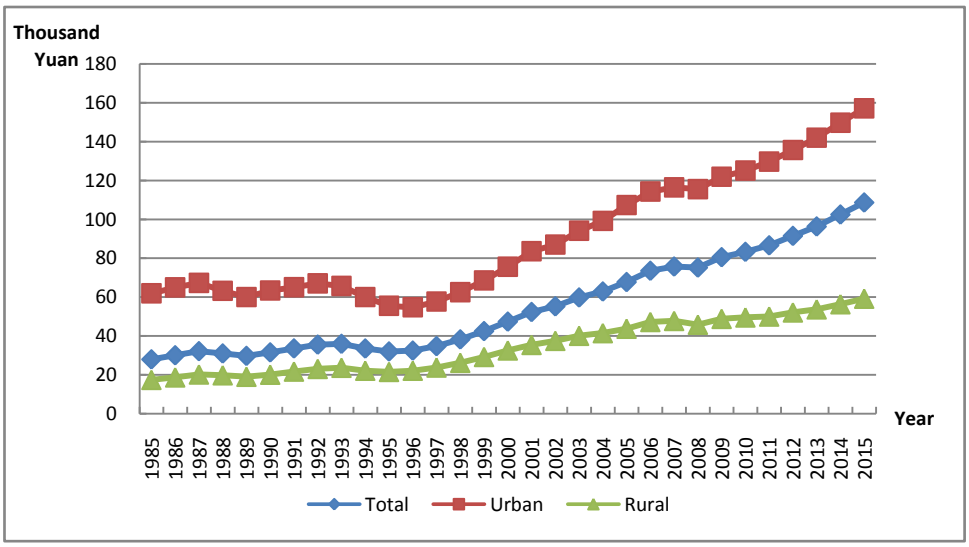


Figure QH-2.2 Real Human Capital Per Capita by Region for Qinghai，1985-2015

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 2015, the nominal labor force human capital increases from 42 billion Yuan to 1,676billion Yuan, an increase of more than 33

times; and the real labor force human capital increases from 42 billion Yuan to 267 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	42	42	42	42
1986	52	51	49	49
1987	62	62	55	55
1988	74	74	56	56
1989	88	88	56	56
1990	104	104	63	63
1991	123	123	69	69
1992	142	142	74	74
1993	165	165	77	77
1994	190	190	73	73
1995	218	218	71	71
1996	249	249	73	73
1997	282	282	79	79
1998	320	320	89	89
1999	359	359	100	100
2000	402	402	113	113
2001	437	437	120	120
2002	469	470	126	126
2003	514	516	135	136
2004	558	563	141	142
2005	604	610	151	153
2006	670	677	165	167
2007	750	759	173	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)
2008	838	848	175	177
2009	945	959	192	194
2010	1069	1087	205	208
2011	1160	1179	210	213
2012	1260	1281	221	224
2013	1381	1404	233	236
2014	1529	1554	250	254
2015	1676	1704	267	271

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 2015, the nominal average labor force human capital increases from 20,890 Yuan to 478,310 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 20,890 Yuan to 76,240 Yuan, an increase of approximately 3 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	20.89	44.30	13.30	20.89	44.30	13.30
1986	24.19	50.15	15.32	22.81	47.13	14.50

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
1987	27.91	56.58	17.66	24.69	49.33	15.88
1988	31.97	63.53	20.41	24.08	46.70	15.79
1989	36.59	71.45	23.43	23.43	44.78	15.37
1990	41.77	79.97	26.94	25.21	47.87	16.42
1991	47.46	88.85	30.78	26.76	48.93	17.84
1992	53.55	98.33	35.02	28.06	49.86	19.04
1993	60.74	109.72	39.78	28.33	48.80	19.57
1994	68.46	121.52	45.00	26.17	43.87	18.34
1995	77.08	134.93	50.62	25.01	40.70	17.83
1996	86.11	148.18	56.65	25.35	40.12	18.34
1997	96.22	162.59	63.35	27.04	41.88	19.68
1998	106.76	176.84	70.70	29.74	45.28	21.75
1999	117.51	190.95	78.22	32.87	49.14	24.16
2000	129.80	207.60	86.37	36.44	53.64	26.84
2001	140.54	223.00	93.92	38.63	55.94	28.84
2002	149.87	234.37	101.64	40.23	57.58	30.33
2003	162.87	253.98	110.42	42.80	61.30	32.14
2004	175.42	271.40	119.30	44.45	64.16	32.92
2005	188.72	289.75	128.18	47.19	68.70	34.31
2006	208.00	315.51	140.88	51.20	73.49	37.29
2007	230.48	347.37	153.54	53.06	76.11	37.88
2008	254.30	380.82	166.47	52.98	76.62	36.57
2009	283.01	421.22	181.04	57.37	82.12	39.11
2010	314.84	465.92	195.12	60.44	86.43	39.84
2011	340.61	502.06	210.08	61.57	87.86	40.31
2012	367.87	536.99	226.20	64.48	91.21	42.10
2013	399.69	582.22	242.96	67.36	95.03	43.61
2014	438.40	637.46	261.13	71.79	101.11	45.68
2015	478.31	693.10	278.98	76.24	106.94	47.75

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-education Category (1)	6-education Category (2)	5-education Category (3)	6-education Category (4)	(5)
1985	145	145	145	145	11
1986	169	169	161	161	12
1987	198	198	174	174	13
1988	232	232	175	175	14
1989	271	271	174	174	14
1990	318	319	191	191	15
1991	365	366	206	206	16
1992	418	419	219	219	16
1993	481	482	220	220	17
1994	549	550	204	204	18
1995	630	631	200	200	19
1996	727	729	216	216	20
1997	838	841	239	240	21
1998	951	955	272	273	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	1075	1081	311	313	25
2000	1213	1220	352	354	27
2001	1395	1408	398	401	31
2002	1553	1569	444	449	34
2003	1789	1815	502	509	40
2004	1995	2028	539	547	46
2005	2200	2238	585	595	54
2006	2574	2642	670	687	64
2007	2920	3008	720	741	75
2008	3279	3389	744	769	90
2009	3673	3810	827	858	110
2010	4030	4183	873	905	133
2011	4452	4601	907	937	155
2012	4919	5090	981	1015	181
2013	5445	5633	1049	1085	211
2014	6006	6210	1135	1173	252
2015	6578	6796	1228	1269	302

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 2015, the nominal human capital per capita increases from 37,740 Yuan to 1,243,640 Yuan, an increase of more than 32 times; and the real human capital per capita increases from 37,740

Yuan to 232,200 Yuan, an increase of approximately 5 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 2015, 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.

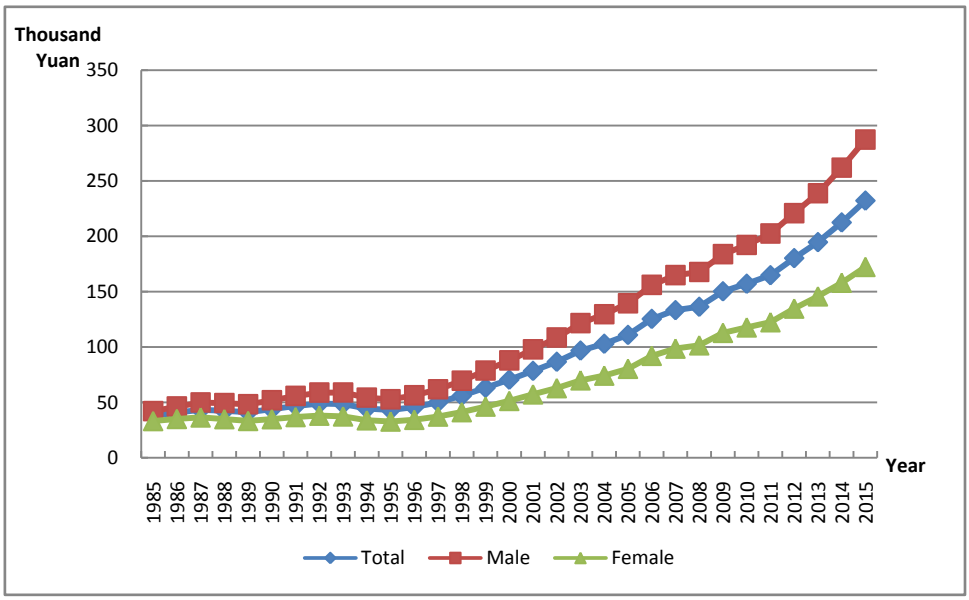


Figure NX-2.1 Human Capital Per Capita by Gender for Ningxia，1985-2015

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	37.74	84.87	23.91	37.74	84.87	23.91
1986	43.08	94.32	27.42	40.81	88.98	26.09
1987	49.17	104.41	31.64	43.29	89.63	28.59
1988	56.10	117.07	36.05	42.32	85.38	28.15

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	63.83	131.45	40.80	41.02	82.50	26.89
1990	72.98	147.30	46.80	43.76	87.63	28.30
1991	82.62	164.12	53.13	46.67	91.34	30.51
1992	93.33	182.16	60.25	48.84	92.75	32.49
1993	106.16	204.68	68.47	48.50	90.47	32.44
1994	119.72	227.12	77.55	44.38	80.44	30.21
1995	135.78	256.03	87.42	43.04	77.30	29.26
1996	154.05	288.49	97.81	45.69	81.71	30.63
1997	174.82	326.02	109.15	49.93	88.87	33.02
1998	195.74	359.85	121.78	55.92	98.10	36.92
1999	218.11	394.97	135.54	63.13	108.65	41.88
2000	242.61	433.41	150.19	70.44	119.58	46.64
2001	275.24	483.05	166.44	78.41	131.56	50.58
2002	302.78	515.82	182.62	86.61	141.20	55.83
2003	344.75	583.55	200.54	96.73	157.37	60.11
2004	380.95	631.11	219.84	102.90	164.76	63.05
2005	416.88	675.61	239.64	110.88	173.60	67.92
2006	481.62	782.64	261.12	125.35	197.75	72.32
2007	540.33	869.76	282.61	133.25	209.10	73.91
2008	600.40	958.02	303.39	136.30	213.47	72.21
2009	667.01	1053.20	327.45	150.27	233.87	76.77
2010	725.52	1128.66	350.87	157.11	241.57	78.62
2011	809.03	1225.48	377.69	164.81	247.92	78.72
2012	903.88	1333.46	408.25	180.25	263.96	83.67
2013	1010.21	1454.51	438.59	194.70	278.72	86.60
2014	1124.32	1575.74	475.51	212.48	296.03	92.41
2015	1243.64	1696.47	513.45	232.20	314.93	98.79

Figure NX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

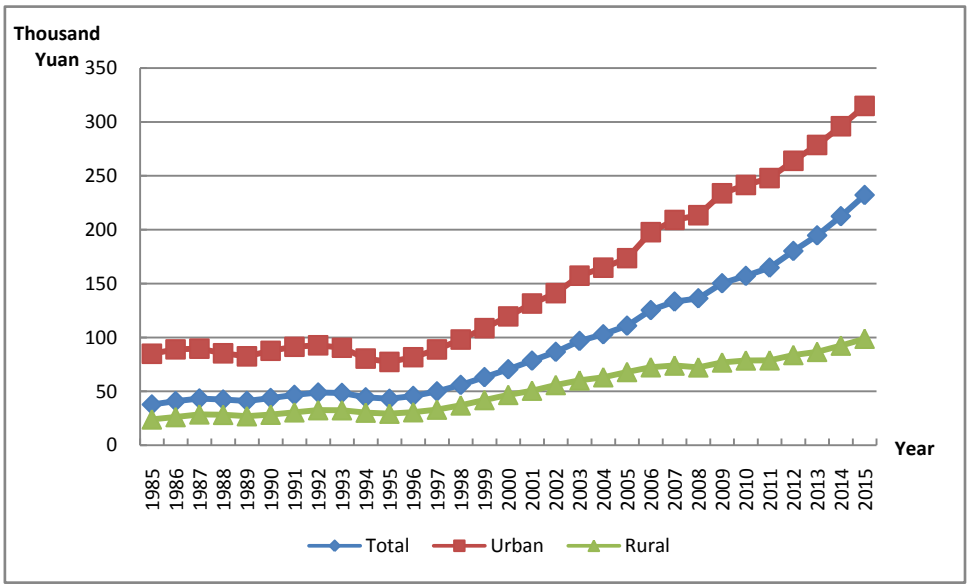


Figure NX-2.2 Real Human Capital Per Capita by Region for Ningxia，1985-2015

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 2015, the nominal labor force human capital increases

from 49 billion Yuan to 2,368 billion Yuan, an increase of more than 48 times; and the real labor force human capital increases from 48 billion Yuan to 443 billion Yuan, an increase of approximately 8 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	49	49	49	49
1986	58	58	55	55
1987	69	69	61	61
1988	85	85	64	64
1989	104	104	67	66
1990	128	128	77	77
1991	149	149	84	84
1992	173	173	90	90
1993	199	199	91	91
1994	229	229	85	85
1995	264	264	84	84
1996	303	303	90	90
1997	349	350	100	100
1998	403	403	115	115
1999	461	461	134	134
2000	527	525	153	153
2001	575	574	164	164
2002	622	623	179	179
2003	691	693	195	196
2004	761	768	207	208
2005	844	851	226	228
2006	946	956	248	250
2007	1062	1074	264	267

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	1207	1222	276	279
2009	1392	1412	315	319
2010	1590	1616	346	351
2011	1690	1718	345	351
2012	1783	1814	357	363
2013	1919	1952	371	377
2014	2140	2178	406	413
2015	2368	2412	443	451

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 2015, the nominal average labor force human capital increases from 24,780 Yuan to 704.60 Yuan, an increase of more than 27 times; and the real average labor force human capital increases from 24,780 Yuan to 131,880 Yuan, an increase of approximately 4 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	24.78	49.71	16.54	24.78	49.71	16.54
1986	28.53	55.46	19.15	27.03	52.32	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
1987	33.23	62.62	22.28	29.26	53.75	20.13
1988	38.55	71.82	25.57	29.07	52.38	19.97
1989	44.68	82.64	29.18	28.69	51.87	19.23
1990	52.41	95.82	33.55	31.41	57.01	20.29
1991	58.95	105.51	38.41	33.28	58.72	22.06
1992	65.86	115.51	43.81	34.44	58.81	23.62
1993	73.88	127.27	49.80	33.75	56.25	23.59
1994	83.12	141.02	56.42	30.81	49.94	21.98
1995	93.50	156.51	63.76	29.65	47.26	21.34
1996	104.73	174.07	71.74	31.12	49.30	22.46
1997	117.74	194.22	80.66	33.72	52.94	24.40
1998	132.34	216.07	90.55	37.92	58.90	27.45
1999	147.90	239.05	100.48	42.93	65.76	31.05
2000	165.57	265.20	111.31	48.18	73.17	34.57
2001	180.13	282.07	121.50	51.49	76.82	36.92
2002	193.62	295.75	131.72	55.62	80.96	40.27
2003	211.91	319.19	143.45	59.78	86.08	42.99
2004	230.00	340.64	155.76	62.45	88.93	44.67
2005	250.85	364.57	169.14	67.06	93.68	47.94
2006	277.57	399.49	187.53	72.75	100.94	51.94
2007	306.46	439.05	205.80	76.15	105.55	53.82
2008	340.71	488.35	224.07	77.82	108.81	53.33
2009	383.66	551.21	244.10	86.85	122.40	57.23
2010	428.96	615.85	263.26	93.21	131.81	58.99
2011	469.14	665.33	284.48	95.81	134.60	59.29
2012	507.97	703.90	307.32	101.62	139.34	62.98
2013	557.66	760.57	331.06	107.77	145.74	65.37
2014	627.40	844.44	357.71	118.90	158.64	69.51
2015	704.60	934.24	382.29	131.88	173.43	73.56

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	513	513	513	513	26
1986	614	614	573	573	29
1987	727	727	631	631	32
1988	840	841	634	634	35
1989	965	966	628	629	38
1990	1117	1118	693	694	43
1991	1317	1319	751	752	48
1992	1509	1511	791	792	55
1993	1715	1719	799	801	64
1994	1935	1940	711	712	75
1995	2169	2175	664	666	86
1996	2429	2439	674	676	96
1997	2818	2833	753	757	105
1998	3245	3268	865	871	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)	
1999	3696	3725	1012	1020	128
2000	4240	4299	1170	1185	141
2001	4978	5088	1318	1346	155
2002	5335	5445	1420	1448	173
2003	5910	6040	1566	1599	195
2004	6455	6603	1663	1700	220
2005	7187	7352	1837	1879	246
2006	7941	8139	2003	2051	275
2007	8935	9148	2137	2187	310
2008	10004	10250	2217	2271	347
2009	11150	11443	2455	2518	387
2010	12321	12667	2604	2677	441
2011	13959	14353	2788	2869	503
2012	15396	15830	2968	3053	597
2013	17015	17489	3157	3246	716
2014	18745	19249	3444	3537	855
2015	20450	20964	3738	3834	1000

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 2015, the nominal human capital per capita increases from 40,300 Yuan to 987,620 Yuan, an increase of more than 23 times; and the real human capital per capita increases from 40,300

Yuan to 180,520 Yuan, an increase of approximately 3 times.

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 2015, 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.

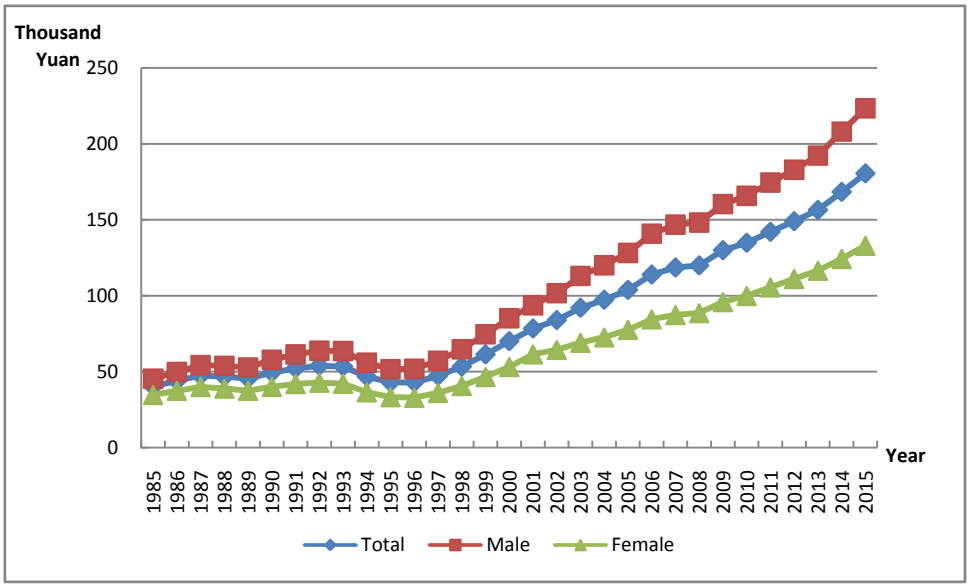


Figure XJ-2.1 Human Capital Per Capita by Gender for Xinjiang, 1985-2015

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	40.30	91.53	20.47	40.30	91.53	20.47
1986	47.16	105.70	23.41	43.95	98.23	21.92
1987	54.68	121.31	26.92	47.48	103.52	24.12
1988	61.91	132.04	30.72	46.72	96.31	24.66

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	69.78	144.91	34.86	45.44	92.31	23.66
1990	79.66	160.99	40.15	49.40	98.14	25.73
1991	91.48	184.61	45.93	52.14	102.96	27.28
1992	102.70	206.33	51.81	53.86	105.29	28.60
1993	114.63	229.20	58.11	53.40	102.96	28.95
1994	127.15	252.74	64.97	46.68	88.90	25.77
1995	140.17	276.55	72.35	42.94	82.16	23.43
1996	154.83	304.01	80.23	42.94	81.81	23.49
1997	176.57	350.12	89.45	47.20	91.03	25.20
1998	199.95	398.74	99.91	53.32	103.78	27.93
1999	223.97	446.86	111.51	61.32	119.04	32.20
2000	253.82	509.23	124.77	70.02	135.52	36.92
2001	295.96	600.63	137.54	78.37	153.69	39.20
2002	315.16	623.03	150.59	83.88	161.20	42.54
2003	347.14	678.82	165.42	91.98	174.76	46.64
2004	377.70	728.02	181.33	97.29	183.57	48.92
2005	406.20	770.72	198.01	103.80	193.18	52.79
2006	451.67	840.10	216.21	113.90	208.49	56.51
2007	495.57	905.42	232.91	118.53	214.81	56.79
2008	541.23	972.28	251.34	119.92	214.98	55.96
2009	590.21	1043.03	272.00	129.94	230.26	59.38
2010	637.99	1109.54	292.12	134.81	236.43	60.28
2011	711.08	1229.00	313.29	142.03	248.23	60.53
2012	773.25	1318.91	336.79	149.05	257.70	62.15
2013	843.29	1421.81	362.58	156.48	267.38	64.28
2014	916.31	1524.62	391.27	168.33	285.77	66.92
2015	987.62	1619.93	421.10	180.52	302.12	71.59

Figure XJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2015, 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.

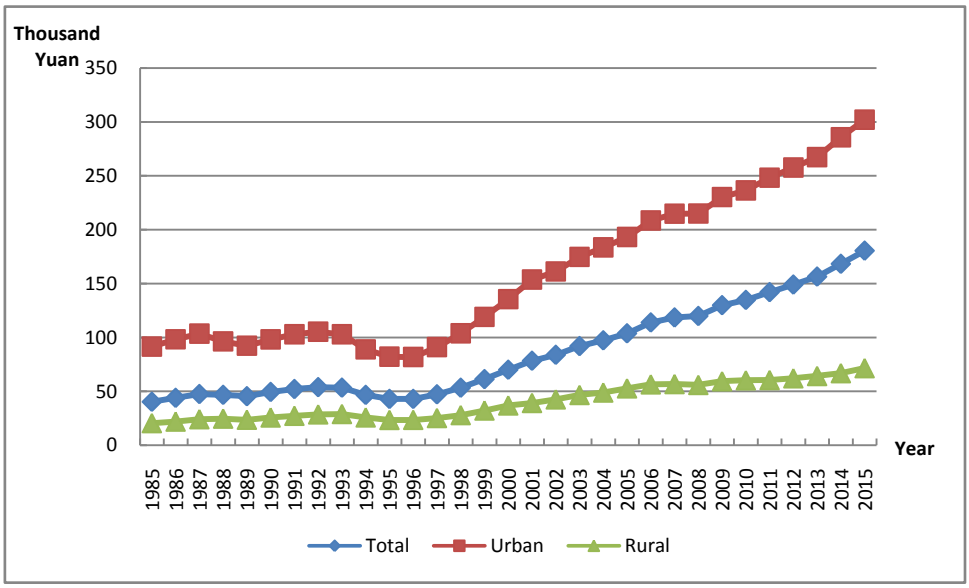


Figure XJ-2.2 Real Human Capital Per Capita by Region for Xinjiang, 1985-2015

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 2015, the nominal labor force human capital increases

from 167 billion Yuan to 7,988billion Yuan, an increase of more than 46 times; and the real labor force human capital increases from 167 billion Yuan to 1,447 billion Yuan, an increase of approximately 8 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	167	167	167	167
1986	198	198	185	185
1987	237	237	207	206
1988	300	300	227	227
1989	376	376	245	245
1990	471	470	292	291
1991	556	555	317	316
1992	657	657	345	344
1993	780	780	364	364
1994	925	925	340	340
1995	1082	1082	332	332
1996	1248	1249	347	347
1997	1405	1407	377	377
1998	1566	1569	419	419
1999	1740	1744	478	479
2000	1843	1859	511	515
2001	2009	2018	536	539
2002	2163	2170	580	582
2003	2387	2394	638	639
2004	2593	2618	672	679
2005	2939	2974	756	765
2006	3189	3230	809	819
2007	3623	3672	869	881

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	4097	4157	908	922
2009	4703	4779	1034	1051
2010	5392	5486	1136	1157
2011	5802	5905	1155	1175
2012	6179	6291	1184	1206
2013	6673	6791	1230	1252
2014	7377	7501	1342	1366
2015	7988	8121	1447	1472

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 2015, the nominal average labor force human capital increases from 25,400 Yuan to 575,020 Yuan, an increase of more than 21 times; and the real average labor force human capital increases from 25,400 Yuan to 104,170 Yuan, an increase of approximately 3 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	25.40	51.14	15.32	25.40	51.14	15.32
1986	29.45	58.99	17.57	27.45	54.83	16.45

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
1987	34.72	69.40	20.32	30.24	59.23	18.20
1988	41.40	78.77	23.32	31.36	57.45	18.72
1989	49.07	90.20	26.66	31.97	57.46	18.09
1990	58.99	104.22	31.05	36.56	63.54	19.90
1991	67.08	118.84	35.52	38.21	66.28	21.10
1992	75.56	134.70	40.55	39.62	68.73	22.38
1993	84.78	151.76	46.24	39.52	68.17	23.04
1994	95.36	170.99	52.43	35.04	60.15	20.80
1995	106.50	191.41	59.16	32.66	56.87	19.15
1996	118.34	212.60	66.33	32.86	57.21	19.42
1997	131.17	235.66	74.17	35.15	61.27	20.90
1998	144.81	258.29	82.51	38.71	67.22	23.07
1999	159.42	281.82	91.68	43.78	75.08	26.47
2000	173.33	301.82	100.89	48.06	80.32	29.85
2001	186.64	321.08	111.09	49.83	82.16	31.67
2002	198.73	336.64	121.21	53.25	87.10	34.24
2003	215.85	363.40	133.23	57.67	93.56	37.56
2004	231.82	385.44	146.02	60.12	97.19	39.40
2005	251.30	411.39	160.41	64.63	103.12	42.76
2006	274.03	441.17	176.01	69.47	109.48	46.00
2007	299.38	479.81	191.53	71.81	113.84	46.70
2008	327.77	520.69	207.15	72.67	115.13	46.12
2009	363.63	573.66	223.94	79.94	126.64	48.89
2010	404.16	631.86	240.03	85.17	134.64	49.53
2011	433.23	675.85	256.88	86.21	136.51	49.63
2012	457.60	704.56	275.22	87.70	137.66	50.79
2013	489.71	747.82	294.87	90.28	140.63	52.27
2014	534.34	814.24	316.21	97.24	152.62	54.08
2015	575.02	870.75	337.06	104.17	162.40	57.30

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	3837		3837	
1986	4348		4201	
1987	4763		4359	
1988	5211		4416	
1989	5643		4340	
1990	6114		4268	
1991	6679		4187	
1992	7247		4147	
1993	7998		4209	
1994	8681		4199	
1995	9407		4172	
1996	10380		4331	
1997	11440		4507	
1998	12300		4712	
1999	13180		5262	
2000	14360		5951	

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	15590		6572	
2002	16480		7167	
2003	17490		7800	
2004	18940		8484	
2005	20180		8958	
2006	21740		9452	
2007	23580		10050	
2008	25740		10530	
2009	27050		11000	
2010	28650		11380	
2011	31220		11780	
2012	33000		11970	
2013	35750		12420	
2014	37700		12550	
2015	40660		13140	

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 2015, the nominal human capital per capita increases from 823,140 HKD to 6,815,460 HKD, an increase of more than 7 times; and the real human capital per capita increases from 823,140 HKD to 2,202,540 HKD, an increase of approximately 1.7 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 2015, 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.

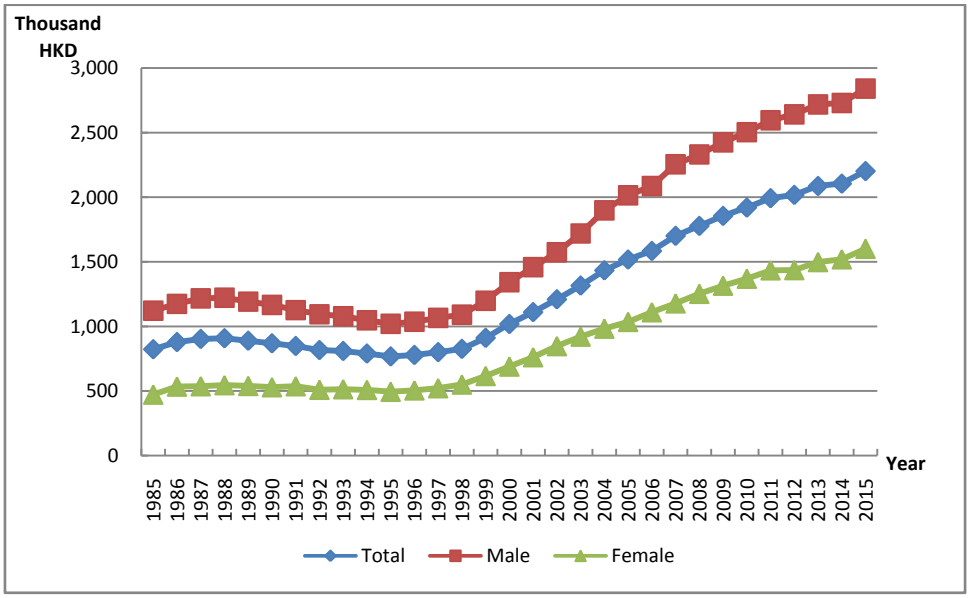


Figure HK-2.1 Human Capital Per Capita by Gender for Hong Kong, 1985-2015

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 2015, the nominal labor force human capital increases

from 2,012 billion HKD to 27,580 billion HKD, an increase of more than 12 times; and the real labor force human capital increases from 2,012 billion HKD to 8,915 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	2012		2012	
1986	2281		2204	
1987	2539		2324	
1988	2801		2374	
1989	3083		2371	
1990	3445		2405	
1991	3800		2383	
1992	4223		2417	
1993	4694		2471	
1994	5203		2517	
1995	5773		2560	
1996	6515		2718	
1997	7187		2832	
1998	7740		2966	
1999	8345		3331	
2000	9222		3823	
2001	10200		4297	
2002	10810		4700	
2003	11520		5135	
2004	12520		5609	
2005	13500		5994	
2006	14870		6463	

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)
2007	15530		6622	
2008	16990		6949	
2009	18040		7332	
2010	19470		7735	
2011	21190		7995	
2012	22380		8115	
2013	24050		8359	
2014	25530		8497	
2015	27580		8915	

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 2015, the nominal average labor force human capital increases from 653,070 HKD to 6,104,580 HKD, an increase of more than 8 times; and the real average labor force human capital increases from 653,070 HKD to 1,973,250 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	56810	56800	56810	56800
1986	59500	59500	59100	59100
1987	64290	64260	63520	63490
1988	72840	72800	71050	71020
1989	83740	83710	78230	78200
1990	96900	96990	86930	87010
1991	108500	108700	93960	94080
1992	120800	121000	100100	100300
1993	131100	131300	105600	105700
1994	140300	140300	108500	108500
1995	149000	150000	111200	111900
1996	150400	151400	108900	109600
1997	157700	159400	113100	114300
1998	160700	162600	113400	114700

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	164300	166500	115700	117300
2000	164000	166300	114100	115600
2001	155200	158300	107900	110100
2002	151000	154300	105200	107600
2003	157600	160900	110100	112500
2004	157200	160400	108100	110300
2005	159400	162200	107100	109000
2006	159400	163000	106500	108900
2007	161200	165900	105800	108900
2008	162100	166500	102800	105600
2009	156300	161800	99960	103500
2010	155700	160200	98660	101500
2011	154400	157300	96450	98270
2012	151000	153300	92520	93930
2013	147100	148900	89440	90510
2014	142600	144500	85680	86800
2015	138100	139200	83250	83910

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 2015, the nominal human capital per capita increases from 3,203,630 NTD to7,189,600 NTD, an increase of more than 1.2 times; and the real human capital per capita increases from

3,203,630 NTD to 4,443,070 NTD, an increase of approximately 0.4 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 2015, 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, 1985-2015

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 2015, the nominal labor force human capital increases from 30,320 billion NTD to 95,560 billion NTD, an increase of more than 2 times; and the real labor force human capital increases from 30,320 billion NTD to 53,840 billion NTD, an increase of approximately 0.8 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	30320	30440	30320	30440
1986	32270	32400	32050	32180
1987	35100	35240	34680	34810
1988	39980	40140	39000	39160
1989	46340	46530	43290	43470
1990	53370	53640	47880	48120
1991	60270	60590	52180	52460
1992	66830	67210	55390	55710
1993	73090	73490	58840	59170
1994	78530	78890	60740	61020
1995	84370	85160	62950	63540
1996	84430	85230	61110	61690
1997	88640	89630	63580	64290
1998	89810	90920	63350	64130
1999	93170	94470	65610	66520
2000	93930	95300	65330	66280
2001	90520	92250	62960	64160
2002	88520	90490	61690	63060

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)
2003	93020	95170	65010	66510
2004	94880	97110	65250	66790
2005	95900	98030	64480	65910
2006	96870	99460	64740	66460
2007	96760	99950	63520	65610
2008	99680	102800	63210	65220
2009	95560	99200	61130	63460
2010	95450	98730	60470	62550
2011	97100	99640	60660	62240
2012	94090	96320	57660	59030
2013	93830	95740	57050	58210
2014	92020	93880	55290	56410
2015	89320	90840	53840	54750

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 2015, the nominal average labor force human capital increases from 2,878,020 NTD to 6,550,170 NTD, an increase of more than 1.2 times; and the real average labor force human capital increases from 2,878,020 NTD to 3,948,290 NTD, an increase of approximately 0.4 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/renkoupucha /2000pucha/pucha.htm • 2005,http://www.stats.gov.cn/tjsj/ndsj/renkou/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/renkoupucha /2000pucha /pucha.htm • 2005,http://www.stats.gov.cn/tjsj/ndsj/renkou/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.1998-2014*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: 2003-2014	• *Educational Statistics yearbook of China.2003-2014*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 • 1985-2015 Census and Statistics Department of Hong Kong	
Total population	• 1980-2015,Hong Kong *Statistics Yearbook*	It is the resident population.
Enrollment by education level	• 1985-2015,Hong Kong Education Bureau	
Mortality rate by age and sex	• Hong Kong Mortality Table	
Birth by sex	• 1985-2015, Hong Kong *Statistics Yearbook*	
Employment rate by age, sex and education level	• 1985-2015, Hong Kong Census and Statistics Department	
Consumer Price Index (CPI)	• 1981-2015, 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/zhengcehuobisi/631/2012/20120706181352694274852/20120706181352694274852_.html	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 date of 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 2012-2015, 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 2014, the female enrollment data for university and college is available in the statistic yearbooks. The enrollment of 2015 is obtained by using method of line fitting from 2012 to 2014.

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 2015, 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: 2003-2015* to estimate the age distribution (1982-2015) 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 2015.

3.2.1 Estimate the age distribution λ: 2003-2015

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, first, for year 2003, we assume that students in Grade 3 and Grade 4 in junior middle school in the last year have the same age distribution as those of new entrants to senior middle school in this 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). Second, for 2004 and later, 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 2004, the age distribution of new entrants to senior middle school is the same as that of Grades 3 and 4 students in junior middle school in 2003 (Table A.6).

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.7 is the age distribution in rural areas in 2003, Table A.8 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 and 2004 instead.

3.2.2.1 for primary school

1995: use the age distribution of Grade 3 and Grade 4 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 in 2004 instead.

2001: use the age distribution of Grade 3 in junior middle school in 2004 instead.

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: 1985-2015

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 subtracting 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: 1985-2015

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 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 2015, birth rate for each year from 1983 to 2015, national, rural and urban population by age and gender from the population sampling surveys for 1987 and each year from 1989 to 2015.

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 with the sampling weights adjusted, respectively. 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. 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

	Enrollment								
	Total	**Of which: new entrant**	**Of which: female**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**
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	0.003	0.003
11	0.000	0.000
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	0.000	0.000
11	0.036	0.034
12	0.368	0.370
13	0.472	0.473

Age	Male	Female
14	0.098	0.098
15	0.021	0.020
16	0.005	0.004
17	0.000	0.000
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	0.000	0.000
14	0.053	0.055
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 Entrants in Senior Middle School, Rural, 2004

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.7 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	0.000	0.000	0.000	0.000
18					0.018	0.013	0.000	0.000	0.000	0.000
19					0.003	0.002	0.000	0.000	0.000	0.000
20							0.000	0.000	0.000	0.000
21							0.000	0.000	0.000	0.000
22							0.000	0.000	0.000	0.000

Table A.8 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	0.063	0.060	0.063	0.060
18					0.013	0.009	0.406	0.393	0.406	0.393
19					0.002	0.001	0.440	0.438	0.440	0.438
20							0.079	0.091	0.079	0.091
21							0.011	0.015	0.011	0.015
22							0.001	0.002	0.001	0.002

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 = Age–16, if Sch <10

Exp = 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, 2009,

[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.

2011.

(5) We use CHFS to obtain urban and rural parameters for 2010.

(6) We use CFPS to obtain urban and rural parameters for 2010, 2012 and 2014.

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. UHS, CFPS, CHNS, CHIP, CHFS.

Table B.1 shows the distribution of the five 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
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, CHIP 2007 and 2013.

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.

In 2013, it only shows individual's total employment income and household's total disposable income. The employment income includes total wage income or net business 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&1999&2002

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)2007&2013

LEVEL	Sch
Graduate school	18
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

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 recorded in the wage file.

Generally, annual wage income is the months of work 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, and 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

Level	Sch
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

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 1985-2014. 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		
2010				U/R	U/R
2011			U/R		
2012					U/R
2013		U/R			
2014					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	1988.12	842.55	1656.11	702.35
	Sch	10.78	2.93	9.95	2.76
	Exp	20.73	10.87	18.06	9.32
1989	inc	2274.24	1004.89	1905.92	859.41
	Sch	10.93	2.97	10.11	2.69
	Exp	20.91	10.91	18.37	9.30
1990	inc	2500.78	1081.25	2104.96	918.86
	Sch	11.10	2.93	10.29	2.70
	Exp	21.26	10.77	18.59	9.27
1991	inc	2744.04	1161.50	2336.45	1002.57
	Sch	11.27	2.95	10.50	2.65
	Exp	20.74	10.50	18.28	9.00
1992	inc	3227.00	1682.20	2715.65	1298.94
	Sch	11.41	2.76	10.72	2.56
	Exp	21.05	10.55	18.69	9.00
1993	inc	3903.40	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	4493.44	2948.74
	Sch	11.51	2.77	10.93	2.49
	Exp	21.25	10.54	18.96	9.07
1995	inc	6690.14	4181.73	5578.44	3474.40
	Sch	11.61	2.72	10.97	2.48
	Exp	21.49	10.26	19.23	8.94

	inc	7381.06	5035.56	6172.46	4422.40
1996	Sch	11.64	2.69	11.07	2.43
	Exp	21.80	10.28	19.58	8.96
	inc	8554.39	6037.77	7107.18	5311.87
1997	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**			
Year	**Variables**	**Male**		**Female**		**Male**		**Female**	
		Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
	inc	1791.00	2276.34	1533.43	1853.47	1461.48	1559.38	1201.15	1228.54
1989	Sch	8.71	4.12	8.09	4.20	6.33	4.03	4.60	4.32
	Exp	19.45	11.83	17.49	10.44	18.20	11.37	16.83	10.29
	inc	2045.60	1422.36	1671.63	1132.50	1490.34	1494.89	1236.42	1164.49
1991	Sch	8.99	4.01	8.29	4.12	6.69	3.91	4.91	4.31
	Exp	20.41	11.64	17.82	10.08	18.97	11.59	17.38	10.31
	inc	3134.82	2964.40	2788.02	3778.16	2121.92	2156.36	1761.58	1802.64
1993	Sch	9.38	3.69	8.69	3.86	7.11	3.70	5.33	4.27
	Exp	21.12	11.18	18.69	9.64	19.63	11.50	18.34	10.24
	inc	7025.26	6122.51	5792.59	5397.44	4600.88	4451.26	3545.55	3435.83
1997	Sch	10.09	3.33	9.54	3.51	7.34	3.53	5.58	4.16
	Exp	21.87	10.74	19.00	9.40	21.08	11.56	19.85	10.47
	inc	9760.32	10325.85	7897.94	7407.23	5508.20	5787.25	4044.92	3785.20
2000	Sch	10.78	3.23	10.39	3.38	7.98	3.24	6.44	4.07
	Exp	22.39	10.59	20.26	9.55	21.93	11.56	20.99	10.39
	inc	13541.8	12739.86	11251.07	9855.11	7358.49	7880.15	5308.34	6180.02
2004	Sch	10.93	3.04	10.51	3.15	8.31	3.15	6.80	3.99
	Exp	25.41	10.17	23.30	9.40	25.70	10.98	23.79	9.56

2006	inc	18792.1	26490.01	13956.96	15775.01	10539.10	10510.90	7085.33	7591.08
	Sch	11.27	3.15	10.99	3.32	8.40	3.57	6.92	4.22
	Exp	26.09	9.82	24.09	9.35	26.39	10.77	24.46	9.27
2009	inc	28743.6	40840.80	20239.06	32595.36	15538.62	15253.97	11833.96	11484.78
	Sch	11.18	3.07	11.02	3.27	8.40	3.27	7.35	4.00
	Exp	26.86	10.25	24.09	9.67	26.79	10.84	24.61	9.44
2011	inc	36485.3	36499.09	31295.38	32538.66	22789.02	21888.71	16994.48	16362.40
	Sch	12.16	3.39	12.22	3.57	8.75	3.48	7.79	4.00
	Exp	25.67	11.22	22.27	10.35	27.51	10.70	25.23	9.30

Table B.1.3 Summary Statistics: CHIP samples

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1988	inc	1935.97	944.34	1641.99	942.49	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	5530.94	3041.86	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				
	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	34402.12	31291.25	24608.49	24986.65	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	20.82	10.93	22.40	12.78	19.42	11.35
2013	inc	45240.05	34012.79	35317.5	24618.97	23186.10	18911.58	21586.40	17782.74
	Sch	12.64	3.07	12.85	3.06	9.36	2.43	8.98	2.78
	Exp	21.92	10.89	18.71	9.59	22.95	12.16	21.71	11.37

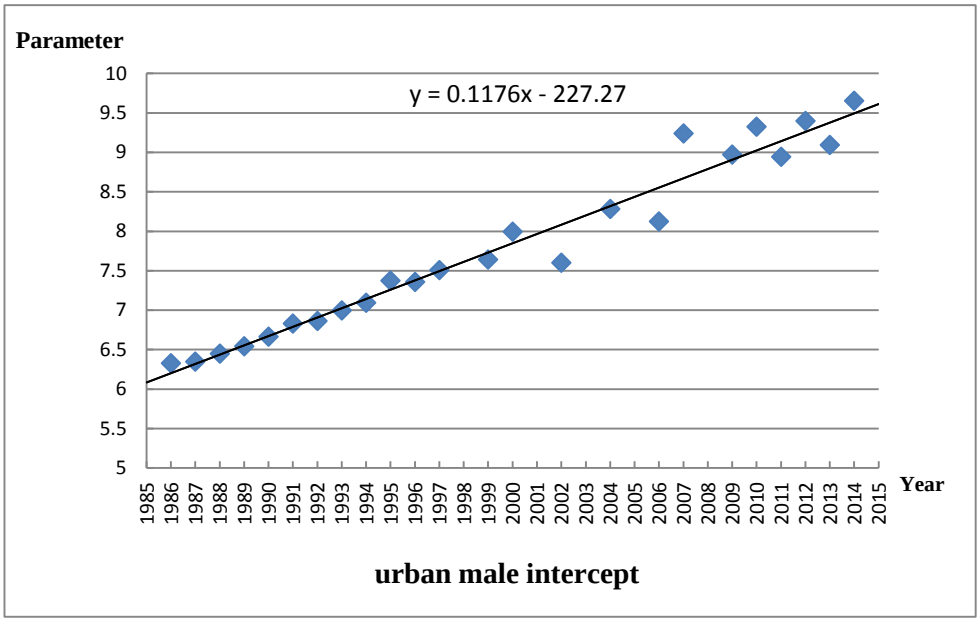
Table B.1.4 Summary Statistics: CFPS samples

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2010	inc	31650.26	32077.30	23658.67	20316.85	12390.06	14043.94	7661.73	9338.17
	Sch	11.15	3.77	11.39	3.95	6.82	4.14	5.03	4.45
	Exp	21.53	11.35	17.75	9.99	25.58	11.12	23.57	9.53
2012	inc	33584.09	32654.54	24534.76	23210.04	20030.26	18640.25	11976.83	12906.42
	Sch	10.55	3.70	10.88	3.87	8.21	3.67	6.48	4.47
	Exp	22.24	11.67	19.12	10.31	23.55	12.04	22.18	10.45
2014	inc	38924.03	29346.79	29402.67	29325.93	22462.92	21722.99	14021.59	15319.39
	Sch	10.52	4.01	10.74	4.17	7.27	4.22	5.76	4.71
	Exp	22.27	12.22	20.38	10.96	24.10	12.07	23.11	10.57

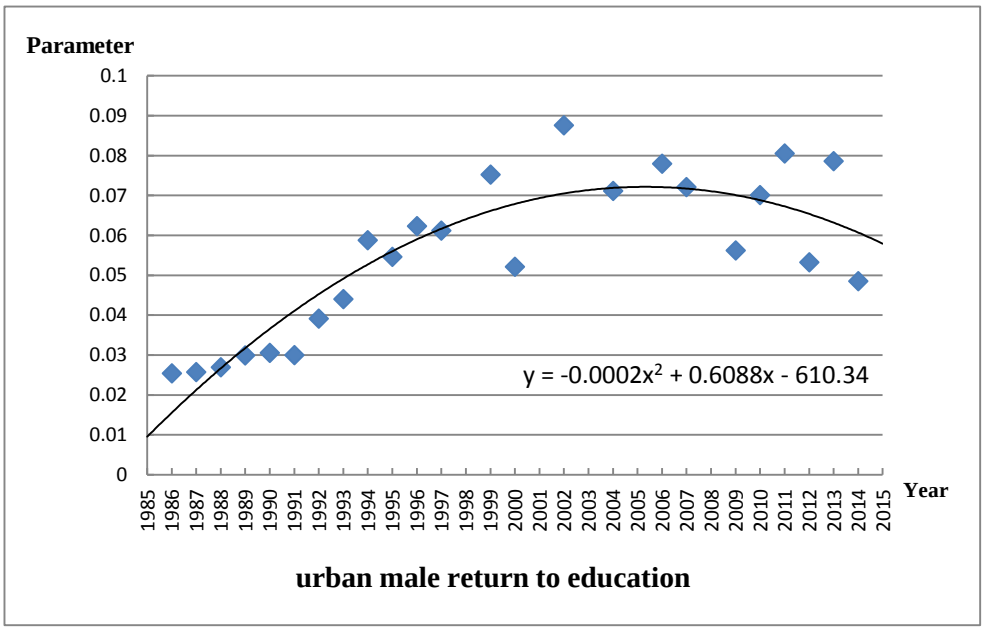
Table B.1.5 Summary Statistics: CHFS samples

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

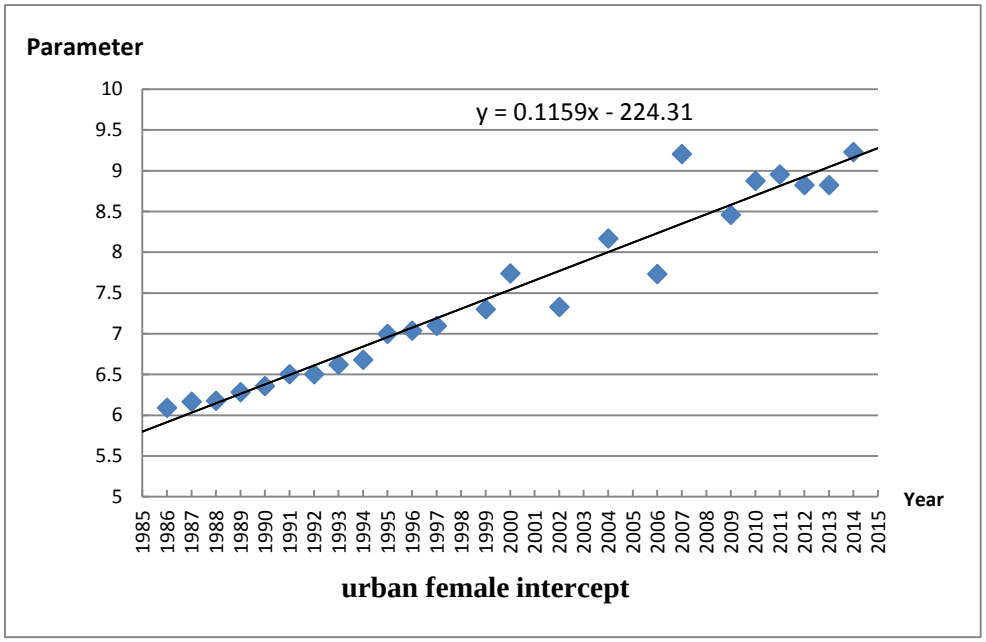
Figures B.1-B.4 Parameter Estimates Against Time: Urban sample



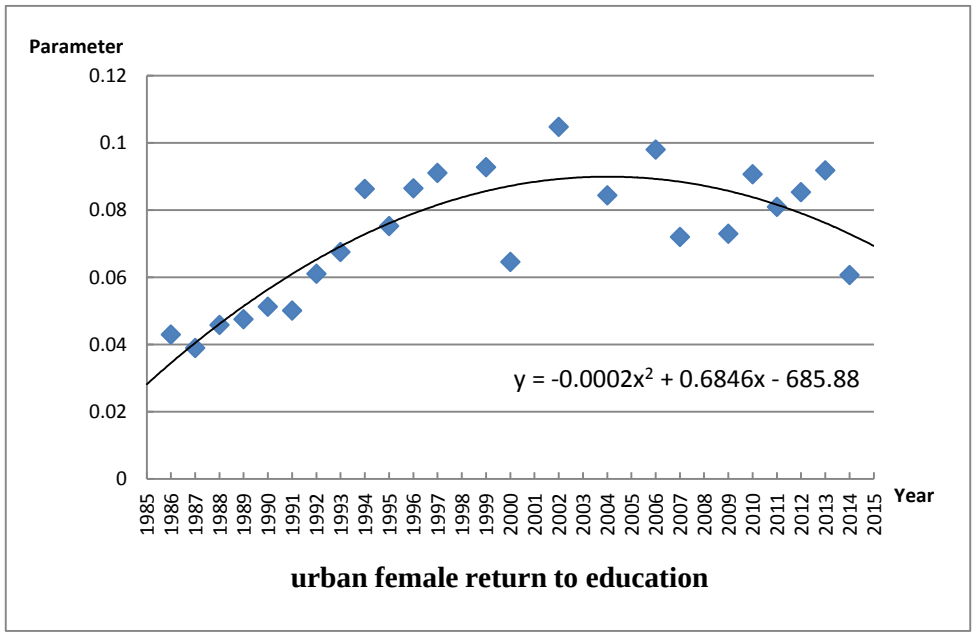
urban male intercept



urban male return to education

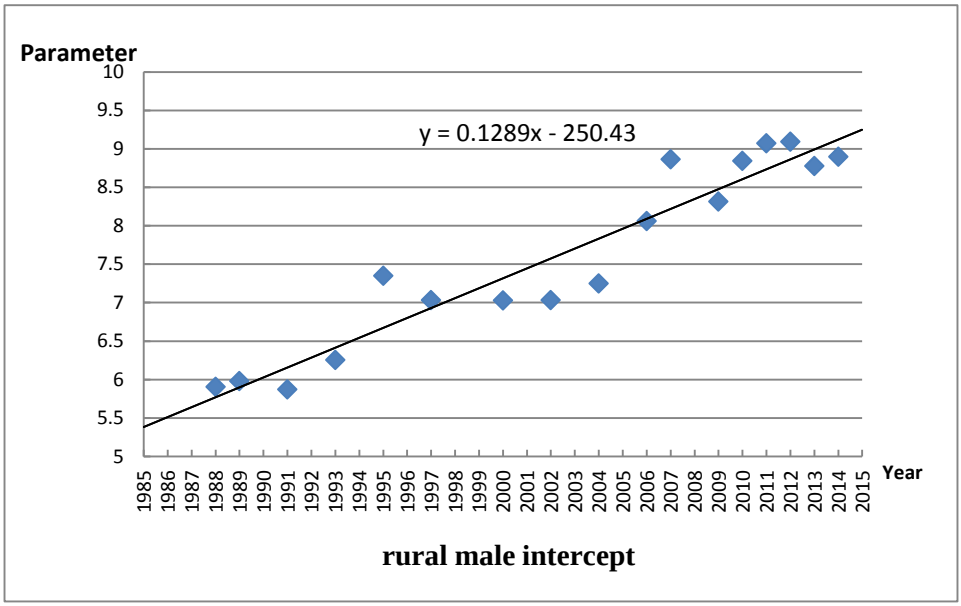


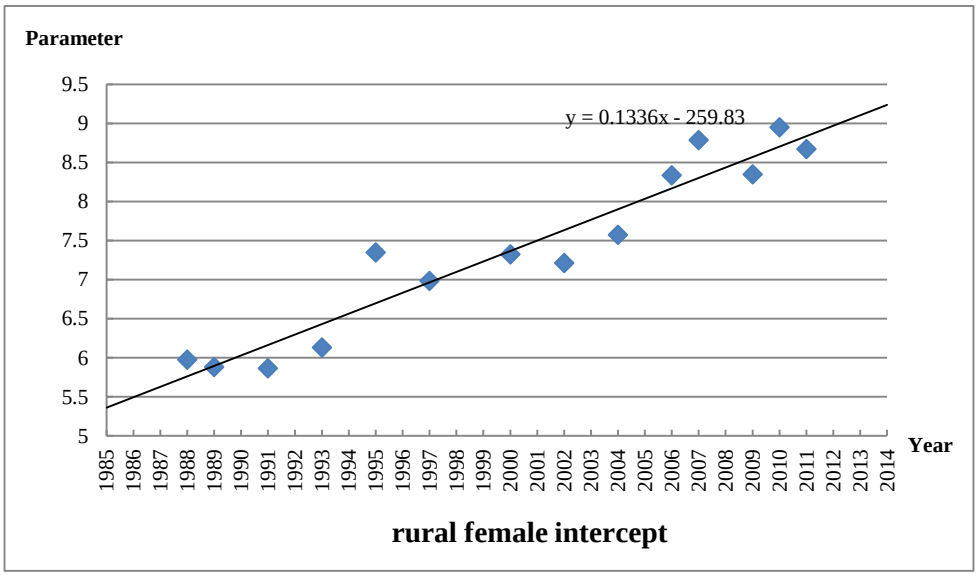
urban female intercept

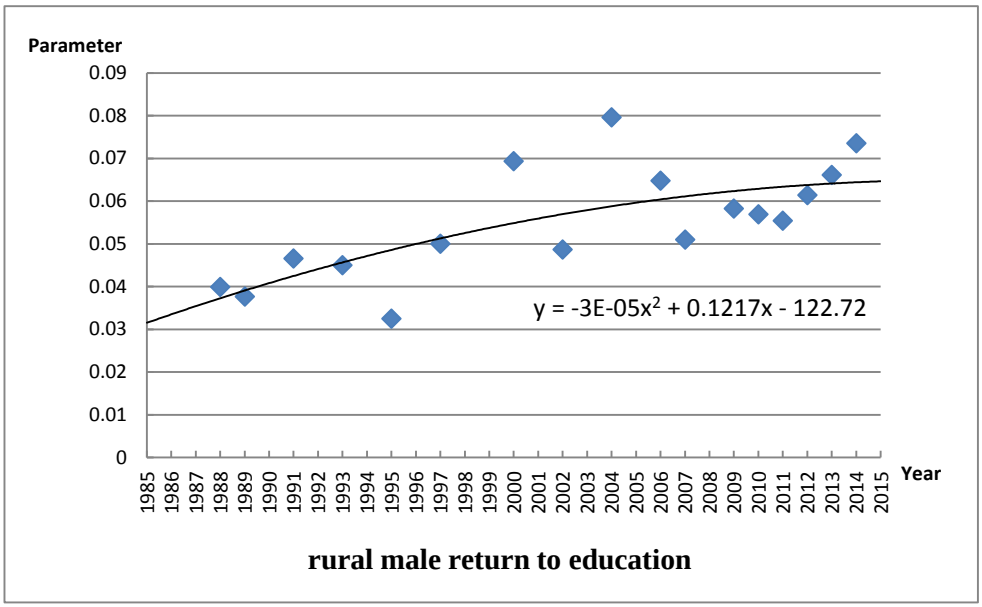


urban female return to education

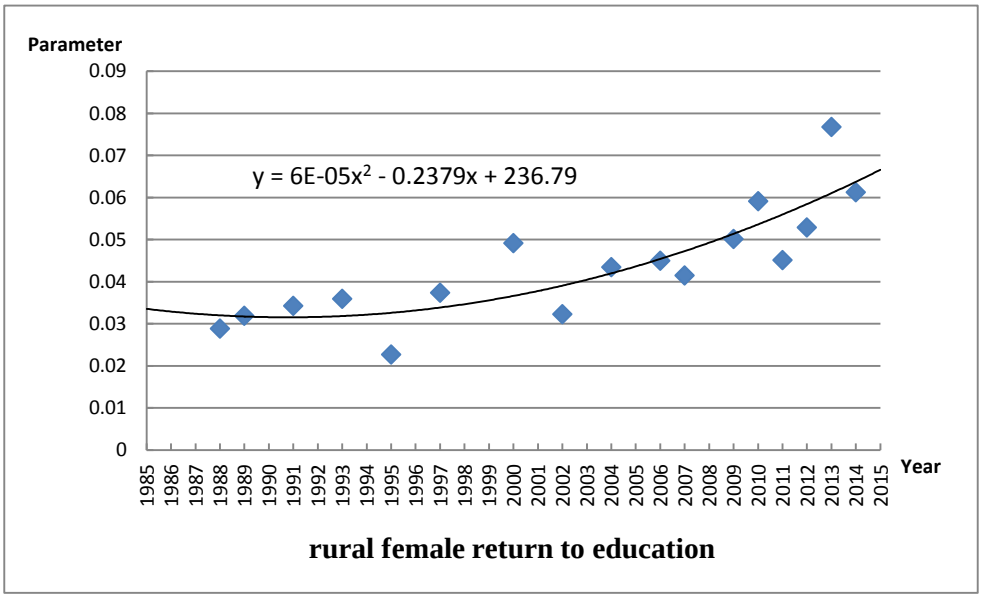
Figures B.5-B.8 Parameter Estimates Against Time: Rural Samples







rural male return to education



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 2015 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 2015. s indicates sex equaling to one and two for males and females, respectively. a indicates age ranging from 0 to 60 years. e indicates the levels of education classified into five categories for years 1985-2015 including no schooling(ns), primary school(pri), junior middle school(jm), senior middle school(sm), and college(col). For years 2000-2015, 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): cumulative 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 exp^2 by OLS.

$$\ln \text{yinc} = \alpha + \beta s + \gamma \exp + \delta \exp^2 + \text{u}$$

We use the fitted value of ln yinc from the equation above to obtain $\text{m}_\text{i} = e^{\ln \text{yinc}}$. 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= $\alpha \times e^{\ln \text{yinc}}$.

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	
2000-2015	0	6	9	12	15	16

(2) Coding of work experience:

For people younger than age 16, working experience is: *exp*=0;

For people older than age 16, if s<10, working experience is: *exp=age*-6;

For people older than age 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 $\text{yinc}_{y,s,a,e} = \text{whrs}_{y,s,a,e} \times \text{com}_{y,s,a,e}$.

According to

[1] Jeffrey M. Wooldridge (2005), Introductory Econometrics: A Modern Approach, 3rd edition.

$$mhrs_{y,s,a,e}=whrs_{y,s,a,e}\times empr_{y,s,a,e}\ ,\quad ymi_{y,s,a,e}=whrs_{y,s,a,e}\times empr_{y,s,a,e}\times com_{y,s,a,e}$$

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 educational for individuals older than 16, we use the data from census years of 1987, 1995, 2000, 2005 and 2010 and replace middle years' employment rates by the average of these years.

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 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"
The employed by age group, sex and education in 2005	"China Population and Employment Statistics Yearbook 2006"
The employed by age group, sex and education in 2010	"China Population and Employment Statistics Yearbook 2011"
Population by age, sex and education in 2010	"China Population Census 2011"

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 9.5%. To divide the age group data in 2005 and 2010 we assume that the employment rate in each age in the same age group has the same increasing rate. For example , the employment rate of a 25-year-old individual in 2005 equals to the employment rate of a 25-year-old individual in 2000 times the growth rate of the employment rate of the individual's corresponding age group (25-29) between 2000 and 2005.

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 $\lambda(y,s,a,e)$ 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:

pop_inschool(y,s,a,e-n)= 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, 1985-2015, growth rate on average is 6.10% and 8.60% 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: $senr(y,s,a,jm\text{-}pri)*mi(y,s,a+6,jm)*R^6$

(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: $senr(y,s,a,jm\text{-}pri\text{-}1)*mi(y,s,a+5,jm)*R^5$, 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: $senr(y,s,a,sm\text{-}jm)*mi(y,s,a+3,sm)*R^3$

(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:

$senr(y,s,a,sm\text{-}jm\text{-}1)*mi(y,s,a+2,sm)*R^2$, 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:

$senr(y,s,a,col\text{-}sm)*mi(y,s,a+3,col)*R^3$

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:

$$\text{pop\_inschool(y,s,a,e)} = \sum_{n=0}^{y(e)} \text{pop\_inschool}(y, s, a, e)$$

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: 1985-2015

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. Tables C.5-C.8 show the labor force human capital.

In tables C.2、C.4、C.6、C.8, we report the results based on six education categories from 1985-2015. Due to data reasons, originally when we do imputation we don't differentiate college and university before 2000, and when we do human capital calculation we separate college and university before 2000 by using China Population Census 1990 and 2000. 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 in all provinces. We also assume that the ratio of university to college enrollment is the same across gender.

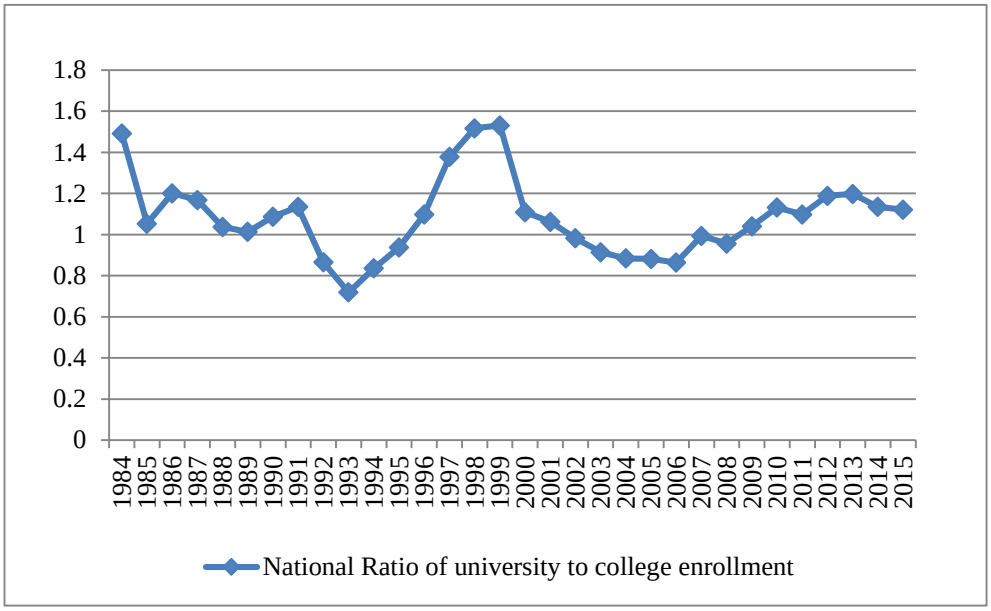


Figure C.7.1 National Ratio of university to college enrollment, 1984-2015

Tables and figures of appendix C

Table C.1 Real Human Capital by Region and Gender, 1985-2015

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	12343	6266	9484	11373
1986	13548	6919	10842	11552
1987	14482	7508	12372	11808
1988	14257	7523	12730	11022
1989	14532	7775	12746	10118
1990	17064	9218	14713	10671
1991	18690	10284	16913	11354
1992	19972	11061	18912	11781
1993	19903	11231	19410	11301
1994	18203	10335	18236	9983

Year	Urban Male	Urban Female	Rural Male	Rural Female
1995	17683	10098	17789	9319
1996	19924	11332	18446	9146
1997	23377	13320	19922	9429
1998	28064	15898	22203	10071
1999	33617	19339	24720	10788
2000	39168	22427	26995	11529
2001	44507	25546	28849	12228
2002	50176	28781	30731	12957
2003	57962	32609	32043	13495
2004	63039	35344	32170	13719
2005	69592	39089	32771	14490
2006	79169	43338	34489	15562
2007	87367	47848	34453	16211
2008	94587	51467	33744	16816
2009	109057	58316	35422	18606
2010	119752	63448	35242	19788
2011	131433	69600	33906	20525
2012	144486	76545	33658	21983
2013	164561	86103	33029	23419
2014	181831	93641	32815	25278
2015	201433	102152	32553	27570

Note: The results are based on five education categories.

Table C.2 Real Human Capital by Region and Gender, 1985-2015

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	12330	6268	9484	11373
1986	13542	6923	10842	11552
1987	14484	7514	12372	11808
1988	14263	7538	12730	11022

Year	Urban Male	Urban Female	Rural Male	Rural Female
1989	14549	7791	12746	10118
1990	17092	9243	14713	10671
1991	18732	10320	16913	11354
1992	20031	11108	18913	11781
1993	19978	11286	19411	11301
1994	18287	10395	18237	9983
1995	17779	10163	17790	9319
1996	20071	11436	18446	9146
1997	23600	13470	19923	9429
1998	28376	16112	22204	10071
1999	34056	19664	24722	10788
2000	39708	22948	26997	11530
2001	45246	26269	28852	12229
2002	51217	29723	30735	12958
2003	59356	33833	32048	13497
2004	64725	36874	32176	13721
2005	71389	40865	32778	14493
2006	81469	45547	34502	15568
2007	90109	50480	34472	16221
2008	97660	54584	33772	16832
2009	112857	62174	35462	18631
2010	124184	67954	35294	19824
2011	136140	74572	33956	20563
2012	149617	82095	33710	22025
2013	170327	92323	33082	23465
2014	188016	100273	32869	25330
2015	208098	109247	32606	27627

Note: The results are based on six education categories.

Table C.3 Per Capita Real Human Capital by Region and Gender, 1985-2015

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	106.10	62.76	24.93	32.93
1986	111.93	66.60	28.48	33.40
1987	115.49	69.57	32.50	34.06
1988	108.37	66.47	33.06	31.58
1989	105.71	65.83	32.73	28.79
1990	118.76	74.97	37.33	30.18
1991	127.44	80.67	42.79	31.97
1992	132.97	84.22	47.71	33.06
1993	130.41	82.96	48.87	31.58
1994	117.35	74.24	45.79	27.79
1995	112.31	70.58	44.59	25.84
1996	117.86	73.83	46.97	25.88
1997	129.57	81.20	51.84	27.34
1998	146.58	91.69	58.95	29.90
1999	165.84	105.86	66.92	32.84
2000	182.42	116.77	74.42	35.88
2001	198.91	126.37	81.72	38.96
2002	215.29	135.93	89.59	42.37
2003	240.43	147.64	96.33	45.35
2004	253.42	154.73	99.90	47.49
2005	271.92	165.91	105.38	51.75
2006	297.03	178.30	112.29	56.70
2007	316.45	190.43	113.79	60.46
2008	331.04	199.58	112.96	64.03
2009	369.36	221.54	120.38	72.42
2010	392.86	235.62	121.32	78.56
2011	418.16	251.38	119.32	83.61
2012	448.03	270.08	121.45	92.03

Year	Urban Male	Urban Female	Rural Male	Rural Female
2013	498.07	296.82	122.14	100.53
2014	537.37	314.48	124.50	110.79
2015	581.84	335.15	126.65	123.57

Note: The results are based on five education categories.

Table C.4 Per Capita Real Human Capital by Region and Gender, 1985-2015

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	105.99	62.77	24.93	32.93
1986	111.88	66.64	28.48	33.40
1987	115.49	69.64	32.50	34.06
1988	108.43	66.60	33.06	31.58
1989	105.83	65.97	32.73	28.79
1990	118.96	75.18	37.33	30.18
1991	127.72	80.95	42.79	31.97
1992	133.36	84.59	47.71	33.06
1993	130.90	83.37	48.87	31.58
1994	117.88	74.67	45.79	27.79
1995	112.91	71.04	44.59	25.84
1996	118.72	74.51	46.98	25.89
1997	130.76	82.15	51.84	27.34
1998	148.17	92.95	58.95	29.90
1999	167.97	107.66	66.93	32.84
2000	185.21	119.30	74.42	35.89
2001	202.43	129.81	81.73	38.97

Year	Urban Male	Urban Female	Rural Male	Rural Female
2002	219.85	140.32	89.60	42.37
2003	246.15	153.23	96.34	45.36
2004	260.20	161.43	99.91	47.50
2005	278.94	173.44	105.41	51.75
2006	305.66	187.39	112.33	56.72
2007	326.38	200.90	113.85	60.50
2008	341.80	211.67	113.06	64.09
2009	382.23	236.20	120.52	72.52
2010	407.40	252.35	121.50	78.71
2011	433.14	269.33	119.50	83.77
2012	463.94	289.67	121.64	92.21
2013	515.52	318.26	122.34	100.73
2014	555.65	336.75	124.70	111.02
2015	601.10	358.43	126.86	123.83

Note: The results are based on six education categories.

Table C.5 Real Labor Force Human Capital by Region and Gender, 1985-2015

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	4974	2392	3862	4676
1986	5502	2689	4512	4844
1987	6062	3003	5249	5028
1988	5959	2988	5613	4827
1989	6084	3084	5798	4524
1990	7268	3669	6795	4819
1991	7812	4062	7971	5235
1992	7981	4252	9018	5520

Year	Urban Male	Urban Female	Rural Male	Rural Female
1993	7623	4175	9278	5321
1994	6854	3811	8697	4701
1995	6646	3731	8485	4371
1996	7306	4038	8885	4310
1997	8500	4656	9752	4491
1998	10332	5599	11075	4868
1999	12728	6824	12418	5235
2000	15591	8129	13632	5575
2001	16867	8871	14343	5845
2002	18267	9703	15287	6249
2003	20366	10844	16024	6639
2004	22137	11706	15910	6722
2005	25255	13441	16179	7086
2006	28049	14438	17569	7802
2007	30574	15884	18167	8416
2008	33671	17279	18200	8900
2009	41336	20547	19385	10008
2010	48130	23614	19404	10736
2011	50442	24609	18825	11252
2012	53399	25995	18812	12135
2013	59252	28424	18723	13134
2014	65989	31159	18674	14335
2015	73369	34130	18352	15592

Note: The results are based on five education categories.

Table C.6 Real Labor Force Human Capital by Region and Gender, 1985-2015

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	4965	2392	3862	4676
1986	5488	2687	4512	4844
1987	6046	2998	5249	5028
1988	5941	2989	5613	4827
1989	6071	3080	5798	4524
1990	7247	3664	6795	4819
1991	7790	4059	7971	5235
1992	7969	4250	9018	5520
1993	7611	4173	9279	5321
1994	6845	3810	8697	4701
1995	6642	3731	8485	4371
1996	7302	4044	8886	4310
1997	8513	4661	9752	4491
1998	10351	5604	11076	4869
1999	12753	6839	12420	5235
2000	15327	8080	13635	5575
2001	16687	8854	14346	5846
2002	18185	9714	15291	6250
2003	20381	10858	16028	6641
2004	22379	11881	15916	6724
2005	25538	13659	16186	7089
2006	28427	14735	17581	7808
2007	31042	16254	18186	8425
2008	34250	17747	18228	8915
2009	42128	21190	19425	10033
2010	49148	24441	19456	10772
2011	51551	25513	18876	11289
2012	54642	27025	18864	12176

2013	60663	29595	18776	13180
2014	67545	32460	18728	14386
2015	75119	35617	18405	15648

Note: The results are based on six education categories.

Table C.7 Per Capita Real Labor Force Human Capital by Region and Gender, 1985-2015

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	66.72	37.29	17.65	23.60
1986	70.38	39.77	20.41	24.06
1987	73.39	41.84	23.56	24.63
1988	68.08	39.35	24.24	22.98
1989	65.90	38.69	24.23	21.05
1990	74.32	43.82	27.77	22.12
1991	78.14	46.49	31.93	23.45
1992	79.01	47.27	35.53	24.20
1993	75.09	45.28	36.24	23.01
1994	66.62	40.13	33.82	20.13
1995	63.42	38.07	32.93	18.59
1996	65.39	38.96	34.83	18.62
1997	71.34	42.32	38.66	19.72
1998	80.99	47.70	44.22	21.64
1999	92.11	54.05	50.12	23.72
2000	103.81	59.86	55.72	25.76
2001	109.58	62.84	60.45	27.59
2002	115.42	66.15	65.75	29.86
2003	125.37	71.25	70.10	32.02
2004	131.76	74.11	71.69	33.16
2005	144.01	81.36	75.56	35.98
2006	155.16	86.29	81.88	40.01
2007	164.46	93.11	84.41	43.57

Year	Urban Male	Urban Female	Rural Male	Rural Female
2008	173.95	98.92	84.84	46.73
2009	202.01	113.58	90.99	53.43
2010	222.98	125.38	92.11	58.47
2011	232.46	130.41	91.13	62.70
2012	243.86	137.02	93.36	69.43
2013	267.36	148.48	94.81	76.63
2014	291.75	158.93	96.96	85.10
2015	318.49	170.79	98.09	94.81

Note: The results are based on five education categories.

Table C.8 Per Capita Real Labor Force Human Capital by Region and Gender, 1985-2015

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	66.69	37.31	17.65	23.60
1986	70.32	39.77	20.41	24.06
1987	73.33	41.82	23.56	24.63
1988	68.02	39.38	24.24	22.98
1989	65.87	38.69	24.23	21.05
1990	74.25	43.80	27.77	22.12
1991	78.08	46.50	31.93	23.45
1992	79.02	47.30	35.53	24.20
1993	75.10	45.30	36.24	23.01
1994	66.64	40.16	33.83	20.13
1995	63.48	38.11	32.94	18.59
1996	65.48	39.06	34.83	18.62
1997	75.66	43.72	38.70	19.73
1998	85.97	49.34	44.29	21.65

Year	Urban Male	Urban Female	Rural Male	Rural Female
1999	97.95	56.08	50.19	23.74
2000	102.67	59.54	55.73	25.76
2001	108.95	62.79	60.46	27.60
2002	115.40	66.37	65.77	29.86
2003	125.89	71.58	70.12	32.02
2004	133.20	75.21	71.72	33.17
2005	145.62	82.68	75.59	36.00
2006	157.25	88.06	81.94	40.03
2007	166.98	95.28	84.50	43.62
2008	176.94	101.59	84.97	46.81
2009	205.88	117.13	91.18	53.57
2010	227.69	129.77	92.35	58.66
2011	237.57	135.20	91.38	62.91
2012	249.53	142.46	93.61	69.67
2013	273.73	154.59	95.07	76.90
2014	298.63	165.57	97.24	85.40
2015	326.09	178.23	98.38	95.15

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 of 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 are 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

$$\text{Chongqing GFCF} = \frac{Sichuan\ GFCF}{\text{Sichuan GCF}} * Chongqing\ GCF \qquad (1)$$

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

$$W_{1952} = \frac{GFCF_{1953}}{\delta+\theta} - GFCF_{1953} \quad (2)$$

$GFCF_{1953}$ 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

$$g_n = (1 - \delta)^n \qquad (3)$$

Where n denotes age and δdenotes 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

$$g_n = \frac{(T-n)}{(T-b*n)} \quad (4)$$

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:

$$T_t = \prod_{i=1}^{3} Z_{it}^{(Share_{it}+Share_{it-1})/2} \quad (5)$$

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:

$$. \qquad Share_{it} = U_{it} / \sum_{i=1}^{3} U_{it} \quad (6)$$

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:

$$. \qquad U_{it} = \left(\delta_{it} + r_t - \frac{q_{it}-q_{it-1}}{q_{it}}\right) * q_{it} K_{it}^{P} \quad (7)$$

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.,

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:

$$U_t = \sum_{i=1}^{3} U_{it} = \sum_{i=1}^{3} \left(\delta_{it} + r_t - \frac{q_{it} - q_{it-1}}{q_{it}}\right) * q_{it} K_{it}^{P} \quad (8)$$

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, 1985-2015（hyperbolic）

Unit: 100 millions of 1985 Yuan

Province	1985	1990	1995	2000	2005	2015
Beijing	51	116	228	436	862	2592
Tianjin	38	67	115	202	376	2119
Hebei	95	147	244	483	870	3549
Shanxi	54	80	109	167	308	1400
Inner Mongolia	31	50	92	150	390	2989
Liaoning	102	163	253	358	628	2658
Jilin	40	63	99	151	275	1846
Heilongjiang	68	106	151	240	381	1469
Shanghai	71	132	253	502	850	2102
Jiangsu	99	220	481	954	1914	7559
Zhejiang	15	31	151	448	1097	3811
Anhui	46	80	130	222	382	1620
Fujian	31	50	93	196	363	1670
Jiangxi	43	64	104	180	371	1514
Shandong	122	213	351	618	1243	5102
Henan	99	162	259	478	892	5188
Hubei	70	106	176	352	615	2589
Hunan	48	73	103	165	284	1307
Guangdong	94	163	388	811	1592	6074
Guangxi	45	57	87	144	258	1619
Hainan	8	17	41	61	92	352
Chongqing	47	61	96	180	389	1627
Sichuan	73	109	160	283	517	1983
Guizhou	29	40	53	86	164	676
Yunnan	75	89	135	215	345	1575
Tibet	8	10	15	20	40	206
Shaanxi	41	70	99	149	257	1246

Province	1985	1990	1995	2000	2005	2015
Gansu	34	51	63	90	161	593
Qinghai	14	20	27	48	97	514
Ningxia	13	19	25	34	65	355
Xinjiang	32	52	103	172	298	1185
National	**2082**	**3237**	**5268**	**8781**	**15570**	**56053**

Table D.2 Wealth Capital Stock at Constant Prices, 1985-2015（geometric）

Unit: 100 millions of 1985 Yuan

Province	1985	1990	1995	2000	2005	2015
Beijing	43	98	192	363	720	2112
Tianjin	31	55	95	166	312	1790
Hebei	76	118	199	401	721	2946
Shanxi	43	64	87	134	255	1169
Inner Mongolia	25	40	76	122	336	2526
Liaoning	79	131	206	288	520	2192
Jilin	32	51	80	122	228	1538
Heilongjiang	56	86	122	194	309	1223
Shanghai	59	109	212	417	697	1686
Jiangsu	83	186	407	797	1602	6213
Zhejiang	12	26	136	388	940	3127
Anhui	37	66	107	182	315	1355
Fujian	25	41	78	165	302	1398
Jiangxi	34	51	85	148	311	1246
Shandong	100	175	286	508	1038	4220
Henan	80	131	211	395	742	4367
Hubei	56	85	144	293	508	2172
Hunan	39	58	82	133	233	1093
Guangdong	78	134	331	684	1333	5045
Guangxi	35	44	70	119	215	1365
Hainan	6	14	35	50	74	296
Chongqing	36	47	77	149	329	1361

Province	1985	1990	1995	2000	2005	2015
Sichuan	60	88	128	232	427	1645
Guizhou	23	32	42	70	135	570
Yunnan	56	68	109	176	283	1345
Tibet	6	8	12	16	33	176
Shaanxi	33	57	79	119	210	1046
Gansu	27	40	49	72	132	495
Qinghai	11	16	21	39	81	441
Ningxia	11	15	19	27	54	301
Xinjiang	26	42	86	141	245	997
National	**1672**	**2604**	**4290**	**7165**	**12825**	**46314**

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