Human Capital in China
2021

Principal Investigator

Haizheng Li

China Center for Human Capital and Labor Market Research

Central University of Finance and Economics

Beijing, China

December 2021

This project is funded by

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)

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Faculty Team Members

Belton Fleisher

Special-term Professor and Senior Fellow, CHLR (2008-present)

Professor Emeritus of Economics, Ohio State University

Editor, *China Economic Review*

Barbara Fraumeni

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Professor Emerita of Public Policy, University of Southern Maine

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Special-term Professor, CHLR (2008- present)

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Special-term Professor, CHLR (2008- present)

Associate Professor of Economics, University of Hawaii at Manoa

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Associate Professor, CHLR (2012- present)

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Associate Professor, CHLR (2013- present)

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Assistant Professor, CHLR (2015- present)

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Chen Huang	Assistant Professor, CHLR (2019- present)
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Yi Zhang	Assistant Professor, CHLR (2020-present)

2021 Student Team

Project Management Committee

Manager	Hao Zhong
Members	Xiaoxue Chang, Xinwei Guo, Zhebin Zhang

Graduate Students, CHLR

Yifan Chen, Jingfei Gao, Li He, Lingyan Hu, Xiaofei Jin,
Zengxiu Kang, Wenbo Li, Yi Li, Hongyu Lin, Yaxin Ou,
Qi Shao, Xu Wang, Chunxiao Zhang, Lianfeng Zhang,
Meilian Zhang

Doctoral and postdoctoral students participating in the project:

Mingyu Ma	Doctoral Student, CHLR (2019- present)
Xin Li	Doctoral Student, CHLR (2019- present)
Yiting Xu	Doctoral Student, CHLR (2018- present)
Yan Su	Doctoral Student, CHLR (2017- present)

Administrative Members at the CHLR

Rong Huang	Executive Assistant to Director/Project Coordinator (2015- present)
Shujia Zhao	Project Coordinator (2018- present)

2020 Student Team

Project Management Committee

  Manager   Chaoqi Wang

  Members   Lingyan Shi, Yiting Xu, Hanjun Wang

Graduate Students, CHLR

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                    Xiaoyu Xiang, Ziru Wang, Hao Zhong, Wei Zhang, Zhebin Zhang

2019 Student Team

Project Management Committee

Manager   Mingyu Ma

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Graduate Students, CHLR

                    Xian Dong, Yue Du, Xiaoxuan He, Huan Liu, Lingyan Shi,

                    Yabing Tang, Chaoqi Wang, Hanjun Wang, Guangyin Wen,

                    Heng Xu, Hongyu Yang

2018 Student Team

Project Management Committee

Manager   Shuning Yuan

Members   Ce Guo, Jiantao Ma

Graduate Students, CHLR

                    Siyao Dai, Lingxiao Huang, Xin Li, Junjian Liu, Mingyu

                    Ma, Xinli Xu, Zeshen Ye, Xin Zhang, Yong Zhang

2017 Student Team

Project Management Committee

Manager   Yue Sun

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Kun Yi, Shuning Yuan, Ping Zhang,

2016 Student Team

Project Management Committee

Manager   Liyuan Ma

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Hongbin Pan, Yue Sun, Huiying Wang, Yi Yang,

Kanran Yin, Yisi Zeng, Qiuyue Zhang,

2015 Student Team

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Manager   Xiang Zheng

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Bing Yan, Yangyang Zheng,

Graduate Students, CHLR

Bing Wang, Jiapeng Dong, Wang Li, Xiang Wang, Shuli Shen,

Jingyi Zhang, Zhiying Bian, Miaomiao Mo, Ni Zeng

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Project Management Committee

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

Graduate Students, CHLR

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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 Student Team

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Members   Tingting Ding, Junzi He, Bo Li

Graduate Students, CHLR

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 Student Team

Project Management Committee

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

Graduate Students, CHLR

Tingting Ding, Junzi He, Junfeng Li, Tianjing Li, Shirui Wang,

Wenbo Wu

2011 Student Team

Graduate Students, CHLR

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

Biao Luo, Lina Zhai, Li Zhang

2010 Student Team

Graduate Students, CHLR

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

Lin Ding, Hongling Wang, Qiujie Wu, Xiaomin Yan

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

2009 Student Team

Graduate Students, CHLR

Huajuan Chen, Yuhua Dong, Mengxin Du, Jinquan Gong,

Jingjing Jiang, Rui Jiang, Qian Li, Sen Li,

Chen Qiu, Xinping Tian, Mo Yang

Former Faculty Team Members：

Shan Li	Associate Professor, CHLR (2016-2020)
Li Yu	Associate Professor, CHLR (2010-2018)
Fang Xia	Assistant Professor, CHLR (2013-2016)
Kang-Hung Chang	Associate Professor, CHLR (2009-2015)
Chun-Wing Tse	Assistant Professor, CHLR (2012-2015)
Ake Blomqvist	Special-term Professor, CHLR (2009-2011)
Song Gao	Assistant Professor, China Academy of Public Finance and Public Policy, CUFE (2009-2010)

Former doctoral and postdoctoral students participated in this project：

Xing Chen	Doctoral Student, CHLR (2015-2020)
Yuzhe Ning	Doctoral Student, CHLR (2015-2020)
Dazhi Guo	Doctoral Student, CHLR (2012-2017)
Yuefang Qiu	Doctoral Student, CHLR (2012-2017)
Junzi He	Doctoral Student, CHLR (2013-2017)
Yue Sun	Doctoral Student, CHLR (2013-2017)
Tang Tang	Doctoral Student, CHLR (2012-2016)
Bo Li	Doctoral Student, CHLR (2011-2014)
Na Jia	Doctoral Student, CHLR (2010-2013)
Yunling Liang	Doctoral Student, CHLR (2009-2012)

Qinyi Liu	Doctoral Student, Hunan University (2011-2014), Georgia Institute of Technology (2014-2018)
Xiaobei Zhang	Doctoral Student, Hunan University (2010-2013)
Zhiyong Liu	Post-doctoral fellow, CHLR (2011-2013)

Former administrative Members at the CHLR

Jing Xiao	Graduate Coordinator (2010- 2018)
Beiwen Sun	Executive Assistant to Director (2011-2016)
Hao Deng	Graduate Coordinator / Executive Assistant to Director (2008-2011)
Ruiju Wang	Executive Assistant to Director (2008-2010)

Invited Commentator of the Human Capital Report for Each Year[1]

Invited Commentator of the Twelfth Human Capital Report (December 5, 2020)

Yongmiao Hong   Director and Professor of Economics and Management,

University of Chinese Academy of Sciences (UCAS)

Jong-Wha Lee   Professor of Economics, University of Korea, Korea

Invited Commentator of the Eleventh Human Capital Report (December 14, 2019)

Yaojiang Shi   Director, The Center for Experimental Economics in Education,

China

Invited Commentator of the Tenth Human Capital Report (December 9, 2018)

Guoen Liu   Professor of Economics, Peking University National Development

Research Institute;

Director of China Center for Health Economic Research

Zhuo Chen   Professor, University of Georgia, USA

Invited Commentator of the Ninth Human Capital Report (December 9, 2017)

Junjie Hong   Professor and Dean, School of International Economics and Trade,

University of International Business and Economics

Weiguo Yang   Dean, School of Labor and Human Resources, Renmin University of

China

Invited Commentator of the Eighth Human Capital Report (December 10, 2016)

Min Tang   State Council Counselor;

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[1] The first and the fifth Human Capital Report do not invite commentator.

	Vice President of Youcheng Entrepreneur Foundation for Poverty Alleviation
Boqing Wang	Founder of MyCOS;
	Vice President of China International Talent Professional Committee

Invited Commentator of the Seventh Human Capital Report (December 12, 2015)

Gary Jefferson	Professor of Brandeis University, USA
Scott D. Rozelle	Professor of Stanford University, USA
Shi Li	Professor of Beijing Normal University
Tao Xin	Professor of Beijing Normal University

Invited Commentator of the Sixth Human Capital Report (October 12, 2014)

Shujie Han	Director of Editorial Department of China Human Resources Development Magazine
Martina Lubyova	Director of the Institute of Prediction, Slovak National Academy of Sciences
Peter F. Orazem	Professor, Lowa State University, USA
Jeffrey S. Zax	Professor, University of Colorado, Boulder

Invited Commentator of the Fourth Human Capital Report (December 12, 2012)

Weizhong Hou	Professor of Economics, California State University, Long Beach

Weiping Li	Chief Expert of the Academy of Human Resources and Social Security
Tao Yang	Professor, Darden School of Business, University of Virginia, USA
Yansui Yang	Professor, School of Public Administration, Tsinghua University

Invited Commentator of the Third Human Capital Report (October 28, 2011)

Desheng Lai	Professor and Dean, School of Economics and Business Administration, Beijing Normal University
Yang Du	Professor, Institute of Population and Labor Economics, Chinese Academy of Social Sciences
Zhaoming Gui	Professor, School of Management, Wuhan Institute of Technology

Invited Commentator of the Second Human Capital Report (October 15, 2010)

Ardo Hansson	Chief Economist, World Bank in China
Danling Zhao	Deputy Inspector, Personnel Department, Ministry of Education
Yuetian Li	Deputy Director, Policy Research Division, Ministry of Human Resources and Social Security
Guoqiang Long	Minister of Foreign Economic Research, Development Research Center of the State Council

Pictures of Project Team for Each Year

2009 Project Team Student Members

(In the middle, Professor Barbara Fraumeni, the late Nobel Laurent Professor Kenneth Arrow, Professor Dale Jorgenson and his wife Linda.)

2010 Project Team Student Members

(This picture was taken at the 2009 release of the 1st China Human Capital Report.)

2011 Project Team Student Members

(The following pictures are photos of Professor Barbara Fraumeni and the project team student members.)

2012 Project Team Student Members

2013 Project Team Student Members

2014 Project Team Student Members

2015 Project Team Student Members

2016 Project Team Student Members

2017 Project Team Student Members

2018 Project Team Student Members

2019 Project Team Student Members

2020 Project Team Student Members

2021 Project Team Student Members

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 and labor markets, focusing on China and related economies.

Current members of the advisory board include Nobel Laureate James Heckman and Professor Dale W. Jorgenson of Harvard University, founder of the income-based method for measuring human capital.

The major research in the Center is related to the broad area of human capital and labor markets, including but are not limited to human capital and skill measurement, human capital investment, human capital mobility, human capital and innovation, and health economics. The main research project at the Center level is China human capital measurement.

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 8 full-time faculty members, 5 special-term professors, and 5 senior research fellows.

The CHLR has Master's, doctoral and post-doctoral programs. The Center's graduate programs are internationally oriented. The curriculum and instruction are rigorously designed following research universities in the United States. All courses are taught in English. As of 2021, 1 post-doctoral student, 10 doctoral students and 129 master students have graduated. Currently, the Center has 53 students, with 43 Master's students, 9 doctoral students and 1 post-doctoral student.

The Impact of the 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 measurement metrics, quantitatively describing China's human capital distribution, trend and dynamics. It constructs important measurements for further evaluating human capital and its contribution to economic development and provides policy-makers with important information on the nation's human capital development.

The project is led by Professor Haizheng Li (Georgia Institute of Technology). The research team includes Professor Barbara M. 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 staffs at the CHLR.

The human capital project was established in 2009 and is one of the landmark achievements of the Central University of Finance and Economics. The project has been funded by the National Natural Science Foundation of China for twelve consecutive years.

The project team has released the "China Human Capital Report" (Chinese and English version) every year in the annual International Human Capital Conference. Participants at the conference included the late Nobel Prize winner Professor Arrow, Professor Dale Jorgenson of Harvard University, officials from the World Bank and OECD, and many other international scholars; Zhenghua Jiang, vice chairman of the National People's Congress, Keng He, vice chairman of the Finance and Economics Committee, Guoqiang Long, deputy director of the Development Research Center of the State Council, Xianchun Xu, deputy director of the National Bureau of Statistics, and many domestic scholars.

Since the inaugural issue of the China Human Capital Report 2009, the project

has generated great impact both at home and abroad. Major media like Guangming Daily and People's Daily published news about the China Human Capital Reports upon its release every year.

The China Human Capital Report released on December 5, 2020 was reported on China News Network and triggered a heated discussion—ranked at the top of the Network's hot search list. Two weeks later, related topics had been read nearly 18 million instances, leading to more than 2300 discussions. So far, nearly 20 mainstream media including CCTV, Tencent, Sina Education, Workers' Daily and China News have issued special reports from different perspectives. Many of these reports have been reprinted in mainline outlets including People's Daily, Guangming.com, China.com, Xinhuanet.com, and China Youth Daily.

China's human capital report series and all related data are freely available for public use. They can be downloaded at：

Official website of China Center for Human Capital and Labor Market Research:

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

Official website of Central University of Finance and Economics & University of Electronic Science and Technology of China Joint Research Data Center:

http://cedcdata.cufe.edu.cn/cedc/metadata/list.html

The Impact of China Human Capital Report series

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

- "Human Capital Measurement: from Individual to Aggregate", Haizheng Li, Yan Su, Xianfang Xiong and Yiting Xu, forthcoming, *China Journal of Econometrics*, 2021.

- "Regional Distribution and Dynamics of Human Capital in China 1985-2014", Barbara M. Fraumeni, Junzi He, Haizheng Li and Qinyi Liu, *Journal of Comparative Economics*, Volume 47, pp. 853-866, 2019.
- "Physical Capital Estimates for China's Provinces, 1952-2015 and Beyond", Holz, A. Carsten and Yue Sun, *China Economic Review*, Volume 51, pp. 342-357, 2018.
- "Advance in Human Capital and Economic Growth: A Comparison among

East, Central and Western Regions", Zhiyong Liu, Haixuan Li, Yongyuan Hu and Chenhua Li, *Economic Research Journal*, Volume 53, pp. 50-63, 2018.

- "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 M. Fraumeni and Xiang Zheng, National Bureau of Economic Research (NBER), working paper, No. 22906, 2016.
- "Human Capital Estimates in China: New Panel Data 1985-2010", Haizheng Li, Qinyi Liu, Bo Li, Barbara M. Fraumeni and Xiaobei Zhang, *China Economic Review*, Volume 30, pp.397-418, 2014.
- "China's Human Capital Measurement: Method, Results and Application", Haizheng Li, Bo Li, Yuefang Qiu, Dazhi Guo and Tang Tang, *Journal of Central University of Finance and Economics*, Volume 5, pp. 69-78, 2014.
- "Regional Distribution and Development of Human Capital in China", Haizheng Li, Na Jia, Xiaobei Zhang and Barbara M. Fraumeni, *Economic Research Journal*, Volume 48, pp. 49-62, 2013.
- "Human Capital in China, 1985-2008", Haizheng Li, Yunling Liang, Barbara M. Fraumeni, Zhiqiang Liu and Xiaojun Wang, *Review of Income and Wealth*, Volume 59, pp. 212-234, 2013.
- "Human Capital Measurement and Index Construction in China", Haizheng Li, Yunling Liang, Barbara M. Fraumeni, Zhiqiang Liu and Xiaojun Wang, *Economic Research Journal*, Volume 45, pp.326-353, 2010. (Reprinted in China Social Science Digest, 2010, No. 12.)
- "Human Capital Index in China", Haizheng Li, Barbara M. Fraumeni, Zhiqiang Liu and Xiaojun Wang, National Bureau of Economic Research (NBER), working paper, 2012 (http://papers.nber.org/papers/w15500).

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

- "Human Capital of Mainland China, Hong Kong and Taiwan, 1997-2018", Xianfang Xiong, Xing Chen, Yuzhe Ning, Haizheng Li and Belton M. Fleischer, Chapter 6, in: Measuring Human Capital, Barbara M. Fraumeni, editor, Cambridge, MA, USA: Academic Press, forthcoming, 2021.
- "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 and 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 Hebei Province", Haizheng Li, Dazhi Guo and 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 and Yunling Liang, Chinese Economists Society

Presidential Forum, in: <u>Economic Reform and Future Development Directions</u>, 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 and Xiaobei Zhang, in: <u>Beijing Human Resources Development Report 2010-2011</u>, 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 and Barbara M. Fraumeni, in: <u>The Changing Wealth of Nations</u>, Washington, DC: World Bank, Chapter 6, pp. 105-114, 2010.

III. Speeches and Presentations:

- China Human Capital Report 2020 was released at the 12th International Seminar on Human Capital (online conference), December 5, 2020.
- Professor Haizheng Li was invited to organize two meetings of the 90th Annual Meeting of the Southern Economic Association to discuss issues related to human capital in the presidential session, November 21-23, 2020.
- Keynote Speaker, The 257th Shuangqing Forum, National Natural Science Foundation of China, "High-quality Economic Development and Human Capital" (online conference), Haizheng Li, September 21-22, 2020.
- The 11th International Symposium on Human Capital, Plenary Session Presentation, "Measuring China's Human Capital-2019", Beijing, China, December 14, 2019.
- Keynote Speaker, the 4th Migrants Health and Development Forum, "Migrants Data and Human Capital Research", Haizheng Li, Migrants Monitoring and Research Center, National Health Commission, December 7, 2019.
- International Conference on "Challenges to Asia and Global Economy", Korea University, "Unobserved Human Capital and Regional Inequality: Evidence from China", Haizheng Li, Seoul, South Korea, May 31, 2019.
- The 10th International Symposium on Human Capital, Plenary Session Presentation, "Measuring China's Human Capital-2018", Beijing, China, December 9, 2018.
- The Society for Economic Measurement 2018 Conference, cosponsored by the Xiamen University, the University of Kansas, Carnegie Mellon University, and the Center for Financial Stability, keynote speech, "Human Capital Metrics and Their Impacts on Economic Development", Haizheng Li, Xiamen, China, June 8-10, 2018.
- The 5th World KLEMS Conference in Harvard University, invited plenary session presentation, "Human Capital Measures and Its Effect on Economic Convergence in China", Haizheng Li, Boston, USA, June 4-5, 2018.
- The 9th International Symposium on Human Capital, Plenary Session Presentation, "Measuring China's Human Capital-2017", Beijing, China, December 10, 2017.
- The 61st World Statistics Conference, "Regional Distribution and Dynamics

of Human Capital in China 1985-2014: Education, Urbanization, and Aging of the Population", Haizheng Li, Marrakech, Morocco, July 18, 2017.

- The 8th 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", Haizheng Li, Shenzhen, China, June 12, 2016.
- The 7th International Symposium on Human Capital, Plenary Session Presentation, "Measuring China's Human Capital-2015", Haizheng Li, Beijing, China, December 12, 2015.
- Keynote Speaker, The 5th Changqing Expert Lecture, "Human Capital and Pre-college Education", Haizheng Li, Beijing, China, June 16, 2015.
- Keynote Speaker, Shaanxi Normal University, International Symposium: Human Capital and Challenge of economic growth in China, "Rural Human Capital in China and the Economic Growth in Future", Haizheng Li, 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", Haizheng Li, Beijing, China, 2014.
- Invited presentation, University of Chicago, Symposium on China's Economy and Governance, "Reginal Distribution of Human Capital in China", Haizheng Li, Chicago, USA, August 27, 2014.
- Keynote Speaker, The 26th Annual Meetings of the Chinese Economics Society of Australia, "Regional Distribution and Growth of China's Human Capital 1985-2010: Urbanization, Education, and Aging", Haizheng Li, Monash University, Melbourne, Australia, July 6-9, 2014.
- Invited Speaker, 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?" Haizheng Li, Shanghai, China, May 28, 2014.
- The 3rd World KLEMS Conference: Growth and Stagnation in the World Economy, invited presentation, "Human Capital Estimates in China: New Panel Data 1985-2010," Haizheng Li, Tokyo, Japan, May 19-20, 2014.
- American Economic Association Annual Meeting, "Human Capital Estimates in China, New Panel Data 1985-2010", Haizheng Li, Philadelphia, USA, January 3-5, 2014.
- Invited Speaker, 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", Haizheng Li, Nanjing, China, May10-13, 2013.
- Invited Speaker, 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", Haizheng Li,

February 24-25, 2011.

- Invited speaker, The Chinese Economists Society (CES) President Forum, "Human Capital and its Contributions", Haizheng Li, Nankai University, Tianjin, China, December 10, 2010,
- Invited Speaker, High-Level Working Group on Skills and Human Capital hosted by the Lisbon Council, "Measuring Human Capital in China", Haizheng Li, Brussels, November 16, 2010.
- Invited plenary session presentation, The 31st IARIW General Conference of the International Association for Research in Income and Wealth, "Human Capital in China", Haizheng Li, St. Gallen, Switzerland, August 23-28, 2010.
- Invited Speaker, The 25th Anniversary of the Sino-US Exchange on Economics Education (Ford Class) Renown Scholar Forum, Renmin University of China, "Human Capital in China", Haizheng Li, Beijing, China, July 23, 2010.
- Plenary Session Chair and co-organizer, Beijing Municipal Government Conference, "World Talent, World City", Haizheng Li, Beijing, May 28, 2010.

IV. Related Funded Projects and Others:

- The Central University of Finance and Economics-University of Electronic Science and Technology of China Joint Data Research Center (CEDC) established a collaboration relationship with CHLR to build large-scale database on human capital, 2019-2021.
- National Natural Science Foundation of China, "Research on Human Capital Measurement in China: Expansion and Deepening", 2018-2021.
- National Natural Science Foundation of China, "Research on Human Capital Measurement in China: Improvement and Application", 2013-2016.
- European Union project (2012-2015), invited participation, "Lifelong Learning, Innovation, Growth and Human Capital Tracks in Europe", 2012-2015 (study human capital, skills and outcomes with other eight research teams from various countries/regions).
- 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 that the CHLR human capital research team participate in the OECD human capital consortium as China's officially designated representative, 2010.
- National Natural Science Foundation of China (NSFC), "China Human Capital Measurement and Index", 2010-2012.
- State Councilor Yandong Liu visited the CHLR in October 2009 and complimented the Center's achievement in human capital research.
- The "China Human Capital Report" series has been requested by the Ministry of Education as a reference since 2009.
- "China Human Capital Report 2009" was requested by the Organization Department of the Central Committee of Communist Party as a reference for policy making, 2009.

Acknowledgement

Improvements in the 2021 Report

- Updated national and provincial human capital estimates for 1985-2019.

- Modified the imputation of population to better match the human capital calculation.

- Compared the results of the population imputation with the newly released data from the 7th Census for accuracy.

- Incorporated the new policy on "one million-expansion of admission for vocational college" in 2019 into human capital calculation.

- Added the new data from 2016 Hong Kong Population Census to estimate Hong Kong human capital.

- Added new survey data from Survey of Family Income and Expenditure in Taiwan for 2007-2018 to estimate Taiwan human capital.

- Updated physical capital data to 2017.

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:

Mainland: age 0-55 for females and age 0-60 for males

Hong Kong: age 0-60 for females and age 0-65 for males

Taiwan: age 0-60 for females and age 0-60 for males

- Labor force human capital:

Mainland: age 16-54 for female and 16-59 for male, excluding students

Hong Kong: age 15-59 for female and 15-64 for male, excluding students

Taiwan: age 15-59 for both male and female, excluding students

Contents

Executive Summary

We estimate China's human capital stock and describe its distribution and dynamics at the national and provincial levels from 1985 through 2019[2]. A variety of human capital indices are constructed and reported.

In addition to the traditional metrics, we apply the widely used Jorgenson-Fraumeni income-based approach (hereinafter referred to as "J-F method"), which provides a more comprehensive measurement of human capital.

The following notes define terms and measures used throughout this report:

- Total human capital refers to: female and male with age range of 0-55 and 0-60, respectively, in Mainland; and 0-60 and 0-65, respectively, in Hong Kong; and 0-60 in Taiwan.

- Labor force human capital refers to (not including full-time students): female and male with age range of 16-55 and 16-60, respectively, in Mainland; and 15-60 and 15-65, respectively, in Hong Kong; and 15-60 in Taiwan.

- We use the term "nation" and "mainland" interchangeably to refer to the 31 provinces (autonomous regions and municipalities) of the mainland China, not including Hong Kong, Macau and Taiwan.

- Unless otherwise specified, the monetary values are measured in 1985 RMB.

- Real provincial-level human capital is adjusted using the relevant provincial living-cost-adjustment index (LCI) and the

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[2] The results for Hong Kong and Taiwan are reported starting from 1997.

Consumer Price Index (CPI) with 1985 as base year and Beijing as base province.

- Average annual growth rates across years are calculated based on the simple average of annual growth rates.

For more details, refer to the comprehensive China Huan Capital Report 2021.

All the data and results are available at the China human capital database and are free for public use. The data can be downloaded at：

Official website of China Center for Human Capital and Labor Market Research:

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

Official website of Central University of Finance and Economics & University of Electronic Science and Technology of China Joint Research Data Center:

http://cedcdata.cufe.edu.cn/cedc/metadata/list.html

The Main Findings of the 2021 Human Capital Report

A. Human Capital at National Level

(I) Traditional Human Capital Measures

1. In 2019, the average age of the labor force at the national level was 38.8 years. The five provinces with the oldest labor force were Heilongjiang, Liaoning, Jilin, Inner Mongolia and Zhejiang, and the five provinces with youngest labor force were Ningxia, Guangdong, Hainan, Guizhou and Tibet.

2. In 2019, the average schooling years of the labor force at the national

level was 10.5. The five provinces with highest years of schooling were Beijing, Shanghai, Tianjin, Jiangsu and Liaoning, and the five provinces with the lowest years of schooling were Gansu, Guizhou, Yunnan, Qinghai and Tibet.

3. In 2019, the proportion of the labor force with high school education or higher was 41.6%, with 21.6% in rural areas and 54.6% in urban areas.

4. In 2019, the proportion of the labor force with college education or above was 20.6%, with 5.6% in rural areas and 30.4% in urban areas.

(II) The Jorgenson-Fraumeni (J-F) Based Human Capital Measures

5. The J-F measure of China's nominal total human capital reached 2776.4 trillion yuan in 2019, with 2418.9 trillion yuan (87.1%) in urban areas and 357.5 trillion yuan (12.9%) in rural areas.

6. Nominal human capital per capita was 2.5 million yuan in 2019, 3.3 million yuan for urban residents and 0.9 million yuan for rural residents. Average human capital for male was 3.1 million yuan and for female was 1.7 million yuan.

7. In 2019, the five provinces with highest human capital stock were Shandong, Jiangsu, Henan, Guangdong and Hebei, and the five provinces with lowest human capital stock were Gansu, Hainan, Ningxia, Qinghai and Tibet.

8. The five provinces with highest human capital per capita were Beijing, Shanghai, Tianjin, Zhejiang and Jiangsu, and the five provinces with lowest level were Xinjiang, Tibet, Yunnan, Gansu and Qinghai.

9. The five provinces with highest average labor force human capital were Beijing, Tianjin, Shanghai, Zhejiang and Jiangsu, and five provinces

with the least were Xinjiang, Hainan, Yunnan, Gansu and Qinghai.

10. In 2019, the proportion of the population aged 0-15 among non-retired people at the national level was 21.9%, and their human capital accounted for 48.5% of total human capital.

11. In 2019, the proportion of the population aged 25-45 to the total labor force was 54.9% at the national level, and their human capital accounted for 66.3% of the total labor force human capital.

12. China's total real human capital in 2019 was 11.5 times its level in 1985, having grown at an average annual rate of 7.9%. The average annual growth rate during the decade 2010-2019 was 8.0%.

13. From 1985 to 2019, rural human capital grew at an average annual rate of 3.2%, and urban human capital grew at 10.4%; while during the decade 2010-2019, the growth rate was 9.8% for urban areas but only 0.7% for rural areas. This decline in the average annual growth of rural human capital largely reflects China's rapid urbanization.

14. Urban human capital surpassed the rural human capital before 1994 and has remained higher since then.

15. Human capital per capita grew from 43.7 thousand yuan to 474.4 thousand yuan, at an average annual rate of 7.5% over the period 1985-2019 and at a rate of 8.4% over the years 2010-2019.

16. The average annual growth rate of human capital per capita during the period of 1985-2019 was 6.5% and 5.3% for urban and rural areas, respectively. For the years 2010-2019, the growth rates were 7.8% and 4.2%, respectively.

B. Human Capital in Hong Kong and Taiwan

17. In 2019, the average age of the labor force was 42.1 years in Hong Kong and 40.8 years in Taiwan.

18. In 2019, the average schooling years of the labor force were 12.4 years in Hong Kong and 13.8 years in Taiwan.

19. In 2019, the proportion of the labor force with high school education or above was 75.6% in Hong Kong and 87.4% in Taiwan.

20. In 2019, the proportion of the labor force with college education or above was 42.3% in Hong Kong and 55.4% in Taiwan.

21. In 2019, the proportion of the population aged 0-15 among non-retired people was 16.9% in Hong Kong, and their human capital accounted for 21.0% of total human capital in Hong Kong.

22. In 2019, the proportion of the population aged 0-15 among non-retired people was 17.8% in Taiwan, and their human capital accounted for 18.8% of total human capital in Taiwan.

23. In 2019, the proportion of the population aged 25-45 to the total labor force was 49.0% in Hong Kong, and their human capital accounted for 59.2% of total labor force human capital in Hong Kong.

24. In 2019, the proportion of the population aged 25-45 to the total labor force was 40.8% in Taiwan, and it accounted for 49.4% of total labor force human in Taiwan.

25. In Hong Kong, the average annual growth rate of J-F based total human capital between 1997 and 2019 was 0.7% while the annual growth rate of human capital per capita was 0.2%. Over the years 2010-2019, the corresponding rates were 2.9% and 2.7%, respectively.

26. In Taiwan, during 1997-2019, the average annual growth rate of J-F based total human capital was -1.4%, and it was -1.0% for human capital

per capita; while over the years 2009-2019, the corresponding rates were -1.3% and -0.4%, 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 the 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.[3] 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 Démurger, 2001), with strong impacts on both productivity growth and reducing regional inequality (Fleisher, Li and Zhao, 2009).

Despite its critical role in China's economic development, there has not

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[3] 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).

been a comprehensive measurement of the total human capital stock in China until 2009, with the first China Human Capital Report issued by this Center. 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 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. These changes include:

1. China has undergone substantial demographic changes in the past 65 years that involve

    (1) The encouragement of large families;

    (2) Subsequently discouragement of population growth due to the one-child policy;

    (3) Dramatic improvements in health and longevity;

    (4) Massive interregional migration and urbanization.

2. 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 else in human history or across nations.

Until the inception of this Project, 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 areas 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 those with 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 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.[4][5] The work of this consortium and the World Bank effort (landge et al. 2018) will facilitate

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[4] See Liu (2011).

[5] 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.

cross-country comparisons. Developed countries 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), and Hu (2005).

The limitations of past studies have precluded implementation of internationally recognized methods for human capital estimation based on China's data. The methodology used in 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, and for urban and rural areas from 1985 to 2019. Our estimates include nominal values, real values, indexes, and quantity measures. We adopt, whereever possible, the Jorgensen-Fraumeni (J-F) lifetime income based approach as discussed above.

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 the 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 descriptive 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 Chapters 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) the sum of investment, minus depreciation, added over time to the initial stock; and ii) the present value of the income flow over an expected lifetime. The first method i.e., the perpetual inventory method, adopts the cost approach (e.g., Kendrick, 1976); the second method adopts the income-based approach (e.g., Jorgenson and Fraumeni, 1987, 1992a, 1992b). However, measuring human capital using the perpetual inventory approach only considers the costs and expenditures as investment, which is then valued by the purchasing price that is often not available for human capital.

Measures of human capital that have been used by researchers in existing studies include:

(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[6] (2006);

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

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

We will elaborate on the Jorgenson-Fraumeni approach in the next section.

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[6] There are four major indexes of human capital each of which covers at least 130 countries, one each by the Institute for Health Measurement and Evaluation (Lim et al., 2018), UNDP (UNDP 2019), World Bank (International Bank for Reconstruction and Development and the World Bank, 2018) and the World Economic Forum (WEF 2017).

2.1 Jorgenson-Fraumeni income-based approach

The Jorgenson-Fraumeni (J-F) method estimates human capital stock based on the expected future lifetime income of all individuals, which would be its asset price if human capital could be traded in the market like physical capital. [7] 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. 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 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 include household production, e.g., cooking, cleaning, and care-giving. Investment

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[7] 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. Even in the United States and other developed countries, wages do not fully reflect marginal productivity because labor markets are not perfectly competitive. Even so, wages are still representative of the human capital gains from an individual perspective, and they are a reasonable a measure of human capital in that sense. With the improvement of the market mechanism in China, this limitation will gradually decrease. According to estimates provided in the current literature, wages are generally lower than labor's marginal productivity (see Fleisher, Li and Zhao, 2010). Therefore, from this perspective, our calculation can be interpreted as a conservative estimate of human capital.

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 in estimating China's human capital.[8]

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 direct child rearing costs such as food and clothing. 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 because 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.

The cost of parental time is not included in measuring tangible human capital. 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. Estimated opportunity cost depends on a student's imputed foregone 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

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[8] 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 the one by 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.

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 the stock of nominal human capital is about five times Gross Domestic Product. However, the J-F human capital estimate is substantially larger than Kendrick's.[9] 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 72 years old in 2021.

Additionally, the Kendrick approach gives no clear rationale for some important assumptions, such as for the split of health expenses between

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

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. [10] 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 parentally provided education, adult education, and learning on the job. Parentally provided education includes teaching 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 measure divided by total population and the Human Capital Productivity Measure is Gross Domestic Product (GDP) divided by a country's employed human capital endowment.

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.[11] 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

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[10] 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.

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

released, we do not apply it here in our calculation.[12]

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 reported in income-based methods. The primary advantage of an index value is that it nets out the effect of aggregate physical capital on labor income, and thus this measure more closely captures the variation in quality and relevance of formal education across time and countries.

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. Our method is closely related to that of in Laroche and Merette (2000) in that we also incorporate informal investments, such as work experience, into the model along with formal education.

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

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

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

where e and a denote years of formal schooling and age, respectively and $\rho_{\varepsilon,a}=L_{\varepsilon,a}/L$ is the proportion of working age individuals of age a with e years of schooling. The variable $\omega_{\varepsilon,a}$ is the efficiency parameter defined as proportion

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

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 the attribute-based method, we need to obtain population data by age, gender and educational attainment for each year we study. Secondly, we need to estimate a gender-specific Mincer equation for each year. It is feasible to calculate a human capital measure based on this approach. In the attribute-based setup, measurement is based on 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 measure 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 in the Cobb-Douglas formulation, as occurred 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.[13]

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

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

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 estimates 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 from workers outside the country. Governance/social capital is measured with a rule of law index.[14] Although the marginal return to human capital in the aggregate is the highest of the three included intangible capital components, the contribution

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[14] It was proposed by the World Justice Project, which includes 8 aspects: Constraints on Government Powers, Absence of Corruption, Open Government, Fundamental Rights, Order & Security, Regulatory Enforcement, Civil Justice and Criminal Justice.

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 it enables comparisons of China's human capital level with those in other countries. Finally, it is less computationally intensive.

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 with a discount rate. Estimation is conducted in a backward recursive fashion, from those aged 59, 58, 57, and so forth to those aged 0,[15] and modified to the China's own context with various needed assumptions about the method and parameters.[16]

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. The backward recursion methods is based on five life stages, and calculation begins with the fifth stage,   backward 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.

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[15] 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 that have adopted the J-F methodology.

[16] The J-F for China does not include nonmarket income.

The final stage is for retirement, individuals who are not in school and not working--older than 59 years old for males and older than 54 years old for females)):

$$mi_{y,s,a,e} = 0 \qquad\qquad (3)$$

where the subscript y, s, a, and e denote year, sex, age and educational attainment respectively, mi is the lifetime market labor income per capita.[17]

The fourth stage is for individuals who are working but not in school (23-59 years old for males and 23-54 years old for females). The equation for this stage is the same as equation 3.

$$mi_{y,s,a,e} = ymi_{y,s,a,e} + sr_{y,s,a} \cdot mi_{y,s,a+1,e} \cdot \frac{1+G}{1+R} \qquad (4)$$

where sr is the survival rate, defined as the current year probability of becoming one year older, G is the real income growth rate, and R is the discount rate, *ymi* denotes annual market income per capita.

The third stage is applied to individuals who are either in school or working (16-22 years old), as it is assumed that anyone who goes to school does not work, even part-time.[18] This stage is bounded by age 22 because of data limitations, and the age distribution of college and above are calculated by senior age distribution. For individuals who work, the equation is same as (4), for individuals who go to college or university, for example, at the first year of university, the equation becomes:

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[17] 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.

[18] 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.

$$mi_{y,s,a,uni\_1} = sr_{y,s,a} \cdot sr_{y+1,s,a+1} \cdot sr_{y+2,s,a+2} \cdot sr_{y+3,s,a+3}$$
$$\cdot mi_{y,s,a+4,uni-completed} \cdot \left(\frac{1+G}{1+R}\right)^4 \qquad （5）$$

For individuals who are in junior or senior high school, for example, at first year of senior high school, the equation becomes:

$$mi_{y,s,a,sm\_1} = [senr_{y,s,a,sm\_1-col\_1} \cdot mi_{y,s,a+3,col\_1}$$
$$+ notenr_{y,s,a,sm\_1-col\_1} \cdot mi_{y,s,a+3,sm-completed}] \cdot \left(\frac{1+G}{1+R}\right)^3 \qquad （6）$$

where *senr* is the promotion rate, which is the probability of the number of students in e educational level entering into e+1 educational level, and *notenr* is the probability that someone who does not enroll in e+1 educational level will complete the e educational level. The calculation equation is

$$notenr_{y,s,a,sm\_1-col\_1} = sr_{y,s,a} \cdot sr_{y+1,s,a+1} \cdot sr_{y+2,s,a+2}$$
$$- senr_{y,s,a,sm\_1-col\_1} \qquad （7）$$

The second stage is for someone going to school but not working (7-15 years old). The equation for students varies depending on the level of enrollment. For those enrolled in the first year of primary school, the equation is

$$mi_{y,s,a,pri\_1} = [senr_{y,s,a,pri\_1-jm\_1} \cdot mi_{y,s,a+6,jm\_1}$$
$$+ notenr_{y,s,a,pri\_1-jm\_1} \cdot mi_{y,s,a+6,pri-completed}] \cdot \left(\frac{1+G}{1+R}\right)^6 \qquad （8）$$

The first stage is for individuals neither in school nor working (0-6 years old):

$$mi_{y,s,a,e} = sr_{y,s,a} \cdot mi_{y,s,a+1,e} \cdot \frac{1+G}{1+R} \qquad （9）$$

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

$$MI(y) = \sum_s \sum_a \sum_e mi_{y,s,a,e} L_{y,s,a,e} \qquad (10)$$

Similar equations can be applied to estimate lifetime nonmarket labor income,[19] which can be added to lifetime market labor income to obtain total lifetime labor income:

$$LIFE(y) = \sum_s \sum_a \sum_e (mi_{y,s,a,e} + nmi_{y,s,a,e}) \cdot L_{y,s,a,e} \qquad (11)$$

3.2 Estimating 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 and make projections based on the basic Mincer (1974) equation. It has been shown that there are significant differences in the parameters of the earnings equation across gender and between the rural and urban population. To ensure our income estimates are accurate as possible, we estimate the parameters separately 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 2019.

The data used for estimating the parameters of the earnings equation come from six 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,

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[19] 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.

1991, 1993, 1997, 2000, 2004, 2006, 2009, and 2011. The third data set is the Chinese Household Income Project (CHIP) for the year of 1988, 1995, 1999, 2002, 2007, and 2013. The fourth data set is the China Household Finance Survey (CHFS) for the year of 2010 and 2012. The fifth data set is the Chinese Family Panel Studies (CFPS) for the year of 2010, 2012，2014 and 2016. The sixth data set is the China Labor-force Dynamic Survey (CLDS) for the year of 2014, this is a new data set we added this year. CHIP (except 2009), CHNS, CHFS, CFPS and CLDS cover both urban and rural population, but UHS covers only the urban population.

UHS is a representative sample of the urban population. Individual earnings are measured as the annual labor income, which includes 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 or above equals 16 years of schooling. Suppose that schooling begins at age 7, years of work experience are imputed 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. The self-employed and temporary job holders are excluded, as 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 socioeconomic, 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, 2013, 2015 and 2017. Information of the statistics on household income starts from the year of 2010, 2012, 2014 and 2016. The urban sample includes only personal income data, comprising wage income. Rural income includes personal income and household income. Personal income primarily consists of wage 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 females 16-55 years old who reported information on education and income status. AppendixB.3.4 gives the complete definitions of income, education, other variables and also the sample selection criteria of CHFS. Table B.1.5 of Appendix B lists the descriptive statistical indicators of CHFS.

CFPS is a nationwide longitudinal survey conducted by the Institute of Social Science Survey (ISSS) at Peking University. The survey focuses on economic, as well as non-economic well-being of Chinese children and adults. A wide range of domains are covered, including economic activities, education outcomes, family dynamics and relationships, migration, and health. In the 2010 survey, CFPS interviewed around 15,000 families with over 40,000 individuals. Information on household income is the total income in the recent year. Urban income includes wage income. Rural income includes agriculture production 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.

CLDS is a nationwide longitudinal survey conducted by the social science survey center (CSS) of Sun Yat-Sen University. CLDS conducted a trial survey in Guangdong province in 2011, completed the first nationwide survey in 2012, completed the first follow-up survey in 2014, and conducted the second follow-up survey in 2016. Due to the limitations of data quality and availability, this report uses only 2014 survey data. Information on household income is the total income in the recent year. Rural income mainly includes agricultural production income. We restrict the sample to males of 16-60 years old and females of 16-55 years old. Appendix C.2.7 contains the complete definitions of income, education, other variables and also the sample selection criteria of CLDS. Table C.1.6 of Appendix B lists the descriptive

statistical indicators of CLDS.

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 national research center of Taiwan. We restrict our sample to individuals who are currently employed and are between 15 and 60 years old for male workers and between 15 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, 2011 and 2016, 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:

$$\ln(inc) = \alpha + \beta \cdot e + \gamma \cdot Exp + \delta \cdot Exp^2 + u \qquad （12）$$

where *ln(inc)* is the logarithm of earnings, *e* is years of schooling, *Exp* and *Exp²* 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 (12) 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 report evidence consistent with 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 convention reported in published literature, we estimate equation (10) by ordinary least squares[20].

We use UHS, CHIP, CHNS，CHFS, CFPS and CLDS 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 any schooling and working experience. Figure 3.2.1 shows the intercept gap between urban and rural population during 1985-2019. 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 little difference between males and females in rural areas.

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[20] 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).
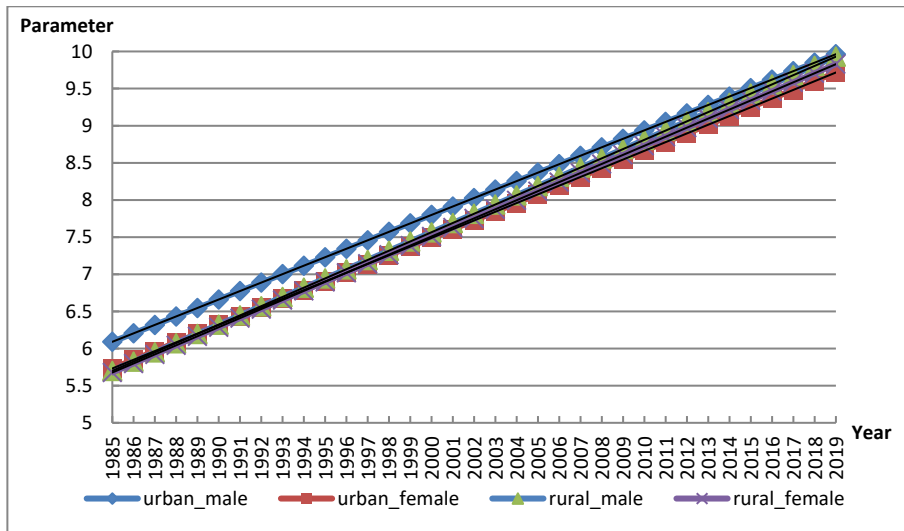
Figure 3.2.1 Mincer Intercepts by Gender and Location

Estimated regression parameters for years of schooling permit measurement of the rate of return rate of return to education. Considering the current development of the Chinese economy and education, we assume that the rate of return to education follows a nonlinear trend. Figure 3.2.2 shows the trends of the return to education for males and females in rural and urban areas. The trends of returns to schooling vary across rural and urban areas, it shows that the rate of return to education for rural women is increasing year by year, while for urban and rural men, the corresponding rate shows a trend of first increasing and then decreasing. In addition, we find that the rate of return to education for males was lower than that for female in urban areas, and the rate of return 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 rate of return to education has been a common phenomenon. But many studies recently show that rate of return to education in urban areas follows a decreasing trend associated with increased enrollment. Wang, Fleisher, and Li (2009) also find that female rates of return exceed male returns, and they argued that rising returns to

education have been an ubiquitous phenomenon in transitional economies.
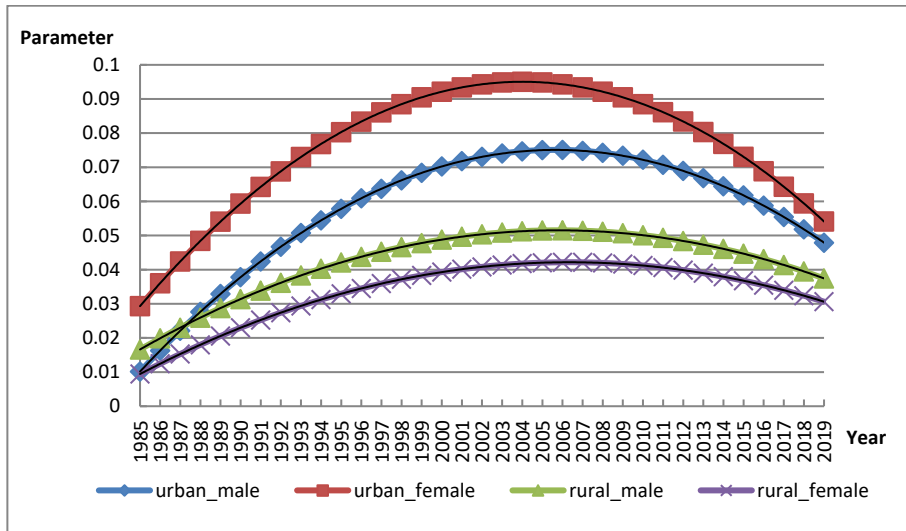
Figure 3.2.2 Rates of Return to Education by Gender and Location

We find that earnings increase with work experience but at a decreasing rate—a pattern found in most existing studies. Figures 3.2.3-3.2.6 show the trends of rate of return to experience by gender and region. As shown in the figures, although the returns to work experience are positive all along, they have been decreasing over time. In urban areas, return to experience for males is higher than that for females overall. In rural areas, the return to experience for males is higher than that for females in their middle years of age.
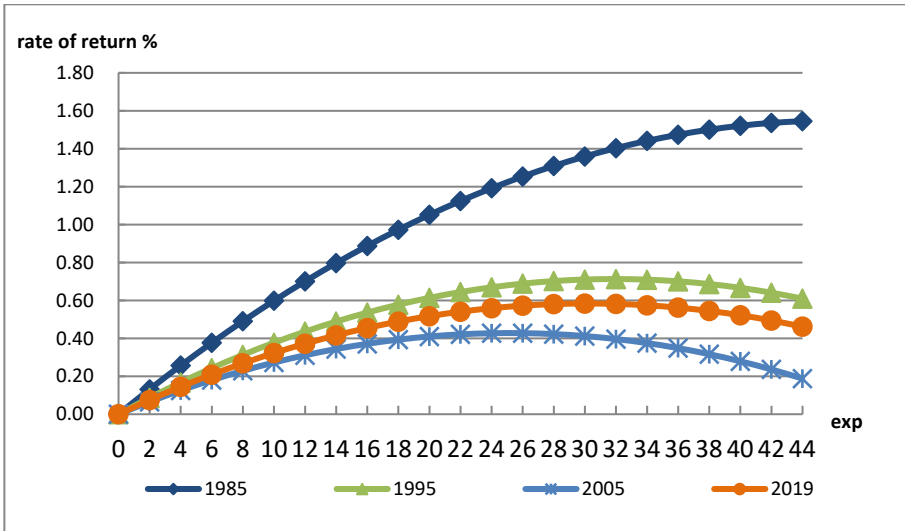
Figure 3.2.3 Return to Experience for Urban Males
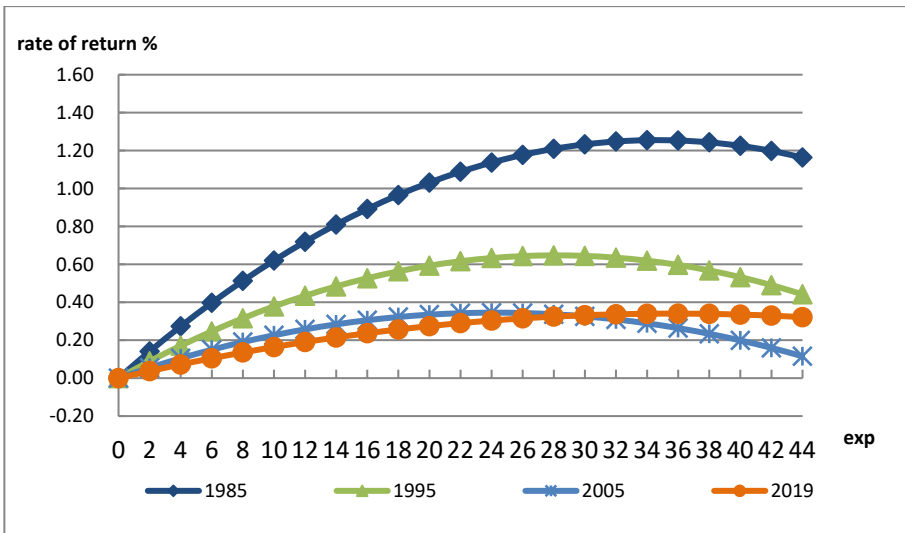
Figure 3.2.4 Return to Experience for Urban Females
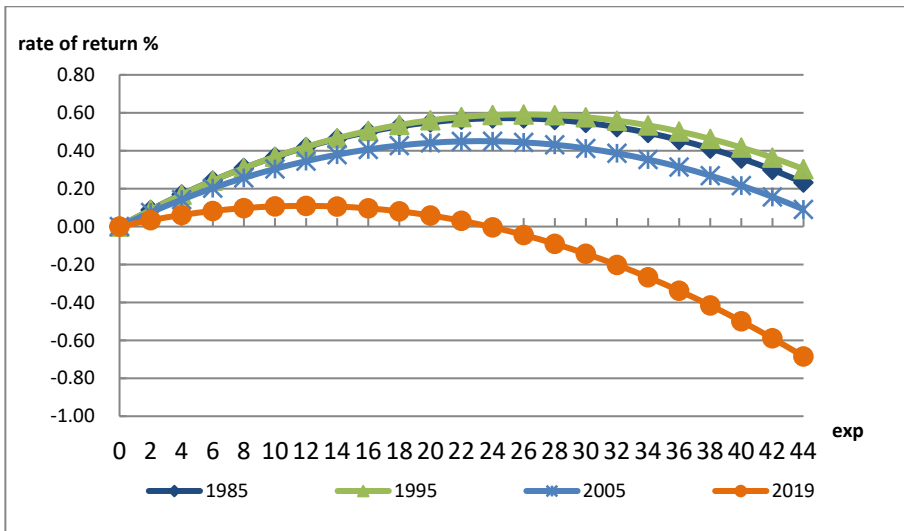
Figure 3.2.5 Return to Experience for Rural Males
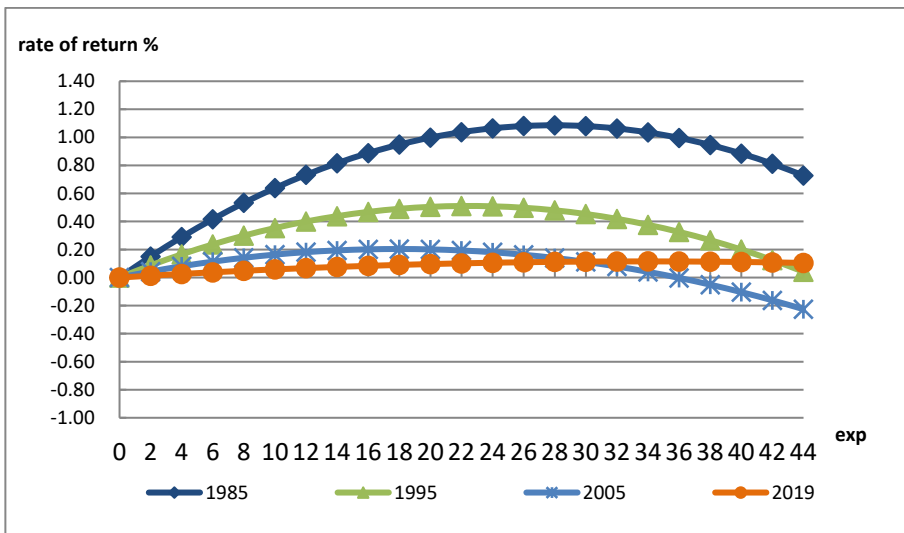
Figure 3.2.6 Return to Experience for Rural Females

3.2.2 Estimating current income using Mincer models at the provincial level

At the province level, we estimate the Mincer equation with macro data as follows:

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

（13）

where *ln(inc)* is the logarithm of earnings, *Sch* is years of schooling, *Exp* and *Exp2* represent years of work experience and experience squared respectively, and u denotes a random error. The variable avwage represents the average employee nominal salary for both the rural and urban population at the provincial level. *Avgdp* stands for nominal GDP per capita. *Ratio* is the primary industry employment ratio of the total working population. The parameters of *Sch·Avgdp* and *Sch·Ratio* reflect the labor market conditions 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* to the equation in order to make better use of the existing data and to aid in solving missing data problems as well as to make the estimation results more realistic.

In the model, $\beta_0 + \beta_1 \cdot \ln(Avwage)$ is the logarithm of the base wage for the population without schooling or working experience $\beta_2 + \beta_3 \cdot Avgdp + \beta_4 \cdot Ratio$ represents the return to education, β_5 and β_6 measure the return to experience. For Shanghai, it only has urban parameter estimates. Moreover, we assume males have different returns to experience in urban and rural areas, but they share the same parameter for *Exp* and *Exp²* across all provinces; we use the same way in estimations for females.

As in the national Mincer parameter estimation, provincial data used for estimation also come from UHS, CHIP, CHNS，CHFS, CFPS and CLDS. We use the ordinary least squares (OLS) to estimate equation (12). When all data sets are available for a sample year, we drop CHNS and use UHS, CHIP, CHFS, CFPS and CLDS due to the relatively low quality of CHNS income measures. The estimates are weighted for obtaining a larger and

28

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 2019. Graphs show that when we plot each of the parameter estimates against time, they are generally trended. We adopt a linear trend model to obtain the fitted values of parameters, that is $Y = \alpha_0 + \alpha_1 \times time + \mu$. Under the assumption that the effect of *Avwage*, *Sch*, *Exp*, *Exp²* on income growth grows at a fixed rate, we use the linear trend fitting method for all the parameters.

3.3 Other data and parameters used

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

3.3.1 Age distribution

We use data from the China Educational Statistical Yearbook: 2003-2019 to estimate the age distribution (1982-2019) 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 2019. 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 2019. 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 2019. 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 1983-1985, 1987, 1988 and 1991-1993, the death rates of the missing years are fitted by using the other available data of the closet year.

For Hong Kong, the data sources of growth rate are Hong Kong Life Tables. We obtain the survival rate (1-death rate) by age and sex. With population and death rates, 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 0-6), school only (age 7-15), 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 age-income profile, and therefore the method of computing lifetime income will be different.

We first estimate a standard Mincer equation 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 or above, or for six categories of schooling where we divide college or 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 or 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 are described in Appendix A.

To impute two critical components of the J-F human capital estimates, we proceed as described below.: 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. 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, where . 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.

Each continuing student is tracked from age of initial enrollment, through individual grade levels, until advancing to the next higher level. The number of years discounted until attaining the higher level of lifetime income depends on the number of years required to advance given the current grade of enrollment.

The terminal educational level is treated as a probabilistic event, allowing us to forecase lifetime income 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, 2010 and 2015 and interpolate middle years' employment rates using 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"
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" Long table data
Population by age, sex and region in 2005	"China Population Census 2005"
Population by region, sex and education in 2005	"China Population Census 2005"
Population by age, sex and education in 2005	"China Population Census 2005"
The employed by age group, sex and education in 2005	"China Population and Employment Statistics Yearbook 2006"
Population by age, sex and region in 2010	"China Population Census 2010" Long table data
Population by region, sex and education in 2010	"China Population Census 2010" Long table data
Population by age, sex and education in 2010	"China Population Census 2010"
The employed by age group, sex and education in 2010	"China Population and Employment Statistics Yearbook 2011"

Population by age, sex and region in 2015	"China Population Census 2015"
Population by region, sex and education in 2015	"China Population Census 2015"
Population by age, sex and education in 2015	"China Population Census 2015"

Note:1. The 1% sample population in 1987 is converted into the whole population by the actual sampling percentage of 0.999%6%.

2. The 1% sample population in 1995 is converted into the whole population by the actual sampling percentage of 1.02666%.

3. The working population in the long table data of "China Census 2000" is transformed into the working population of the whole country according to the sampling ratio of 9.5% in each province, autonomous region, and municipality.

4. The "China Census 2010" long form selects 10% of households to fill in the report. The working population in the long form data is converted into the national working population at a sampling ratio of 9.554% in each province, autonomous region, and municipality directly under the Central Government. Calculation method: Long form sampling ratio = Long table total population / Census total population.

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 using 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 and Hong Kong, employment rate $empr(y, s, a, e)$ includes data by age, sex and education for individuals older than 15 from 1985 to 2019 Taiwan and 1990 to 2019 (Hong Kong). 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 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.[21]

The data used to calculate the rural growth rate are real rural income, where real rural income is nominal income deflated with the rural CPI. The rural real income growth rate in period T 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 formula is below:

$$Gr\_Rate_T = (Real\_Income_T - Real\_Incom_{T-1})/Real\_Income_{T-1}$$

The data used to calculate the urban growth rate are real urban income, where real urban income is nominal income deflated with the urban CPI. The urban real income growth rate in period T 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 34-year period from 1985 to 2019, the growth rate is on average 6.23% and 8.15% annually in the rural and urban

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[21] 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 wages 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.

sectors, respectively, and we use these in the J-F calculation.[22]

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 Table 3.3.1, where we assume that each province grows at a fixed annual rate.

<div align="center">Table3.3.1 Provincial Growth Rate</div>

<div align="right">Unit: %</div>

Province	Urban	Province	Rural
Beijing	9.57%	Zhejiang	7.15%
Shanghai	9.05%	Fujian	7.10%
Zhejiang	8.64%	Henan	6.93%
Anhui	8.60%	Hebei	6.56%
Tianjin	8.46%	Shandong	6.54%
Inner Mongolia	8.36%	Jiangsu	6.51%
Shandong	8.34%	Guangxi	6.46%
Chongqing	8.22%	Jiangxi	6.41%
Sichuan	8.19%	Anhui	6.41%
Guizhou	8.18%	Sichuan	6.40%
Hainan	8.16%	Chongqing	6.31%
Nation	8.15%	Tianjin	6.30%
Hubei	8.15%	Heilongjiang	6.27%
Jiangsu	8.13%	Jilin	6.26%
Yunnan	8.04%	Nation	6.23%
Fujian	8.03%	Hubei	6.23%
Hebei	7.98%	Inner Mongolia	6.18%
Jiangxi	7.95%	Guangdong	6.06%

[22] 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.

Xizang	7.94%	Shaanxi	6.03%
Guangxi	7.91%	Ningxia	6.01%
Jilin	7.89%	Liaoning	5.85%
Guangdong	7.83%	Shanxi	5.77%
Henan	7.82%	Hunan	5.57%
Shaanxi	7.72%	Guizhou	5.55%
Liaoning	7.72%	Yunnan	5.50%
Ningxia	7.68%	Gansu	5.44%
Heilongjiang	7.65%	Hainan	5.31%
Xinjiang	7.58%	Xinjiang	5.12%
Hunan	7.49%	Qinghai	5.07%
Shanxi	7.41%	Beijing	5.00%
Gansu	7.00%	Xizang	4.87%
Qinghai	6.13%	Shanghai	—

For Hong Kong, the data used to calculate growth rate is the average wage index, which we adjust to derive a real wage index. Calculated using the 1980-2019 Hong Kong Real Wage Index published on the website of the Hong Kong Census and Statistics Department (1999Q1 = 100). Calculation method: The actual salary index is adjusted to 1999Q4=100. The actual salary growth rate in year T is equal to the difference between the actual salary index in year T and the actual salary in year T-1 divided by the actual salary index in year T-1. We obtain an average annual growth rate for Hong Kong of 2.48%.

For Taiwan, the data used to calculate growth rate is regular salary (1980-2019). Its calculation method: The consumer price index is adjusted to 1985 as the base period, the actual salary level is equal to the regular salary divided by the actual consumer price index, and the actual salary growth rate in year T is equal to the difference between the actual salary in year T and the actual salary in year T-1 The value is divided by the actual salary in T-1 year. The result shows that, the growth rate on average is 4.00% annually in

Taiwan.

3.3.6 The discount rate

The discount rate that is used calculate the present value of future --t 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) as well as by the OECD consortium (OECD 2010).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 To test the sensitivity of our results to the choice of discount rate, we use alternative discount rates 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%[23], the average benchmark lending rate over 5 years in China from 1996 to 2009, 5.51%[24], and the social discount rate based on the method from the World Bank, 8.14%.[25] Only results based on the discount rate of 4.58% are reported here.

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[23] 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.

[24] 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.

[25] 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 in China

4.1 Population imputation

We use several data sources and methodologies to estimate human capital by year, age, sex, and educational attainment as outlined in Chapter 3. Data for the urban and rural populations disaggregated by age and gender are available for the years 1987, 1995, 2005 and 2015 from the 1% Population Sampling Survey and for 1982, 1990, 2000 and 2010 from the Population Census. For all other years, we use birth and mortality rates by age and sex, and enrollment at different levels of education and regions； to impute yearly urban and rural populations by age, sex and educational attainment. The levels of educational attainment are: illiterate (no schooling), primary school (Grades 1-6), junior middle school (Grades 7-9), senior middle school (Grades 10-12), and college or above. Additional statistical information is available since the year 2000, enabling separation college-level population into those who have completed college and those who report university or above.

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

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

(13)

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

given year, while outflow includes those who achieved the next level of education in that year. *EX (e, a, s)* is a discrepancy term.[26] Thus,

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

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

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

where ERS is the matriculation at level *e*; and λ is the age distribution at education level *e*. To obtain an accurate estimate of λ, we use macroeconomic data available in the (China Education Statistical Yearbook, 1987-2019). Details are reported in Appendix A.

4.2 Trend of population and education distribution

We present several features of China's population growth, based on the imputed population by educational attainment, age, sex, and rural-urban location.

China's total population increased from 1.00 billion in 1982 to 1.42 billion in 2019. The urban population increased by 676 million, while the rural population decreased by 258 million (Figure 4.2.1[27]).

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

[27] The nation and the mainland in this report refer to the 31 provinces (autonomous regions and municipalities) of the mainland, excluding Hong Kong, Macau, and Taiwan.
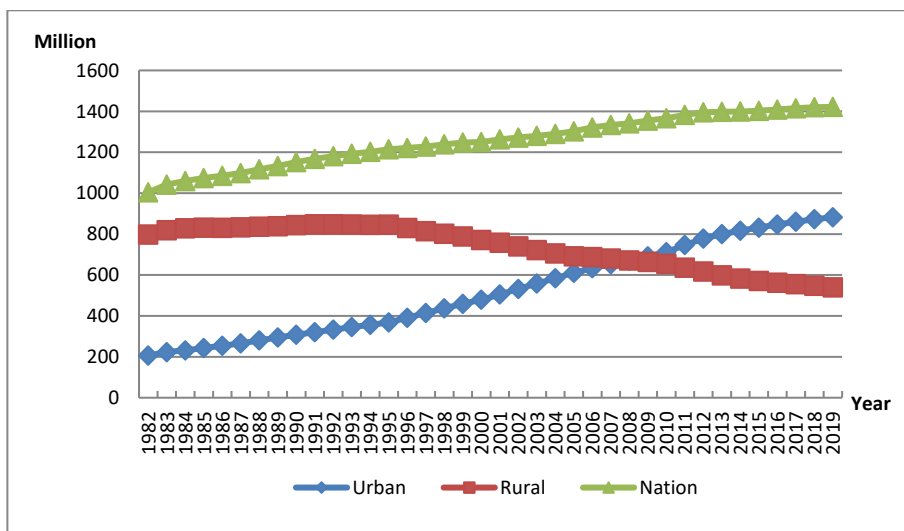
Figure 4.2.1 Population in China by Location 1982-2019

Figures 4.2.2-4.2.4 show the time paths of the national, urban and rural populations classified by educational attainment from 1982 to 2019. The illiterate population fell from 321 million in 1982 to136 million in 2000, but it was relatively stable from 2000 to 2019. The number of primary school graduates increased from 343 million in 1982 to the peak of 402 million in 1997, after which it declined gradually, reaching 199 million in 2019. This decline is the complement of the increased attainment of higher levels of education; reflected in the rapid growth of junior middle school graduates.

The number of junior middle school students grew most among all education levels, increasing from 176 million in 1982 to 414 million in 2019. Senior middle school graduates increased from 66 million in 1982 to 209 million in 2019, while those who graduated from college or above increased from only 6 million in 1982 to 199 million in 2019. The growth of senior middle school and college-and-above graduates was sharply boosted by college expansion program initiated in 1999. Although the proportions of the population who have achieved these education levels are still small, the population of individuals aged 16 years exceeds the number of those whose

highest education level was graduation from middle school or college-and-above in the 1980s and 1990s. The number individuals aged 16 years in 2018 is much greater than the number of individuals with at least a senior middle school level of education. Moreover, the growth of these groups in rural areas is much slower than that in the urban areas.
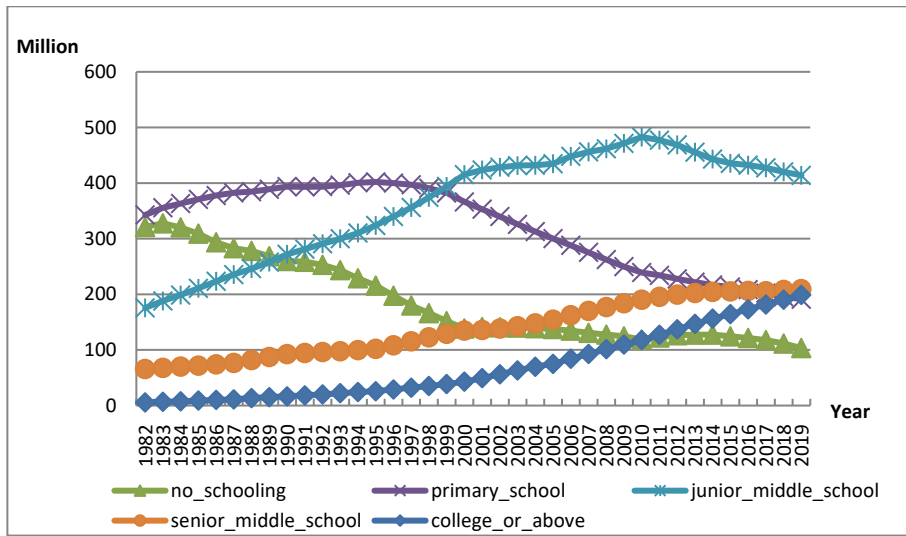
Figure 4.2.2 Population by Education Attainment in China 1982-2019
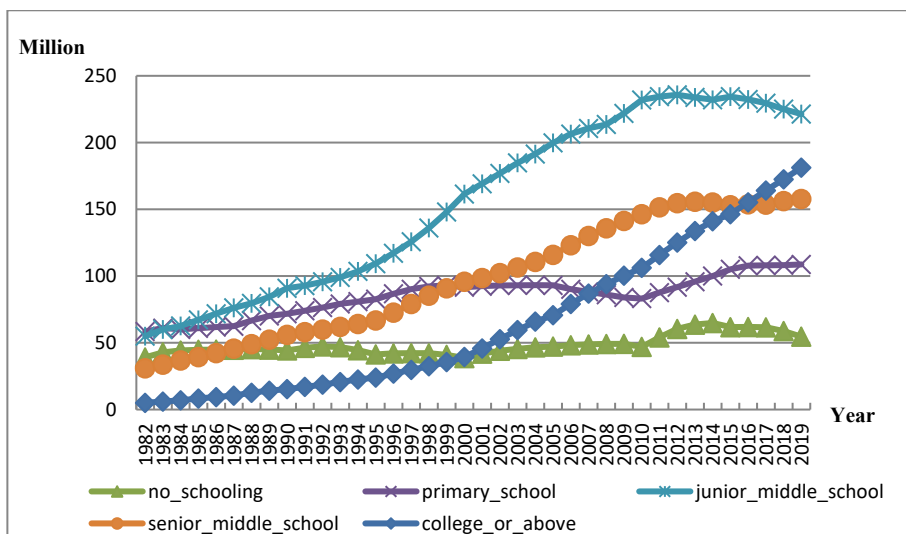
Figure 4.2.3 Urban Population by Educational Attainment 1982-2019
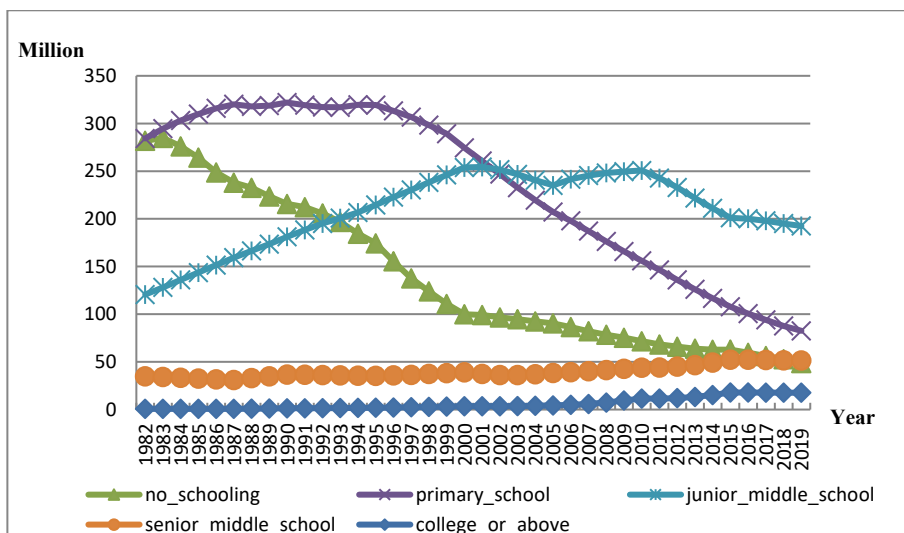
Figure 4.2.4 Rural Population by Educational Attainment 1982-2019

Figures 4.2.5 to 4.2.8 illustrate the increase in educational attainment over the years 1985, 1995, 2010 and 2015 categorized by gender and region. In 1985, among the five education levels, the proportion of the illiterate population and those achieving only primary education dominated the distribution. The 1995 distribution is dominated by individuals with maximum primary and junior middle education while by 2010, junior middle had become the dominant level of education achievement. Junior middle school continues to be the dominant education level in 2015. Female educational attainment has increased relative to that of males; the number of illiterate females decreased at a greater rate than that of illiterate males, and the gender gap at higher education levels also shrank considerably.
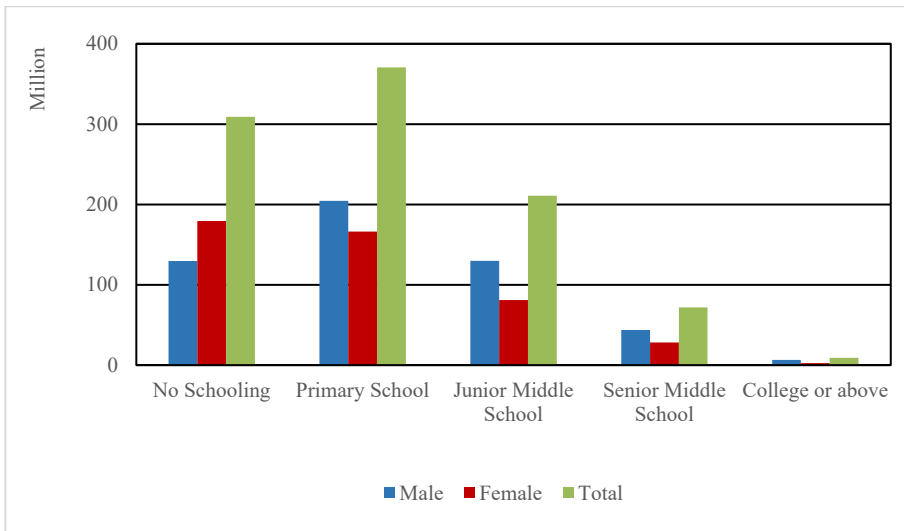
Figure 4.2.5 Population of Different Educational Levels by Gender, 1985
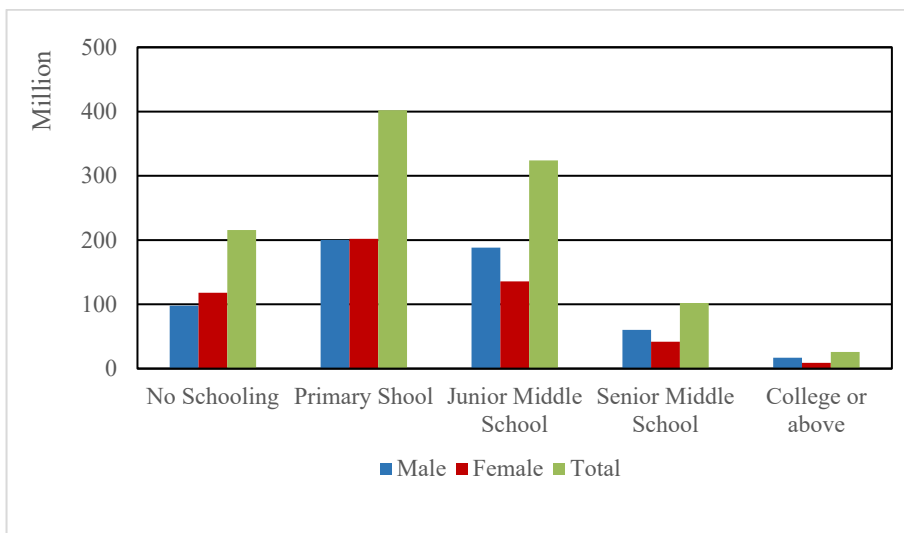
Figure 4.2.6 Population of Different Educational Levels by Gender, 1995
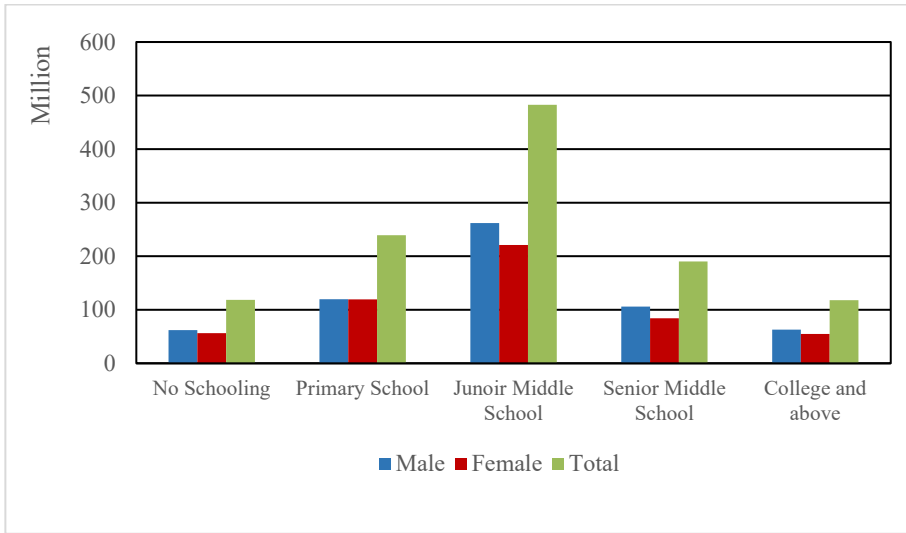
Figure 4.2.7 Population of Different Educational Levels by Gender, 2010
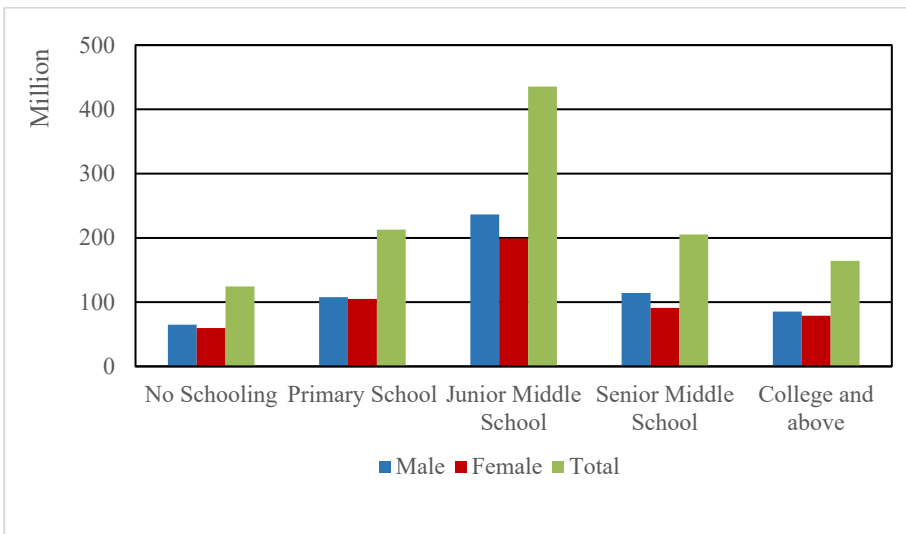
Figure 4.2.8 Population of Different Educational Levels by Gender, 2015

Chapter 5 Age and Education of the Labor Force

In order to know more about the aging of the labor force, education status and higher education penetration rate of each province, we calculated the average age of the labor force, the average number of years of education and the proportion of the population with high school or above education levels in each province.

Through analysis of these three indicators, the results of the cross-provincial comparison of human capital in China can be explained to some extent. Further urban-rural comparisons help to determine the main reasons for the human capital urban-rural provincial disparities.

Through longitudinal comparison, we can see the trend of the three indicators over time, which is helpful to understand the growth of human capital in China.

5.1 Definition of the Labor Force and Education Levels

Definition of the Labor Force:

Mainland: age 16-55 for female excluding students and age 16-60 for male excluding students.

Hong Kong: age 15-60 for female excluding students and age 15-65 for male excluding students.

Taiwan: age 15-60 for female excluding students and age 15-60 for male excluding students.

Definitions of educational attainment levels are shown in the table below:

Table5.1.1 Levels of Educational Attainment before 2000

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

5.2 Average Age of the National Labor Force
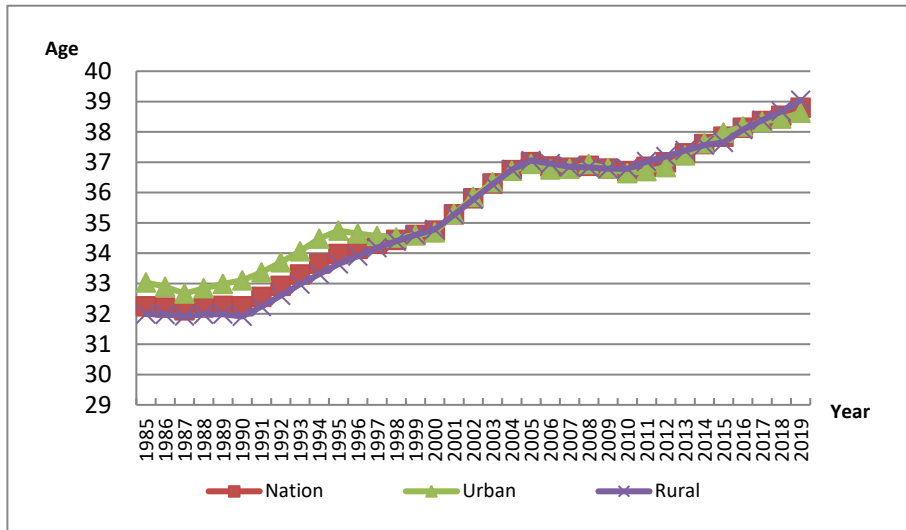
Figure5.2.1 Average Age of the National Labor Force[28]

Figure 5.2.1 shows the average age of the labor force, which is calculated with census data and the 1% sample data. It is worth noting that in the 1987, 1995, and 2005 1% sample data, the age structures and education levels are questionable. For example, comparing the 2000 1% sample data to the 2005 1% sample data, the population with an education level of high school or above was 182.30 million in 2000; while in 2005, the population with the same education level was 215.72 million, which is 33.42 million more than those in 2000. Total high school enrollment from 2001 to 2005 was 58.17 million. All of these figures can be accurate only if the number of deaths in this time period is as high as 24.76 million, accounting for 13.58% of individuals with a high school or above level of

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[28] Note: The average age of the national labor force is calculated according to census data and 1% sample data.

education in 2000.

Also, according to the 2005 1% sample data, the male population 20-24 years old was 37.73 million, this part of the population was 64.02 million in 2010 according to the census, indicating an increase of 26.29 million. Taking into account of deaths, this part of the population should have decreased in 2010. Due to minor statistical errors, there may have been an increase in 2010, but the population increase rate of 69.67% is too high. Thus, it implies that the age structure and education level data in the 2005 1% sample data are unreliable.

The national average age of labor force rose from age 32.25 in 1985 to age 38.80 in 2019, the average age of labor force in rural areas increased from age 31.99 in 1985 to age 39.05 in 2019, and the average age in urban increased from age 33.03 in 1985 to age 38.63 in 2019. After 2005, as the labor force (mainly young labor force) migrated into urban areas, the difference in average age of labor force between the urban and rural areas gradually narrowed.

Table 5.2.1 Average Age of the National Labor Force（1985-2019）

Unit：Year (of age)

Year	Average Age of the Labor Force		
	Nation	**Urban**	**Rural**
1985	32.25	33.03	31.99
1986	32.21	32.89	31.98
1987	32.12	32.67	31.93
1988	32.21	32.84	31.99
1989	32.26	32.99	31.99
1990	32.25	33.10	31.91
1991	32.56	33.37	32.24
1992	32.92	33.70	32.60

Year	Average Age of the Labor Force		
	Nation	**Urban**	**Rural**
1993	33.30	34.06	32.98
1994	33.66	34.48	33.31
1995	33.97	34.74	33.64
1996	34.14	34.65	33.90
1997	34.31	34.57	34.18
1998	34.44	34.52	34.40
1999	34.60	34.59	34.60
2000	34.74	34.69	34.78
2001	35.28	35.29	35.27
2002	35.81	35.85	35.78
2003	36.30	36.34	36.27
2004	36.74	36.71	36.76
2005	37.00	36.94	37.06
2006	36.86	36.76	36.95
2007	36.82	36.79	36.85
2008	36.88	36.94	36.83
2009	36.79	36.79	36.79
2010	36.71	36.64	36.78
2011	36.85	36.70	37.02
2012	36.99	36.84	37.19
2013	37.29	37.22	37.39
2014	37.60	37.63	37.56
2015	37.84	37.98	37.65
2016	38.13	38.18	38.07
2017	38.36	38.34	38.38
2018	38.53	38.43	38.67
2019	38.80	38.63	39.05
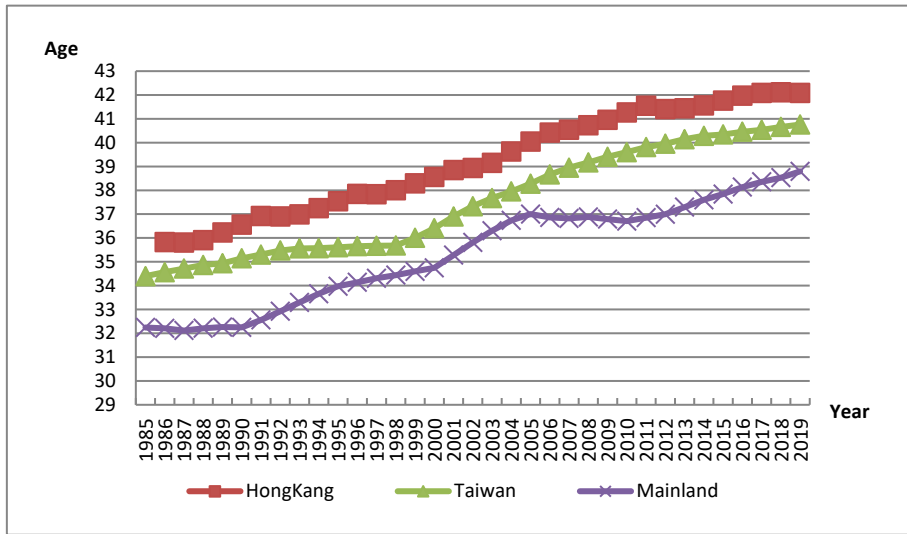
Figure5.2.2 Average Age of the Labor Force in Mainland, Hong Kong and Taiwan

Figure 5.2.2 shows the trends of the average age of the labor force in Mainland, Hong Kong and Taiwan. Table 5.2.2 shows the specific data. The average age of the labor force in Hong Kong increased from 35.82 in 1986 to 42.09 in 2019, while that of Taiwan increased from 34.40 in 1985 to 40.76 in 2019. The labor force average age of Taiwan always lies between that of Hong Kong and Mainland.

Table5.2.2 Average Age of the Labor Force in Mainland, Hong Kong and Taiwan

Unit：Year (of age)

Year	Average Age of the Labor Force		
	Hong Kong	**Taiwan**	**Mainland**
1985		34.40	32.25
1986	35.82	34.56	32.21
1987	35.80	34.71	32.12
1988	35.91	34.86	32.21

Year	Average Age of the Labor Force		
	Hong Kong	**Taiwan**	**Mainland**
1989	36.22	34.94	32.26
1990	36.56	35.14	32.25
1991	36.92	35.30	32.56
1992	36.90	35.47	32.92
1993	36.99	35.56	33.30
1994	37.25	35.57	33.66
1995	37.54	35.61	33.97
1996	37.85	35.65	34.14
1997	37.83	35.67	34.31
1998	38.00	35.68	34.44
1999	38.29	36.00	34.60
2000	38.56	36.41	34.74
2001	38.85	36.90	35.28
2002	38.93	37.33	35.81
2003	39.15	37.67	36.30
2004	39.63	37.95	36.74
2005	40.04	38.28	37.00
2006	40.42	38.66	36.86
2007	40.54	38.95	36.82
2008	40.73	39.17	36.88
2009	40.95	39.40	36.79
2010	41.26	39.60	36.71
2011	41.54	39.81	36.85
2012	41.41	39.95	36.99
2013	41.44	40.14	37.29
2014	41.56	40.28	37.60
2015	41.76	40.34	37.84
2016	41.97	40.46	38.13
2017	42.08	40.54	38.36
2018	42.11	40.66	38.53
2019	42.09	40.76	38.80

5.3 Average Years of Schooling of the National Labor Force
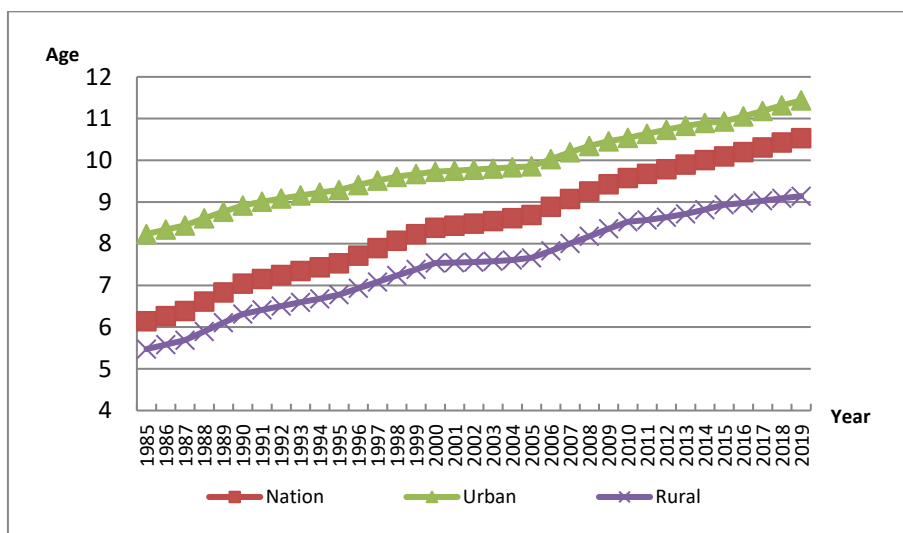
Figure5.3.1 Average Years of Schooling of the National Labor Force[29]

Figure 5.3.1 shows average schooling years of the national labor force, calculated on all the census data and 1% sample data and it shows the upward trend in average schooling years of the national labor force from 1985 to 2019. The national average years of schooling increased from 6.14 years in 1985 to 10.53 in 2019. The rural average years of schooling increased from 5.47 in 1985 to 9.14 in 2019 while the urban average years increased from 8.23 to 11.44 during the same period.

Table5.3.1 Average Years of Schooling of the National Labor Force (1985-2018)

Unit: Year

Year	Average Years of Schooling		
	Nation	**Urban**	**Rural**
1985	6.14	8.23	5.47
1986	6.27	8.34	5.58

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[29] Note: The average age of the national labor force is calculated using census data and 1%-sample data.

Year	Average Years of Schooling		
	Nation	**Urban**	**Rural**
1987	6.39	8.44	5.69
1988	6.61	8.61	5.90
1989	6.83	8.77	6.11
1990	7.04	8.92	6.31
1991	7.15	9.01	6.41
1992	7.25	9.08	6.50
1993	7.35	9.16	6.60
1994	7.43	9.23	6.68
1995	7.53	9.29	6.78
1996	7.72	9.41	6.93
1997	7.90	9.52	7.08
1998	8.07	9.60	7.24
1999	8.23	9.67	7.38
2000	8.38	9.73	7.54
2001	8.43	9.75	7.55
2002	8.48	9.78	7.56
2003	8.54	9.80	7.58
2004	8.61	9.83	7.61
2005	8.69	9.86	7.66
2006	8.88	10.03	7.83
2007	9.07	10.19	8.00
2008	9.25	10.34	8.18
2009	9.42	10.46	8.36
2010	9.57	10.54	8.53
2011	9.68	10.64	8.57
2012	9.79	10.73	8.63
2013	9.90	10.82	8.72
2014	10.00	10.89	8.82
2015	10.10	10.93	8.93
2016	10.20	11.05	8.98
2017	10.31	11.19	9.03
2018	10.43	11.32	9.09
2019	10.53	11.44	9.14

Figure5.3.2 and Table 5.3.2 show the trends of average years of schooling of the labor force in the Mainland, Hong Kong and Taiwan. The labor force average years of schooling of Hong Kong increased from 8.93 in 1986 to 12.42 in 2019, while that of Taiwan increased from 8.86 in 1985 to 13.81 in 2019. The labor force years of schooling of Hong Kong and Taiwan were similar in 1985-2000, and both of them were significantly higher than that of the Mainland.
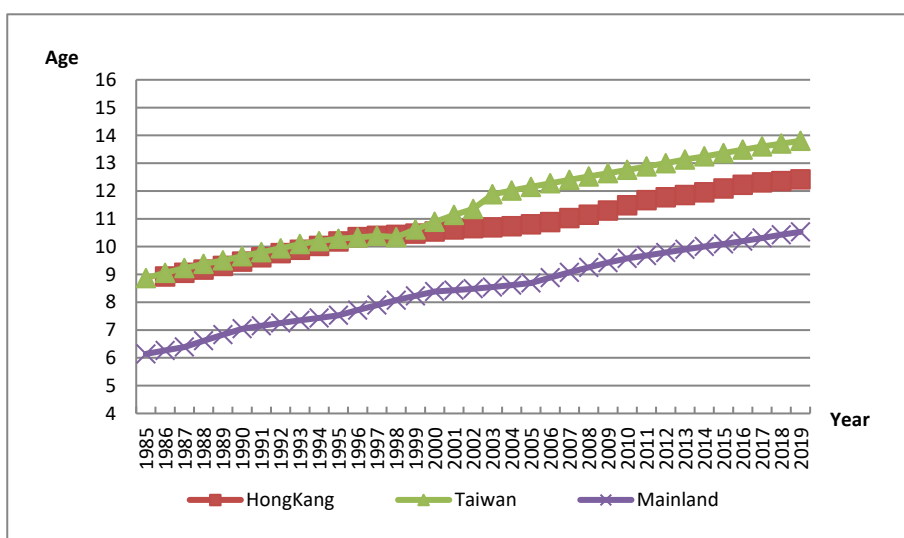
Figure 5.3.2 Average Years of Schooling of the Labor Force in Mainland, Hong Kong and Taiwan

Table5.3.2 Average Years of Schooling of the Labor Force in Mainland, Hong Kong and Taiwan

Unit: Year

Year	Average Years of Schooling		
	Hong Kong	**Taiwan**	**Mainland**
1985		8.86	6.14
1986	8.93	9.06	6.27
1987	9.06	9.23	6.39
1988	9.17	9.38	6.61
1989	9.30	9.50	6.83
1990	9.46	9.65	7.04

Year	Average Years of Schooling		
	Hong Kong	**Taiwan**	**Mainland**
1991	9.61	9.80	7.15
1992	9.76	9.94	7.25
1993	9.88	10.09	7.35
1994	10.02	10.20	7.43
1995	10.18	10.28	7.53
1996	10.34	10.33	7.72
1997	10.39	10.39	7.90
1998	10.42	10.34	8.07
1999	10.47	10.62	8.23
2000	10.54	10.89	8.38
2001	10.61	11.14	8.43
2002	10.66	11.35	8.48
2003	10.69	11.88	8.54
2004	10.73	12.02	8.61
2005	10.80	12.15	8.69
2006	10.88	12.28	8.88
2007	11.02	12.40	9.07
2008	11.15	12.52	9.25
2009	11.29	12.64	9.42
2010	11.48	12.76	9.57
2011	11.67	12.88	9.68
2012	11.77	13.00	9.79
2013	11.85	13.13	9.90
2014	11.95	13.24	10.00
2015	12.09	13.36	10.10
2016	12.22	13.49	10.20
2017	12.31	13.60	10.31
2018	12.36	13.70	10.43
2019	12.42	13.81	10.53
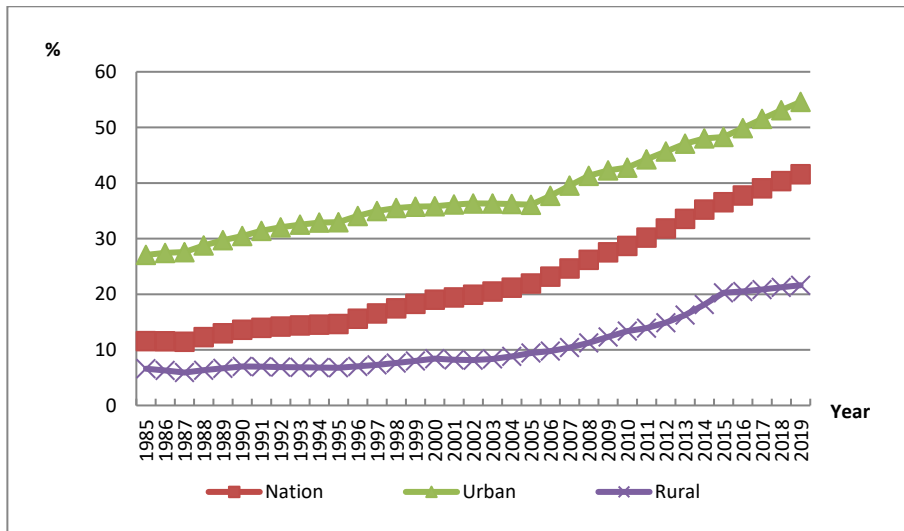
Figure5.3.3 Proportions of High School or Above in the Labor Force[30]

Figure 5.3.3 shows the proportion of high school education level or above in the labor force, which is calculated based on the census data and 1% sample data. It shows that the proportion as a whole had a significant upward trend over time. The national proportion of labor force with at least high school education increased from 11.56% in 1985 to 41.57% in 2019, the rural proportion increased from 6.61% in 1985 to 21.62% in 2019, and the urban proportion increased from 27.07% in 1985 to 54.59% in 2019.

Table5.3.3 National Proportions of High School or Above of the National Labor Force (1985-2019)

Unit: %

Year	Proportions of High School or Above		
	Nation	**Urban**	**Rural**
1985	11.56	27.07	6.61
1986	11.54	27.44	6.29
1987	11.45	27.58	5.92

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[30] Note: The average age of the national labor force is calculated using census data and 1%-sample data.

Year	Proportions of High School or Above		
	Nation	**Urban**	**Rural**
1988	12.28	28.78	6.34
1989	12.99	29.73	6.69
1990	13.60	30.46	7.01
1991	13.95	31.40	6.97
1992	14.19	32.05	6.90
1993	14.38	32.51	6.85
1994	14.52	32.89	6.81
1995	14.64	32.96	6.79
1996	15.60	34.08	7.03
1997	16.56	34.98	7.30
1998	17.47	35.51	7.64
1999	18.26	35.75	8.01
2000	19.01	35.82	8.41
2001	19.43	36.14	8.22
2002	19.90	36.33	8.15
2003	20.48	36.31	8.36
2004	21.19	36.23	8.82
2005	21.94	36.10	9.43
2006	23.17	37.70	9.78
2007	24.63	39.53	10.41
2008	26.18	41.30	11.26
2009	27.55	42.27	12.33
2010	28.68	42.77	13.38
2011	30.19	44.27	13.91
2012	31.82	45.66	14.88
2013	33.57	47.08	16.26
2014	35.23	48.03	18.15
2015	36.55	48.29	20.26
2016	37.76	49.88	20.50
2017	39.07	51.53	20.85
2018	40.36	53.10	21.25
2019	41.57	54.59	21.62
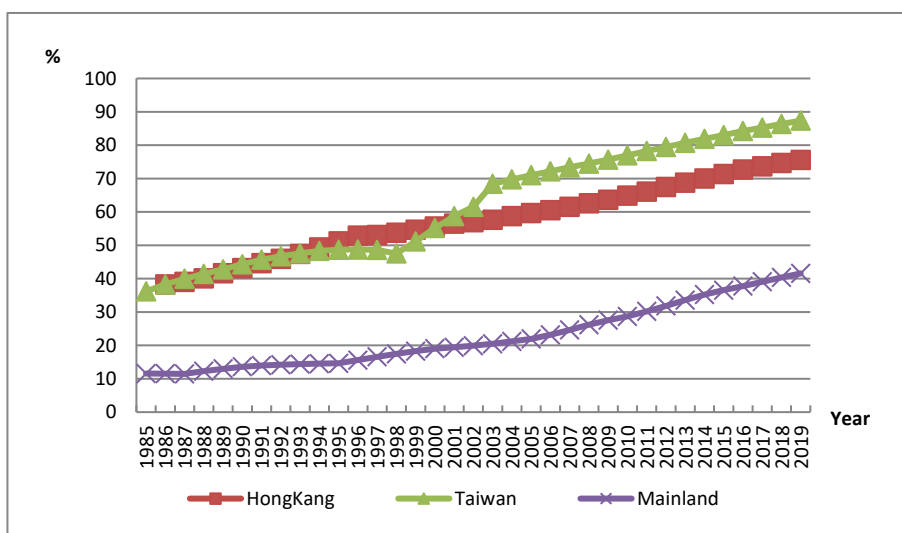
Figure 5.3.4 Proportions of High School Education or Above in the Labor Force of Mainland, Hong Kong and Taiwan

Figures 5.3.4 and Table 5.3.4 show the trends in proportions of population with high school educational attainment or above in the labor force of Mainland, Hong Kong and Taiwan. The proportion in Hong Kong increased from 38.27% in 1986 to 75.60% in 2019 while that of Taiwan increases from 45.69% in 1985 to 87.36% in 2019. The proportion in Hong Kong was greater than that in Taiwan before 2001, but the former one became smaller than the latter one since 2001; the proportions in both regions always exceeded that in Mainland China.

Table5.3.4 Proportions of High School Education or Above in the Labor Force of Mainland, Hong Kong and Taiwan

Unit: %

Year	Proportions of High School Education or Above		
	Hong Kong	**Taiwan**	**Mainland**
1985	-	36.2	11.56
1986	38.27	38.28	11.54
1987	39.04	39.98	11.45
1988	40.08	41.43	12.28

Year	Proportions of High School Education or Above		
	Hong Kong	Taiwan	Mainland
1989	41.63	42.78	12.99
1990	43.17	44.32	13.6
1991	44.63	45.69	13.95
1992	45.92	46.71	14.19
1993	47.41	47.58	14.38
1994	49.32	48.31	14.52
1995	51.15	48.68	14.64
1996	52.89	48.73	15.6
1997	53.08	48.61	16.56
1998	53.74	47.55	17.47
1999	54.68	51.16	18.26
2000	55.61	55.17	19.01
2001	56.5	58.74	19.43
2002	56.94	61.54	19.9
2003	57.65	68.41	20.48
2004	58.76	69.77	21.19
2005	59.66	71	21.94
2006	60.51	72.19	23.17
2007	61.51	73.37	24.63
2008	62.58	74.48	26.18
2009	63.65	75.68	27.55
2010	64.89	76.96	28.68
2011	66.09	78.25	30.19
2012	67.49	79.45	31.82
2013	68.76	80.72	33.57
2014	69.99	81.9	35.23
2015	71.34	83.02	36.55
2016	72.72	84.24	37.76
2017	73.66	85.27	39.07
2018	74.67	86.35	40.36
2019	75.6	87.36	41.57
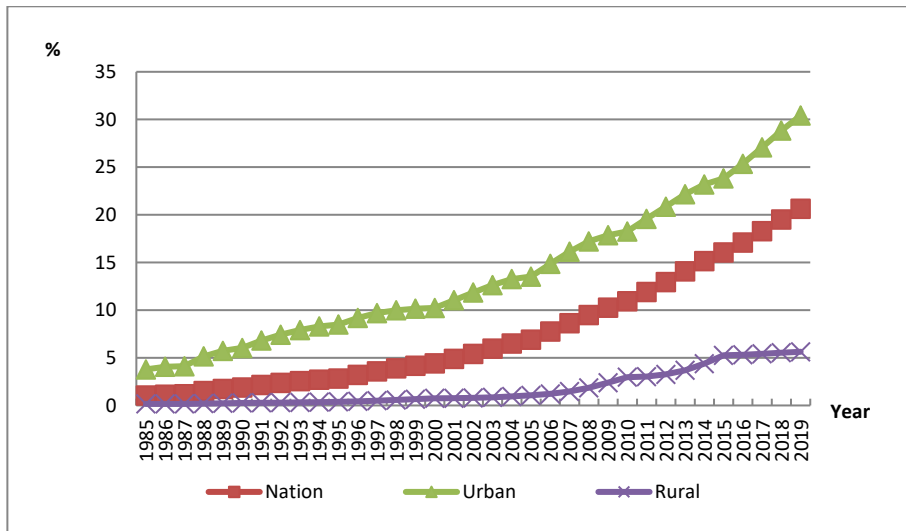
Figure 5.3.5 National Proportions of College Education or Above of the National Labor Force[31]

Figure 5.3.5 shows proportion workers with education of college or above in labor force. We use census data and the 1%-sample data to obtain these results. It shows that national proportion of labor force with schooling of college or above in the labor force increased from 1.04% in 1985 to 20.63% in 2019. Besides, the proportion in the rural areas increased from 0.16% in 1985 to 5.63% in 2019, while that in the urban areas increased from 3.78% to 30.42%. The upward trend is consistent with the improvement and expansion of higher education in China.

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[31] Note: The average age of the national labor force is calculated using census data and 1%-sample data.

Table 5.3.5 National Proportions of College or Above of the National Labor Force (1985-2019)

Unit: %

Year	Proportions of College or Above		
	Nation	**Urban**	**Rural**
1985	1.04	3.78	0.16
1986	1.13	4.06	0.16
1987	1.17	4.12	0.16
1988	1.51	5.15	0.20
1989	1.74	5.73	0.23
1990	1.89	6.03	0.27
1991	2.15	6.81	0.28
1992	2.36	7.43	0.30
1993	2.55	7.91	0.32
1994	2.70	8.29	0.35
1995	2.81	8.49	0.38
1996	3.20	9.18	0.43
1997	3.58	9.69	0.50
1998	3.89	9.98	0.58
1999	4.17	10.15	0.66
2000	4.42	10.23	0.76
2001	4.89	11.05	0.76
2002	5.41	11.85	0.80
2003	5.96	12.63	0.85
2004	6.50	13.26	0.94
2005	6.91	13.52	1.07
2006	7.76	14.85	1.21
2007	8.63	16.13	1.46
2008	9.48	17.21	1.85
2009	10.25	17.86	2.39
2010	10.93	18.25	2.97
2011	11.90	19.58	3.03
2012	12.94	20.86	3.26
2013	14.06	22.16	3.69
2014	15.14	23.18	4.39
2015	16.05	23.82	5.26
2016	17.09	25.35	5.32

Year	Proportions of College or Above		
	Nation	**Urban**	**Rural**
2017	18.28	27.07	5.42
2018	19.51	28.83	5.53
2019	20.63	30.42	5.63
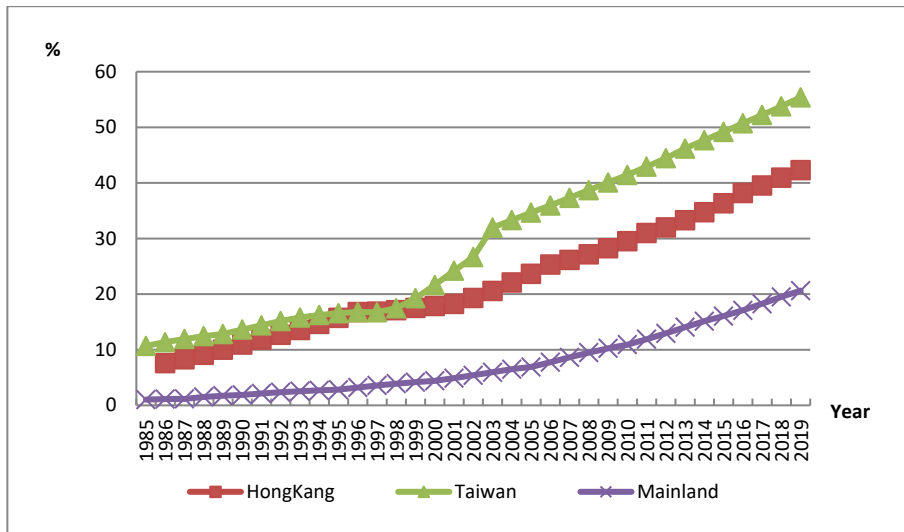
Figure 5.3.6 Proportions of College Education or Above in the Labor Force of Mainland, Hong Kong and Taiwan

Figures 5.3.6 and Table5.3.6 show the trends in the proportions of labor force with college educational attainment or above in the labor force of Mainland, Hong Kong and Taiwan. The proportion in Hong Kong increased from 7.58% in 1986 to 42.29% in 2019, while that in Taiwan increased from 10.70% in 1985 to 55.39% in 2019. The proportion in Taiwan was greater than that of Hong Kong in general, and the proportions in these two areas were always much greater than that in Mainland China.

Table5.3.6 Proportions of College Education or Above in the Labor Force of Mainland, Hong Kong and Taiwan

Unit: %

Year	Proportions of College Education or Above		
	Hong Kong	**Taiwan**	**Mainland**
1985		10.70	1.04
1986	7.58	11.37	1.13
1987	8.29	11.93	1.17
1988	9.08	12.45	1.51
1989	10.01	12.84	1.74
1990	10.94	13.63	1.89
1991	11.83	14.39	2.15
1992	12.67	15.17	2.36
1993	13.54	15.80	2.55
1994	14.63	16.24	2.70
1995	15.73	16.58	2.81
1996	16.76	16.78	3.20
1997	16.85	16.75	3.58
1998	17.12	17.47	3.89
1999	17.51	19.27	4.17
2000	17.87	21.64	4.42
2001	18.23	24.22	4.89
2002	19.31	26.66	5.41
2003	20.57	31.97	5.96
2004	22.09	33.31	6.50
2005	23.66	34.66	6.91
2006	25.32	35.94	7.76
2007	26.15	37.32	8.63
2008	27.16	38.71	9.48
2009	28.26	40.07	10.26
2010	29.52	41.42	10.93
2011	30.98	42.92	11.90
2012	32.00	44.45	12.94
2013	33.28	46.18	14.06
2014	34.73	47.69	15.14
2015	36.33	49.16	16.05
2016	38.17	50.72	17.09

Year	Proportions of College Education or Above		
	Hong Kong	Taiwan	Mainland
2017	39.54	52.22	18.28
2018	40.94	53.78	19.51
2019	42.29	55.39	20.63

5.4 Average Age of the Labor Force at the Provincial Level

Table 5.4.1 shows the comparison of average age of the labor force in 2019 among all provinces in China in descending order in the total, rural and urban labor forces. In general, the average age of the labor force is between 33 and 40 years (of age) in 2019, and the three northeast provinces of China (Heilongjiang，Liaoning, and Jilin) ranked at the oldest, while Tibet is the youngest.

Table 5.4.1 Average Age of the Labor Force at Provincial Level (2019)

Unit: Year (of age)

Rank	Province	Average Age		
		Sub-Total	Urban	Rural
1	Heilongjiang	40.47	40.36	40.64
2	Liaoning	40.30	40.25	40.39
3	Jilin	40.15	39.99	40.38
4	Inner Mongolia	39.59	39.15	40.39
5	Zhejiang	39.48	38.95	40.69
6	Hunan	39.46	39.56	39.34
7	Shandong	39.40	38.77	40.40
8	Chongqing	39.39	39.55	39.03
9	Jiangsu	39.19	38.89	39.93
10	Hubei	39.19	38.72	39.91
11	Sichuan	39.02	38.47	39.65
12	Hebei	38.97	38.75	39.22
13	Shanghai	38.75	38.75	-

Rank	Province	Average Age		
		Sub-Total	Urban	Rural
14	Tianjin	38.68	38.59	39.16
15	Fujian	38.58	38.31	39.13
16	Jiangxi	38.46	38.51	38.40
17	Anhui	38.37	38.18	38.59
18	Shanxi	38.36	38.42	38.28
19	Guangxi	38.23	37.82	38.69
20	Shaanxi	38.10	37.35	39.12
21	Qinghai	38.07	38.43	37.63
22	Beijing	38.05	37.87	39.27
23	Gansu	37.99	37.73	38.22
24	Henan	37.98	37.93	38.02
25	Yunnan	37.96	37.58	38.30
26	Xinjiang	37.67	38.05	37.33
27	Ningxia	37.55	38.03	36.88
28	Guangdong	37.27	37.29	37.19
29	Hainan	37.03	36.81	37.36
30	Guizhou	36.68	36.46	36.89
31	Tibet	36.47	32.77	38.93
	Mainland	38.80	38.63	39.05

5.5 Education Indicators at the Provincial Level

Table 5.5.1 shows the provincial rankings of average years of schooling of the labor force in 2019 in the total, rural and urban labor forces. In general, the average years of education of the labor force in the provinces with better economic development, such as Beijing, Shanghai, and Tianjin, are correspondingly longer; the average years of education in the provinces with lower development levels, such as Tibet, Qinghai, and Yunnan, are shorter. Judging from the comparison of urban and rural provincial areas, the urban labor force in all mainland provinces has more years of education

than rural, and this difference will be even greater in economically underdeveloped provinces. For example, the difference in years of education between urban and rural areas in Tibet is as high as 4.48 years, while the gap in Beijing is only 2.81.

Table 5.5.1 Average Years of Schooling of the Labor Force at Provincial Level (2019)

Unit: Year

Rank	Province	Average Years of Schooling		
		Sub-total	Urban	Rural
1	Beijing	13.08	13.44	10.63
2	Shanghai	12.08	12.08	-
3	Tianjin	11.47	11.82	9.59
4	Jiangsu	11.08	11.62	9.79
5	Liaoning	11.07	11.94	9.12
6	Shaanxi	10.92	11.95	9.51
7	Hubei	10.90	11.86	9.39
8	Shanxi	10.84	11.71	9.67
9	Inner Mongolia	10.76	11.66	9.11
10	Hunan	10.76	11.70	9.62
11	Shandong	10.66	11.54	9.29
12	Guangdong	10.66	11.07	9.57
13	Chongqing	10.60	11.28	9.11
14	Jilin	10.58	11.83	8.91
15	Zhejiang	10.46	10.92	9.41
16	Hainan	10.44	11.16	9.41
17	Hebei	10.43	11.37	9.31
18	Heilongjiang	10.42	11.47	8.84
19	Henan	10.36	11.29	9.38
20	Anhui	10.30	11.30	9.11
21	Fujian	10.29	10.92	9.04
22	Jiangxi	10.28	11.15	9.21
23	Xinjiang	10.16	11.79	8.71
24	Guangxi	10.13	11.27	8.88
25	Sichuan	10.13	11.31	8.77
26	Ningxia	10.05	11.21	8.41

Rank	Province	Average Years of Schooling		
		Sub-total	Urban	Rural
27	Gansu	9.85	11.69	8.30
28	Guizhou	9.45	10.73	8.25
29	Yunnan	9.43	10.89	8.12
30	Qinghai	8.82	10.41	6.89
31	Tibet	7.35	10.04	5.56
	Mainland	10.53	11.44	9.14

Table 5.5.2 shows the 2019 provincial rankings for the proportion of labor force with high school education or above in the total, rural and urban labor forces. Beijing, Shanghai and Tianjin have the highest average years of schooling, while Tibet and Yunnan are at the bottom.

Table5.5.2 The Proportion of High School Education or Above of the Labor Force at Provincial Level (2019)

Unit：%

Rank	Province	The proportion of high school education or above		
		Sub-total	Urban	Rural
1	Beijing	73.12	77.46	43.66
2	Shanghai	60.12	60.12	-
3	Tianjin	51.82	57.32	22.13
4	Jiangsu	48.69	56.18	30.56
5	Hunan	46.24	60.29	29.13
6	Hubei	46.17	60.48	23.81
7	Shaanxi	46.07	59.88	27.24
8	Inner Mongolia	45.25	57.98	22.02
9	Shanxi	44.99	58.46	26.77
10	Liaoning	44.70	58.39	14.09
11	Guangdong	44.48	50.55	27.99
12	Chongqing	43.94	53.46	22.83
13	Shandong	41.55	54.59	21.02
14	Zhejiang	40.78	46.62	27.39
15	Ningxia	40.55	54.73	20.45
16	Hainan	39.65	51.75	22.14

Rank	Province	The proportion of high school education or above		
		Sub-total	Urban	Rural
17	Fujian	39.62	47.76	23.30
18	Jilin	39.46	58.96	13.26
19	Gansu	39.02	61.60	19.99
20	Sichuan	38.47	54.74	19.70
21	Henan	38.46	53.60	22.34
22	Jiangxi	38.24	51.30	22.24
23	Xinjiang	37.05	64.71	12.36
24	Anhui	37.03	52.32	18.84
25	Hebei	36.92	51.93	19.15
26	Heilongjiang	36.38	52.79	11.65
27	Guangxi	34.98	52.09	16.13
28	Qinghai	32.08	48.20	12.54
29	Guizhou	31.82	48.97	15.70
30	Yunnan	30.65	48.64	14.49
31	Tibet	21.39	35.11	12.25
	Mainland	41.57	54.59	21.62

Table 5.5.3 shows the provincial rankings for the proportion of workers with college education or above in the labor force in 2019 in the total, rural and urban labor forces. The rankings are basically consistent with the rankings of the proportion of workers with high school education in general. However, because the permanent population includes many college students who are from other provinces, the number of college students is influenced by the number and quality of universities in the province, resulting in the ranking of the proportion of college-level or above education and the ranking of the proportion of high school level or above education is slightly different.

Table 5.5.3 Proportion of the Provincial Level labor Force with College Education or Above (2019)

Unit: %

Rank	Province	The proportion of college education or above		
		Sub-total	Urban	Rural
1	Beijing	54.27	59.67	17.54
2	Shanghai	40.89	40.89	-
3	Tianjin	31.97	36.49	7.54
4	Liaoning	26.58	36.58	4.22
5	Shaanxi	26.15	39.08	8.50
6	Jiangsu	25.89	32.75	9.30
7	Hubei	24.12	35.02	7.08
8	Inner Mongolia	23.98	33.08	7.37
9	Zhejiang	22.53	28.37	9.16
10	Ningxia	21.45	31.84	6.74
11	Jilin	21.34	34.18	4.09
12	Chongqing	21.26	28.51	5.20
13	Shandong	21.00	31.26	4.84
14	Shanxi	20.88	31.25	6.86
15	Fujian	20.47	27.43	6.53
16	Hunan	19.36	30.81	5.41
17	Heilongjiang	19.26	29.99	3.09
18	Gansu	19.19	34.84	6.01
19	Guangdong	18.49	23.36	5.25
20	Sichuan	18.28	29.67	5.12
21	Anhui	18.15	28.90	5.36
22	Hebei	17.78	29.05	4.45
23	Xinjiang	17.60	33.19	3.68
24	Hainan	16.77	23.93	6.41
25	Jiangxi	16.46	25.81	5.00
26	Guangxi	16.34	27.85	3.65
27	Qinghai	15.36	24.35	4.46
28	Yunnan	15.27	27.53	4.27
29	Henan	15.04	25.32	4.09
30	Guizhou	13.74	23.63	4.44
31	Tibet	13.08	27.37	3.55
	Mainland	20.63	30.42	5.63

Chapter 6   National human capital

6.1 Trends in human capital

It is more meaningful to discuss the trends of the real value of human capital stock than the nominal value.

We use the consumer price index (CPI) in 1985 as the base period to calculate the real value of national human capital. The reason for adopting this method is that: on the one hand, other published deflators are not available for recent years, which makes it inconvenient to update the calculation of real human capital, and the national statistical department updates the consumer price index every year. On the other hand, the real value of human capital calculated based on the consumer price index is smaller than the result calculated using capital deflator index of Zhang Jun et al. (2004) and Holz (2006). Therefore, we give a relatively conservative estimate of the real human capital stock in China.

Discussions of human capital categorized by gender and by region are important in our report, it can reflect the gender difference and urban-rural difference of human capital. Table 6.1.1 shows real human capital for the country as a whole based on 6-education categories, by gender, and by region. From 1985 to 2019, human capital increased 11 times from 42.46 trillion Yuan to 529.80trillion Yuan, an average annual growth rate of 7.95%, lower than the average annual growth rate of the economy. The reason for this rapid growth lies in 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 have trended upward trend between 1985-2019. Rural real human capital increased from 24.78 trillion Yuan to 70.85 trillion Yuan – just more than doubling the level of human

capital over this time period; urban real human capital grew from 17.68 trillion Yuan to 458.95 trillion Yuan which is a 25-fold rise – or human capital rose over 25 times over this period in urban areas. The corresponding annual growth rates are 3.32% for rural areas and 10.37% for urban areas. Before 1994, urban real human capital is smaller than rural real human capital, while after 1994 urban human capital exceeds that in rural areas.

Table 6.1.1 National Real Human Capital by Gender and Region

Billions of 1985 Yuan

Year	National	Male	Female	Urban	Rural
1985	42464	23979	18485	17681	24783
1986	46902	27696	19206	20732	26170
1987	49923	29844	20079	22171	27752
1988	48755	29477	19277	21847	26907
1989	47940	29309	18632	22266	25674
1990	54188	33285	20903	26060	28128
1991	60209	37233	22976	29239	30971
1992	64565	40151	24414	31486	33079
1993	63838	39934	23904	31475	32363
1994	58019	36413	21606	28903	29116
1995	55260	34747	20513	28014	27246
1996	58711	37201	21510	31351	27360
1997	65922	41978	23944	36799	29123
1998	76301	48767	27534	44183	32117
1999	88897	56729	32168	53511	35386
2000	100694	64337	36357	62084	38610
2001	112540	71639	40901	71435	41105
2002	125754	80275	45479	82332	43422
2003	137852	88406	49446	92099	45753
2004	147189	94054	53135	100775	46414
2005	158748	101183	57565	110599	48149
2006	180895	115915	64981	127903	52992
2007	197864	126721	71143	142577	55287
2008	211958	135640	76318	155021	56937
2009	242521	155368	87153	179570	62951

Year	National	Male	Female	Urban	Rural
2010	264213	169251	94963	197947	66266
2011	286902	184045	102857	222801	64101
2012	315699	203015	112684	251636	64063
2013	352809	227979	124830	289106	63703
2014	382348	249239	133109	317632	64716
2015	408469	269318	139152	341550	66919
2016	439860	291109	148751	371950	67910
2017	473597	315523	158074	403843	69754
2018	504198	338758	165440	433353	70845
2019	529800	359018	170782	458951	70849

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

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 1989. 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 therefore, the gap between urban and rural increased. From the perspective of population size, the reason for this different change in urban and rural areas lies in the fact that the early rural population is much higher than the urban population, which in turn makes the total rural human capital larger.

For example, in 1985 the rural population at 808 million was more than three times the size of the urban population at 251 million, however, by 2019, the population in rural China had fallen to 564 million, lower than the urban population of 831 million.

From other perspectives, there are two main reasons for the disparity in real human capital between urban and rural after 1998. One is the rapid urbanization process during the economic transition, as there was a large-scale migrated from rural to urban. The second reason for the growing

disparity is the growing educational level gap between the population in urban and rural areas over this time period. In addition, we find that in the figure the real human capital changes in urban are basically the same as the pattern of exponential growth that is observed in the whole country. To some extent, it can be concluded that the trend of national human capital is being driven by the trend of urban human capital.
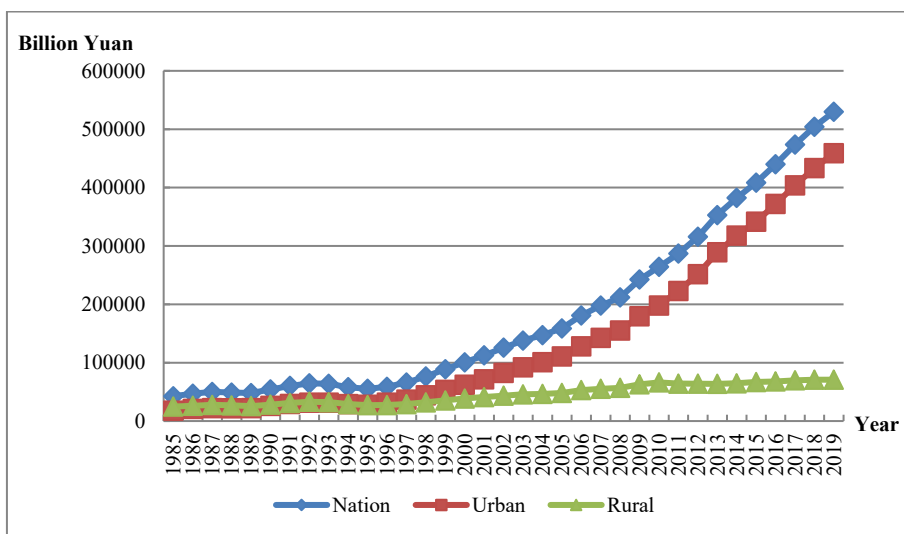
Figure 6.1.1 National Real Human Capital by Region,1985-2019

Table 6.1.2 shows the real human capital index of China from 1985 to 2019 and the real human capital index by gender and region based on 1985. It intuitively shows the trend of human capital.

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

Year	National	Male	Female	Urban	Rural
1985	100	100	100	100	100
1986	110.45	115.50	103.90	117.25	105.60
1987	117.57	124.46	108.62	125.39	111.98
1988	114.81	122.93	104.29	123.56	108.57
1989	112.90	122.23	100.79	125.93	103.60
1990	127.61	138.81	113.08	147.39	113.50
1991	141.79	155.27	124.30	165.37	124.97
1992	152.05	167.44	132.07	178.07	133.48

Year	National	Male	Female	Urban	Rural
1993	150.33	166.54	129.31	178.01	130.59
1994	136.63	151.86	116.88	163.47	117.48
1995	130.13	144.91	110.97	158.44	109.94
1996	138.26	155.14	116.36	177.31	110.40
1997	155.24	175.06	129.53	208.12	117.52
1998	179.68	203.37	148.95	249.89	129.60
1999	209.35	236.58	174.02	302.64	142.78
2000	237.13	268.31	196.68	351.13	155.79
2001	265.02	298.76	221.26	404.01	165.86
2002	296.14	334.77	246.03	465.64	175.21
2003	324.63	368.68	267.49	520.88	184.62
2004	346.62	392.23	287.45	569.95	187.29
2005	373.84	421.96	311.41	625.51	194.28
2006	426.00	483.40	351.53	723.38	213.83
2007	465.96	528.46	384.87	806.37	223.09
2008	499.15	565.66	412.86	876.75	229.75
2009	571.12	647.93	471.48	1015.59	254.01
2010	622.20	705.83	513.73	1119.53	267.39
2011	675.63	767.53	556.43	1260.09	258.65
2012	743.45	846.63	609.60	1423.17	258.50
2013	830.84	950.74	675.30	1635.09	257.05
2014	900.40	1039.40	720.09	1796.42	261.14
2015	961.92	1123.14	752.78	1931.70	270.02
2016	1035.84	1214.01	804.71	2103.63	274.02
2017	1115.29	1315.83	855.14	2284.00	281.46
2018	1187.35	1412.73	894.99	2450.91	285.86
2019	1247.64	1497.22	923.89	2595.68	285.88

6.2 Human capital per capita

Increases in real human capital are not only due to factors such as increased educational attainment, increased return on education, increased

return of on-the-job training and "learning-by-doing", but also by factors like population growth, demographic changes (e.g., the size of retirement group), regional migration or urbanization (e.g., an individual can achieve higher value of human capital by moving from a rural to an urban areas). In order to further understand the dynamic changes of the national human capital, we calculated the per capita human capital. The so-called per capita human capital refers to the ratio of real human capital to non-retired population. Although human capital per capita is also affected by the age distribution of the population, it can eliminate the influence of the total population, so it can better reflect the development of human capital in a region.

Table 6.2.1 shows real human capital per capita for the country as a whole based on 6-education categories, by gender, and by region. From 1985 to 2019, the real human capital per capita in the country showed a growth trend, of which the real human capital per capita increased from 43.71 thousand yuan to 474.4 thousand yuan, an increase of about 10 times. China's average annual growth rate of real human capital per capita from 1985 to 2019 was about 7.49%. Such a high growth rate of real human capital per capita stems from China's rapid economic growth since 1978, the rapid expansion of the scale of "all forms" of education, the transformation of the market economic system (human capital can achieve higher value under market economy conditions) and the large scale of rural-urban migration. Judging from the calculation results of human capital per capita by region, from 1985 to 2019, the human capital per capita of urban has been higher than that of rural.

Table 6.2.1 National Real Human Capital Per Capita by Gender and Region

Thousands of 1985 Yuan

Year	National	Male	Female	Urban	Rural
1985	43.71	46.64	40.42	80.21	33
1986	47.92	53.25	41.88	90.05	34.96
1987	50.49	56.81	43.33	92.52	37.05
1988	48.55	55	41.16	86.27	35.83
1989	47.1	53.85	39.34	83.68	34.15
1990	52.36	60.18	43.38	93.65	37.17
1991	57.56	66.68	47.11	101.47	40.86
1992	61.26	71.52	49.57	105.62	43.77
1993	60.25	70.94	48.12	102.32	43.04
1994	54.55	64.7	43.13	91.57	38.92
1995	51.66	61.68	40.52	86.45	36.55
1996	54.61	65.55	42.39	90.72	37.51
1997	61.01	73.48	47.02	100.26	40.82
1998	70.07	84.63	53.7	113.78	45.84
1999	81.12	97.68	62.45	130.99	51.48
2000	91.71	110.46	70.53	145.42	57.54
2001	102.03	122.8	78.72	159.54	62.74
2002	113.9	137.83	87.18	175.53	68.38
2003	124.94	152.28	94.58	188.23	74.51
2004	133.62	162.64	101.54	198.44	78.17
2005	144.05	175.31	109.68	209.99	83.69
2006	161.91	197.21	122.72	233.76	92.95
2007	175.84	213.12	134.06	252.59	98.58
2008	187.55	226.3	143.79	267.96	103.22
2009	212.82	256.26	163.44	300.93	115.97
2010	230.05	276.25	177.23	322.09	124.12
2011	248.03	297.94	190.83	346.26	124.89
2012	272.23	327.59	208.69	376.86	130.22
2013	305.65	370.37	231.71	423.43	135.11
2014	332.97	406.83	248.51	458.21	142.21
2015	357.46	442.44	260.59	487.47	151.39
2016	385.37	480.19	277.96	523.12	157.79

Year	National	Male	Female	Urban	Rural
2017	417.38	523.29	297.29	563.38	166.93
2018	447.89	563.62	315.32	601.28	174.93
2019	474.38	599.86	329.49	634.25	180.18

Figure 6.2.1 shows the trend of urban and rural real human capital per capita. From the figure, not only can we find that between 1985 and 2018, urban real human capital per capita is significantly higher than that of rural, but the real human capital per capita gap between urban and rural regions continues to widen. Although the real human capital per capita in urban and rural areas have both shown significant growth since 1997, the growth rate in urban is significantly higher than that in rural, and the absolute gap in real human capital per capita between urban and rural areas has gradually widened. Based on Fleisher, Li and Zhao (2009), human capital is a significant contributing factor (total factor productivity) to economic growth.

Therefore, the increase in real human capital per capita gap between urban and rural regions will further widen the urban-rural economic gap, thereby exacerbating the uneven urban-rural development. 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.
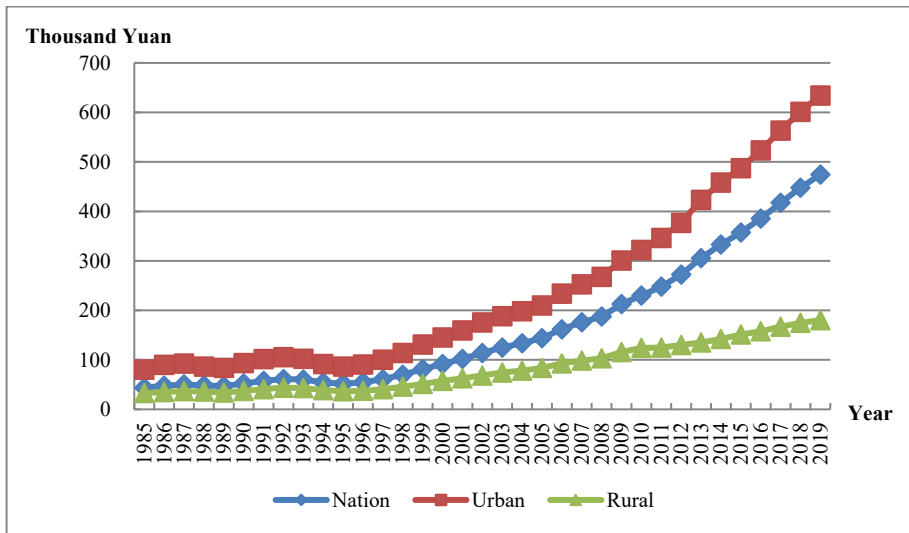
Figure 6.2.1 National Real Human Capital Per Capita by Region, 1985-2019
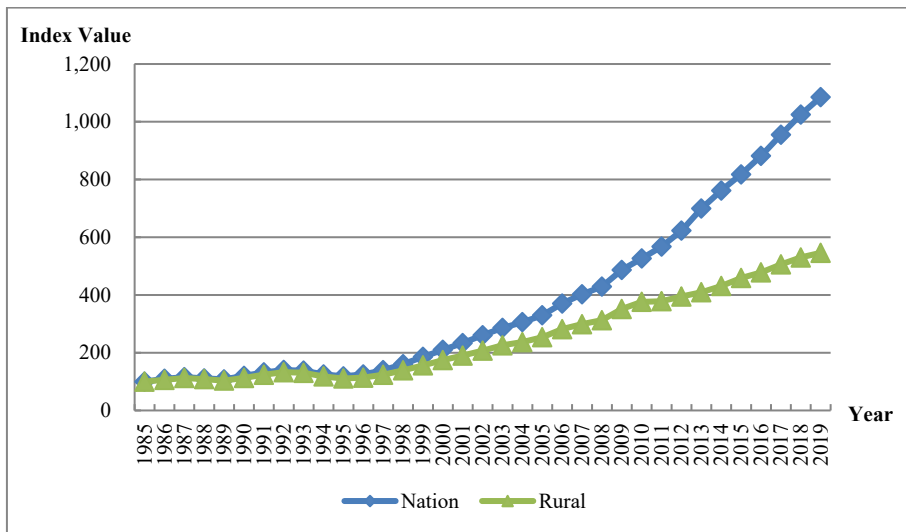
Figure 6.2.2 National Real Human Capital Per Capita Index by Region, 1985-2019

6.3 Labor force human capital

Labor force human capital is estimated in the same way as national human

capital, using the J-F method. Labor force human capital refers to human capital of people who are capable of working. Labor force human capital refers to the human capital of those non-retired people over 16 years old and out-of-school.

6.3.1 National labor force human capital

Table 6.3.1 is the labor force human capital estimated using the national income parameters, population and discount rate of 4.58%. The first column is the nominal labor force human capital calculated according to the six education levels. The second column is the real labor force human capital calculated according to the six education levels. Real human capital in 1985 yuan is nominal human capital deflated by the consumer price index. The last column of Table 6.3.1 also shows the ratio of nominal GDP to nominal labor force human capital.

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 GDP to labor force human capital
1985	18172	18172	9099	0.05
1986	21168	19879	10376	0.05
1987	24715	21630	12175	0.05
1988	28641	21088	15180	0.05
1989	33377	20820	17180	0.05
1990	39075	23643	18873	0.05
1991	44291	25887	22006	0.05
1992	49783	27351	27195	0.05
1993	55608	26631	35673	0.06
1994	62106	23976	48638	0.08

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 GDP to labor force human capital
1995	69395	22851	61340	0.09
1996	79474	24111	71814	0.09
1997	91250	26870	79715	0.09
1998	104510	30957	85196	0.08
1999	118651	35581	90564	0.08
2000	134512	40118	100280	0.07
2001	147866	43700	110863	0.07
2002	161581	48001	121717	0.08
2003	177148	51913	137422	0.08
2004	194060	54612	161840	0.08
2005	214210	59095	187319	0.09
2006	252699	68589	219439	0.09
2007	290998	75280	270092	0.09
2008	330029	80556	319245	0.1
2009	379967	93286	348518	0.09
2010	435688	103424	412119	0.09
2011	492601	110716	487940	0.1
2012	552134	120754	538580	0.1
2013	605308	131417	592963	0.1
2014	665069	140949	641281	0.1
2015	726899	151798	685993	0.09
2016	801944	164020	740061	0.09
2017	881491	177349	820754	0.09
2018	973690	191759	900310	0.09
2019	1067005	204160	990865	0.09

A decrease in the ratio of nominal GDP to nominal labor force human capital over time may 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, before decreasing.

The ratio of nominal GDP to nominal labor force human capital can not only reflect the efficiency of human capital utilization in a region, but also reflect the impact of human capital on sustainable GDP growth from a certain aspect. On the one hand, the higher the ratio means that the higher the contribution of unit human capital to GDP, the higher the efficiency of human capital utilization; on the other hand, the slowdown of the ratio growth may also imply that the growth of GDP will slow down in the future. As shown in Figure 6.3.1, overall, from 1985 to 2019, the ratio of GDP to labor force human capital showed an upward trend but the growth rate slowed down.
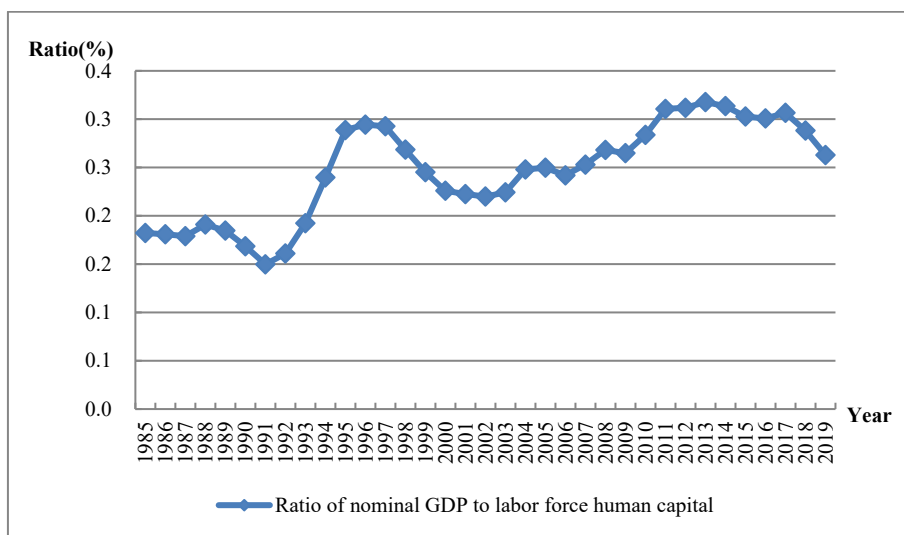
Figure 6.3.1 Nominal National Ratio of GDP to Labor Force Human Capital,

1985-2019

Table 6.3.2 and 6.3.3 show the labor force human capital by gender and region respectively, compare the national human capital development status from gender and region. These results are based on the six education levels, the first three columns are nominal labor force human capital, and the last three columns are real labor force human capital.

82

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

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	18172	10568	7603	18172	10568	7603
1986	21168	12525	8643	19879	11754	8125
1987	24715	14838	9877	21630	12955	8676
1988	28641	17439	11202	21088	12792	8296
1989	33377	20539	12837	20820	12789	8032
1990	39075	24251	14824	23643	14672	8972
1991	44291	27785	16505	25887	16221	9665
1992	49783	31444	18339	27351	17241	10110
1993	55608	35287	20321	26631	16866	9764
1994	62106	39518	22588	23976	15233	8743
1995	69395	44226	25169	22851	14550	8301
1996	79474	51412	28061	24111	15587	8524
1997	91250	59675	31576	26870	17565	9305
1998	104509	68957	35553	30957	20425	10533
1999	118651	78753	39898	35581	23623	11958
2000	134511	89719	44793	40118	26773	13345
2001	147865	98556	49310	43700	29149	14551
2002	161581	107726	53855	48001	32026	15975
2003	177148	118086	59062	51913	34633	17279
2004	194060	129226	64834	54612	36392	18220
2005	214210	142250	71960	59095	39267	19828
2006	252699	168735	83964	68589	45823	22766
2007	290998	194602	96396	75280	50360	24920
2008	330029	220825	109204	80556	53911	26645
2009	379967	254811	125156	93286	62561	30725
2010	435688	292435	143253	103424	69410	34015
2011	492601	331176	161425	110716	74416	36300
2012	552134	372963	179172	120754	81537	39217

Year	Nominal labor force human capital (Billions of Yuan)			Real labor force human capital (Billions of 1985 Yuan)		
	National	Male	Female	National	Male	Female
2013	605308	408852	196457	131417	88743	42674
2014	665069	455046	210023	140949	96393	44556
2015	726899	501051	225848	151798	104570	47228
2016	801944	553695	248249	164020	113158	50862
2017	881491	610742	270749	177349	122752	54597
2018	973690	678443	295247	191759	133454	58305
2019	1067005	746178	320827	204160	142596	61564

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

Table 6.3.3 shows the nominal and real labor force human capital for urban and rural regions respectively. As shown in the table, both nominal and real labor force human capital have upward trend between 1985-2019. The national nominal and real labor force human capital both were increasing during 1985-2019. 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 1998. The regional gap increased from almost -0.85 trillion Yuan in 1998 to over 123.76 trillion Yuan in 2019. In 2019, the national real labor force human capital was 4 times than 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	18172	7579	10593	18172	7579	10593
1986	21168	8976	12192	19879	8388	11491
1987	24715	10657	14058	21630	9154	12476
1988	28641	12486	16155	21088	8886	12202
1989	33377	14674	18703	20820	8979	11841

Year	Nominal labor force human capital			Real labor force human capital (Billions of 1985 Yuan)		
	National	Urban	Rural	National	Urban	Rural
1990	39075	17228	21847	23643	10407	13236
1991	44291	19672	24619	25887	11307	14580
1992	49783	22201	27582	27351	11750	15602
1993	55608	24832	30776	26631	11320	15311
1994	62106	27627	34480	23976	10075	13900
1995	69395	31064	38331	22851	9699	13152
1996	79474	37433	42041	24111	10742	13368
1997	91250	45127	46123	26870	12561	14309
1998	104509	53762	50747	30957	15055	15902
1999	118651	62929	55722	35581	17854	17727
2000	134511	73479	61033	40118	20682	19436
2001	147865	82771	65094	43700	23135	20565
2002	161581	93280	68301	48001	26336	21665
2003	177148	104762	72386	51913	29314	22599
2004	194060	118365	75695	54612	32062	22550
2005	214210	134414	79795	59095	35836	23259
2006	252699	162415	90284	68589	42661	25928
2007	290998	189835	101162	75280	47716	27564
2008	330029	217715	112314	80556	51822	28734
2009	379967	255297	124670	93286	61291	31995
2010	435688	298561	137127	103424	69455	33970
2011	492601	350105	142496	110716	77346	33369
2012	552134	403716	148418	120754	86845	33909
2013	605308	451002	154306	131417	97119	34298
2014	665069	504043	161025	140949	105791	35158
2015	726899	556945	169954	151798	115167	36632
2016	801944	623663	178281	164020	126310	37710
2017	881491	694630	186861	177349	138331	39018
2018	973690	778982	194708	191759	151939	39820
2019	1067005	864140	202864	204160	163958	40201

Figure 6.3.3 shows the trends of real labor force human capital for urban and rural, respectively. Before 1999, the real labor force human capital for the rural was higher than that for urban. After 1999, the real labor force human capital for urban increased more rapidly than that for rural, 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. In addition, the figure shows that the trend of the real labor force human capital in urban is basically the same as that in the whole country. It can be considered that the trend of the national real labor force human capital depends on the trend of urban labor force human capital.
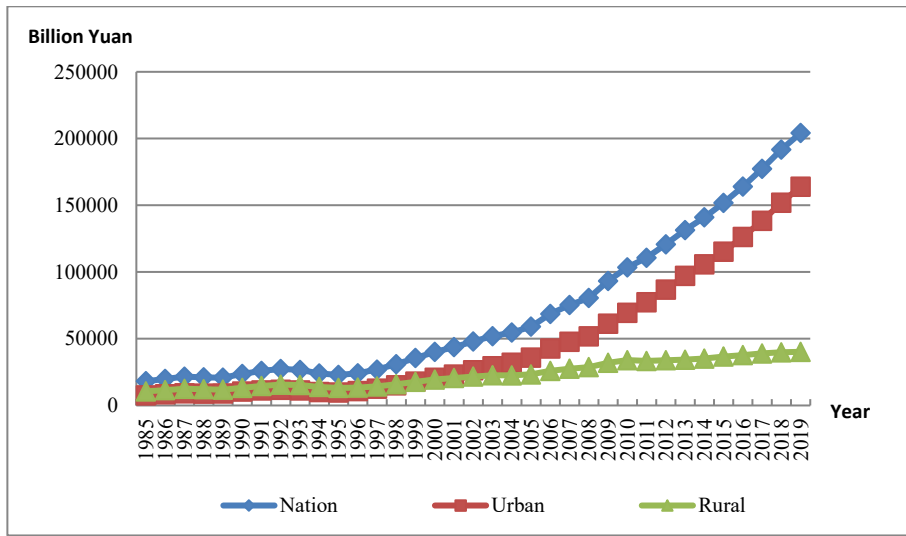
Figure 6.3.3 National Real Labor Force Human Capital by Region, 1985-2019

Figure 6.3.4 shows the national ratio of labor force human capital to total human capital by six 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 1990, the ratio grew steadily, but it dropped dramatically after that, rebounding somewhat in 1998 and fluctuating subsequently. The overall 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.
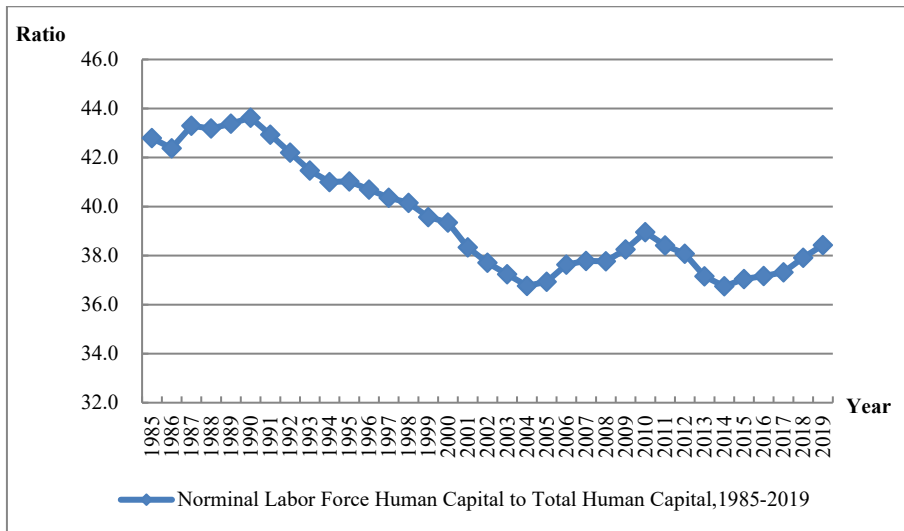
Figure 6.3.4 National Ratio of Labor Force Human Capital to Total Human Capital, 1985-2019

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. Although labor force human capital per capita is also affected by the age distribution of the population, it can eliminate the impact of the labor force population, so it can reflect the development status of labor force human capital per capita in a region. The labor force human capital per capita refers to the ratio of the total labor force human capital to the labor force population, and the labor force population refers to the non-retired population over 16 years old who are out of school.

Table 6.3.4 shows that the average labor force human capital in nominal and real terms. The first column is the nominal labor force human capital per capita calculated at six education levels, and the second column is the real labor force human capital per capita under the six education levels. The real values in this table are calculated by deflating the nominal values with the CPI using 1985 as the base year. The nominal results based on both

education categories are 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）
1985	31.18	31.18
1986	35.33	33.18
1987	40.05	35.05
1988	45.39	33.42
1989	51.52	32.14
1990	58.53	35.42
1991	65.29	38.16
1992	72.50	39.83
1993	80.28	38.45
1994	88.74	34.26
1995	98.17	32.33
1996	111.10	33.71
1997	125.88	37.07
1998	141.84	42.02
1999	158.36	47.49
2000	176.80	52.73
2001	193.56	57.20
2002	211.15	62.72
2003	231.08	67.72
2004	253.25	71.27
2005	278.43	76.81
2006	323.23	87.73
2007	368.92	95.44
2008	415.89	101.51
2009	473.33	116.21
2010	535.48	127.11
2011	601.74	135.24
2012	673.56	147.31
2013	741.48	160.98
2014	817.43	173.24
2015	894.74	186.85
2016	985.61	201.59

Year	Nominal average labor force human capital （Thousands of Yuan）	Real average labor force human capital （Thousands of 1985 Yuan）
2017	1090.00	219.30
2018	1212.20	238.73
2019	1334.33	255.31

Tables 6.3.5 and 6.3.6 report the average labor force human capital by gender and by region separately at the six educational level. The first 3 columns are nominal labor force human capital per capita, the last 3 columns are real labor force human capital per capita. From 1985-2019, the nominal and real labor force human capital per capita exhibit upward 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	31.18	34.32	27.66	31.18	34.32	27.66
1986	35.33	39.68	30.50	33.18	37.24	28.67
1987	40.05	45.75	33.73	35.05	39.94	29.63
1988	45.39	52.28	37.67	33.42	38.35	27.90
1989	51.52	59.73	42.24	32.14	37.19	26.43
1990	58.53	68.28	47.45	35.42	41.31	28.72
1991	65.29	77.08	51.92	38.16	45.00	30.40
1992	72.50	86.45	56.78	39.83	47.40	31.30
1993	80.28	96.63	62.06	38.45	46.19	29.82
1994	88.74	107.68	67.86	34.26	41.51	26.27
1995	98.17	119.99	74.40	32.33	39.47	24.54
1996	111.10	137.17	82.41	33.71	41.59	25.03
1997	125.88	156.59	91.84	37.07	46.09	27.06
1998	141.84	177.69	101.95	42.02	52.63	30.20

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**
1999	158.36	199.05	112.83	47.49	59.71	33.82
2000	176.80	223.03	124.93	52.73	66.55	37.22
2001	193.56	245.07	136.30	57.20	72.48	40.22
2002	211.15	268.49	147.94	62.72	79.82	43.88
2003	231.08	294.89	161.29	67.72	86.49	47.19
2004	253.25	323.89	176.52	71.27	91.21	49.61
2005	278.43	356.19	194.50	76.81	98.32	53.59
2006	323.23	412.77	225.11	87.73	112.09	61.04
2007	368.92	468.23	258.32	95.44	121.17	66.78
2008	415.89	524.71	293.01	101.51	128.10	71.49
2009	473.33	595.35	333.97	116.21	146.17	81.99
2010	535.48	671.31	378.96	127.11	159.34	89.98
2011	601.74	754.26	425.29	135.24	169.48	95.64
2012	673.56	846.95	472.30	147.31	185.16	103.38
2013	741.48	934.20	518.76	160.98	202.77	112.68
2014	817.43	1041.82	557.33	173.24	220.69	118.24
2015	894.74	1150.84	599.01	186.85	240.18	125.26
2016	985.61	1273.94	654.98	201.59	260.35	134.20
2017	1090.00	1411.63	719.96	219.30	283.72	145.18
2018	1212.20	1567.35	797.14	238.73	308.31	157.42
2019	1334.33	1722.15	875.68	255.31	329.11	168.04

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 1985-2019.

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	31.18	53.76	23.97	31.18	53.76	23.97
1986	35.33	60.33	27.07	33.18	56.39	25.52
1987	40.05	67.60	30.59	35.05	58.07	27.15
1988	45.39	74.80	34.82	33.42	53.23	26.30
1989	51.52	82.89	39.72	32.14	50.72	25.15
1990	58.53	91.87	45.51	35.42	55.50	27.57
1991	65.29	101.54	50.80	38.16	58.36	30.08
1992	72.50	111.58	56.55	39.83	59.05	31.99
1993	80.28	122.22	62.88	38.45	55.72	31.28
1994	88.74	133.50	69.95	34.26	48.69	28.20
1995	98.17	146.57	77.45	32.33	45.76	26.57
1996	111.10	165.24	86.01	33.71	47.42	27.35
1997	125.88	186.02	95.62	37.07	51.78	29.67
1998	141.84	206.88	106.40	42.02	57.93	33.34
1999	158.36	227.24	117.98	47.49	64.47	37.53
2000	176.80	249.71	130.81	52.73	70.29	41.66
2001	193.56	269.84	142.38	57.20	75.42	44.98
2002	211.15	292.23	153.12	62.72	82.51	48.57
2003	231.08	315.20	166.69	67.72	88.20	52.04
2004	253.25	342.24	180.05	71.27	92.70	53.64
2005	278.43	372.53	195.32	76.81	99.32	56.94
2006	323.23	433.00	221.99	87.73	113.74	63.75
2007	368.92	492.73	250.71	95.44	123.85	68.31
2008	415.89	552.36	281.21	101.51	131.48	71.94
2009	473.33	625.60	315.89	116.21	150.19	81.07
2010	535.48	704.78	351.60	127.11	163.95	87.10
2011	601.74	797.68	375.26	135.24	176.23	87.88
2012	673.56	894.89	402.67	147.31	192.50	92.00
2013	741.48	983.95	431.03	160.98	211.88	95.81
2014	817.43	1083.54	462.15	173.24	227.42	100.91

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
2015	894.74	1179.27	499.66	186.85	243.85	107.70
2016	985.61	1304.71	531.17	201.59	264.24	112.35
2017	1090.00	1446.37	568.91	219.30	288.04	118.79
2018	1212.20	1613.21	607.77	238.73	314.65	124.30
2019	1334.33	1778.52	646.52	255.31	337.45	128.12

6.4 International comparison

The Jorgenson-Fraumeni lifetime earnings approach is now used by the World Bank in its Changing Wealth of Nation's series to measure human capital for 141 countries (Lange et al. 2018). Table 6.4.1 shows the ratio of labor force human capital to GDP by category, where the human capital and GDP estimates are the web published World Bank figures. The category figures are created by weighting individual country ratios by the share of the population in the country in total population for the category. If human capital and GDP figures are added across countries, as opposed to being population weighted, a number of country figures would be under-estimated relative to figures for the United States. An alternative approach is to use Purchasing Power Parities (PPIs) to adequately reflect the differential buying power of country currencies. For example, PPI adjusted human capital and GDP figures between 1995 and 2014 for China are 2.7 to 3.5 times higher than those in local currency units, which are converted to constant 2014 US dollars (PPI source: online OECD data). Population weights are used in table 6.4.1 as PPIs are not available for a number of the 141 countries or only for certain years. The human capital to GDP ratios are calculated in constant 2014 US dollars, but since the GDP deflator is applied to nominal human capital to construct constant 2014 US dollar human capital in the World Bank report, nominal

ratios are identical to 2014 constant US dollar ratios. The percent that each category's population is in the total population for all 141 countries is indicated in the table.

The 141 countries account for 93 percent of World Bank web published world population estimates in all five years shown, those for which World Bank human capital is available. World Bank human capital income is constructed for individuals aged 15 to 65 (Lange et al. 2018, p. 118). All categories, with the exception of Europe & Central Asia, experience a decrease in the ratio between 1995 and 2014, but the decrease is not always monotonic. China and India, who have larger populations than any other country, both experience a significant decline in the ratio over time.

Table 6.4.1 Population Weighted Ratio of Labor Force Human Capital to GDP

Country Category	1995	2000	2005	2010	2014	# of countries
Advanced	11.2	11.0	10.4	10.2	10.2	23
	17%	16%	16%	15%	15%	
East Asia & the Pacific	12.4	10.7	7.7	8.0	7.9	14
	32%	31%	31%	30%	30%	
Europe & Central Asia	5.8	5.9	5.9	6.5	6.3	24
	7%	6%	6%	5%	5%	
Latin America & the Caribbean	9.1	9.1	8.7	8.4	8.2	22
	9%	9%	9%	9%	9%	
Middle East & North Africa	5.7	5.5	5.5	5.4	5.6	16
	3%	3%	4%	4%	4%	
South Asia	7.0	7.2	7.2	6.4	6.3	6
	23%	24%	24%	25%	25%	
Sub-Saharan Africa	8.1	7.8	7.3	7.5	8.0	36
	10%	10%	11%	12%	13%	
141 countries	9.6	9.0	7.9	7.7	7.7	141
	100%	100%	100%	100%	100%	

Table Note:The Advanced category includes: Australia; Austria; Belgium; Canada; Denmark; Finland; France; Germany; Greece; Iceland; Ireland; Italy; Japan; Luxembourg; Netherlands, Norway, Portugal; Spain; Sweden; Switzerland; Turkey; United Kingdom; and United States.

The Europe & Central Asia category includes: Albania; Armenia; Azerbaijan; Belarus; Bosnia & Herzegovina; Bulgaria; Croatia; Estonia; Georgia; Hungary; Kazakhstan; Kyrgyz Republic; Latvia; Lithuania; Macedonia; Moldova; Poland; Romania; Russian Federation; Slovak Republic; Slovenia; Tajikistan; Turkmenistan; and Ukraine.

The Latin American & the Caribbean category includes: Argentina; Belize; Bolivia; Brazil; Chile; Colombia; Costa Rica; Dominican Republic; Ecuador; El Salvador; Guatemala; Guyana; Haiti; Honduras; Jamaica; Mexico; Nicaragua; Panama; Paraguay; Peru; Uruguay; and Venezuela, RB.   Haiti is missing online World Bank data for GDP in 1995, accordingly it is not included in the ratios for 1995.

The Middle East & North America category includes: Bahrain; Egypt; Arab Republic; Iraq; Jordan; Kuwait; Malta; Morocco; Qatar; Saudi Arabia; Tunisia; United Arab Emirates; Yemen, Republic; Djibouti; Lebanon; Oman; and West Bank and Gaza. Qatar is missing online World Bank data for GDP in 1995, accordingly it is not included in the ratios for 1995.

The South Asia category includes: Bangladesh; India; Maldives; Nepal; Pakistan; and Sri Lanka. Haiti is missing online World Bank data for GDP in 1995 and 2000, accordingly it is not included in the ratios for 1995 and 2000.

The Sub-Saharan category includes: Botswana; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Comoros; Congo, Democratic Republic; Congo, Republic; Cote d'Ivoire; Ethiopia; Gabon; Gambia, The; Ghana; Guinea; Kenya; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Namibia; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; South Africa; Swaziland; Tanzania; Togo; Uganda; Zambia; and Zimbabwe.

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 or above. Starting from 2000, college or above was further divided into two categories: three-year college, and four-year university or above.[32] With this more detailed information on educational attainment, we create a separate human capital series starting

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

from 2000.[33]

Productive capital stock measures the volume (or productive capacity) of physical capital. To be used, for example, in productivity analysis. 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.

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 (2018 physical capital data has not been updated). This is not surprising, given that in most other countries human capital accounts for over 60% of national wealth.[34] The nominal ratio of human capital to physical capital, (the latter as measured by Holz), decreases in almost all years, but the rate of decrease slows down after 1996. The trend in the ratio of human capital to physical capital indicates that the share of human capital is declining, but the rate of decline is gradually decreasing and has begun to show a steady upward trend. Since human capital is also related to population changes, we are still not sure whether this trend indicates that the policies adopted by the government are too focused on physical capital investment and cause relatively insufficient human capital investment.

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

[34] World Bank (1997). The World Bank wealth estimates include physical capital, World Bank (1997). The World Bank wealth estimates include physical capital, natural resources, and other forms of intangible capital besides human capital.
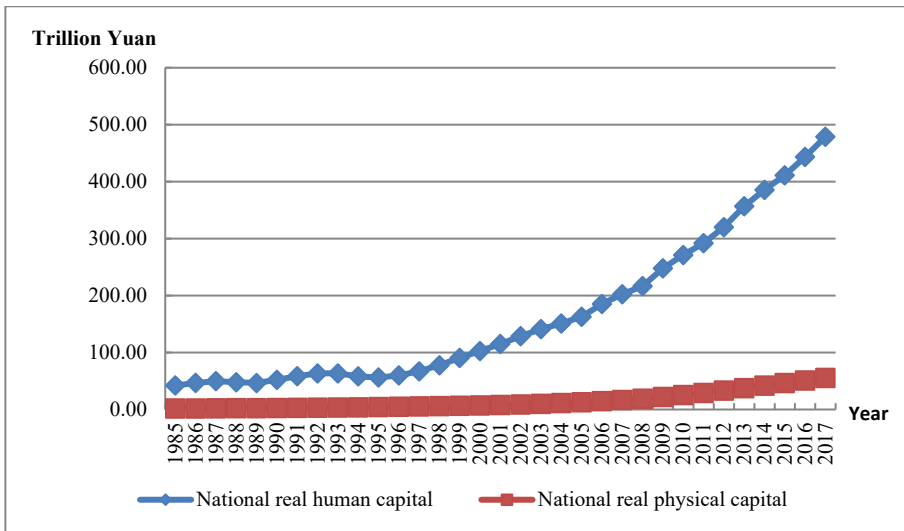
**Figure 6.5.1 Real Human Capital Stock and Real Physical Wealth
Capital Stock, 1985-2017**
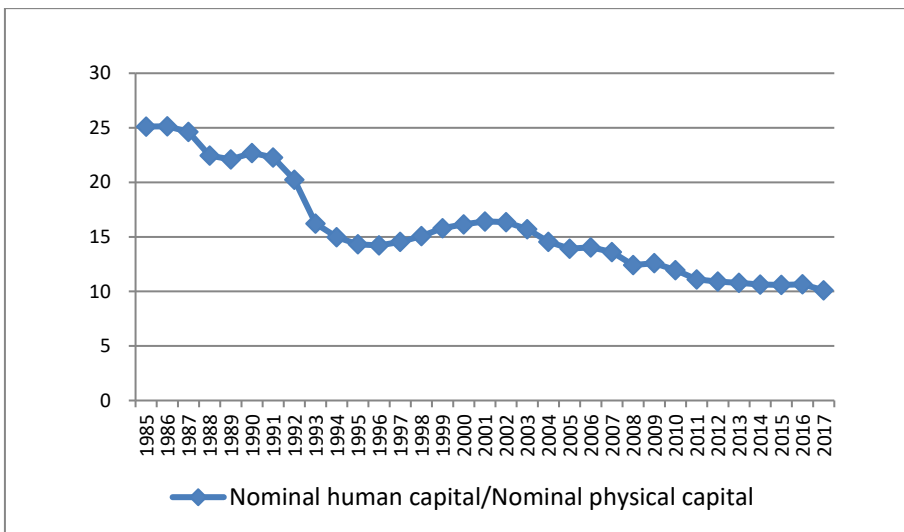
Figure 6.5.2 Human Capital to Physical Capital Ratio, 1985-2017

Chapter 7   Cross-province Comparison

By comparing the stocks of human capital across provinces and over time, we gain some understanding of the regional 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

The 6-education category nominal provincial human capital stocks in 2019 are shown in figure 7.1.1. Current year human capital is the nominal human capital adjusted by living cost and expressed in 1985 yuan for each province. The provinces are shown in descending order of their total real human capital stocks in 2019. Shandong is the highest-ranked province in terms of total real human capital, followed by Jiangsu; Tibet ranks the lowest. Notable features of the differences across provinces include: (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 Guangdong, Shandong,

Henan, Jiangsu rank relatively higher. (2) Provinces at the top rank of human capital per capita (figure 7.1.1), such as Shanghai and Beijing, also rank high in terms of total stock but their total human capital is magnified by differences in their education levels and age structure.
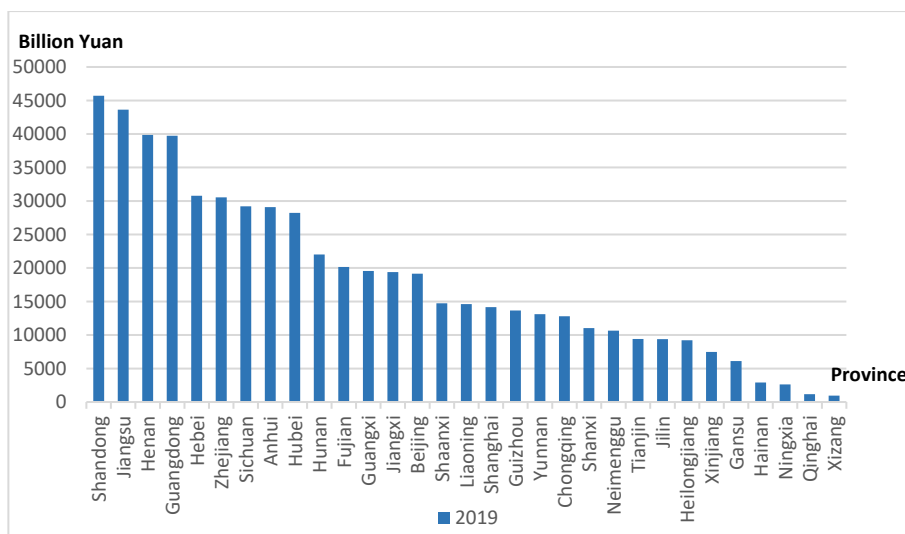
Figure 7.1.1 Provincial Real Human Capital in 2019

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).[35,36]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 Jiangsu; Tibet ranks the lowest.

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[35] Brandt Loren, Holz Carsten, 2006. Spatial price differences in China: estimates and implications. Economic Development and Cultural Change 55, 43–86.
[36] 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.
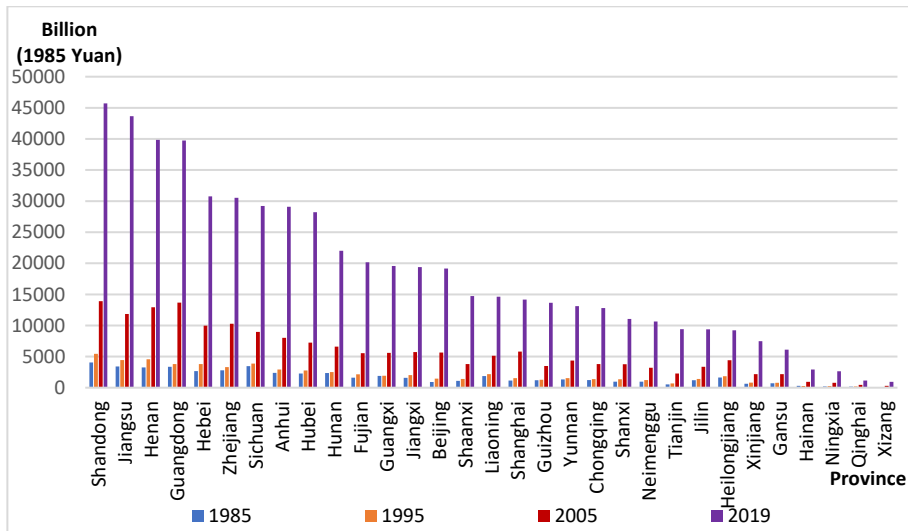
Figure 7.1.2 Provincial Real Human Capital

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, Shanghai and Tianjin ranked 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. The ranking is influenced by education level and population structure. More importantly, at this stage of China's economic development, regional inequality in potential earnings has led to clustering of educated workers in the provinces where their earnings potential is highest.
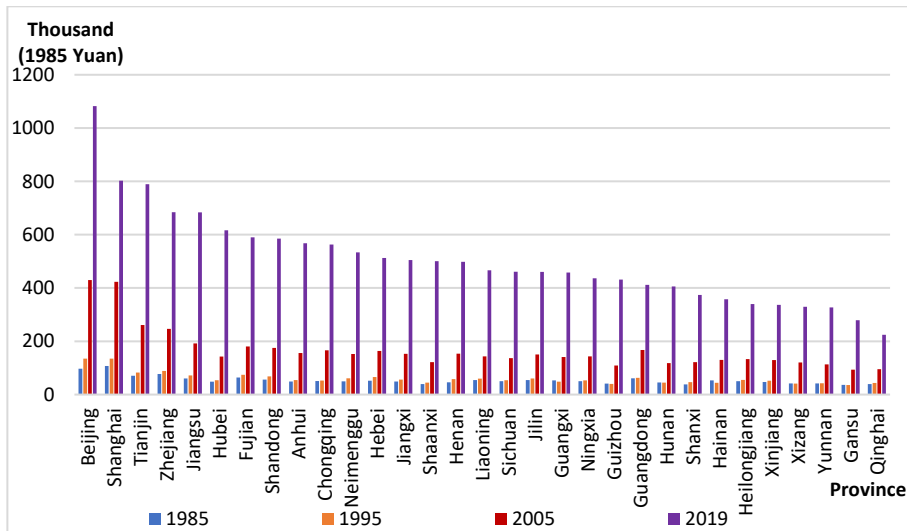
Figure 7.1.3 Provincial Real Human Capital Per Capita

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.
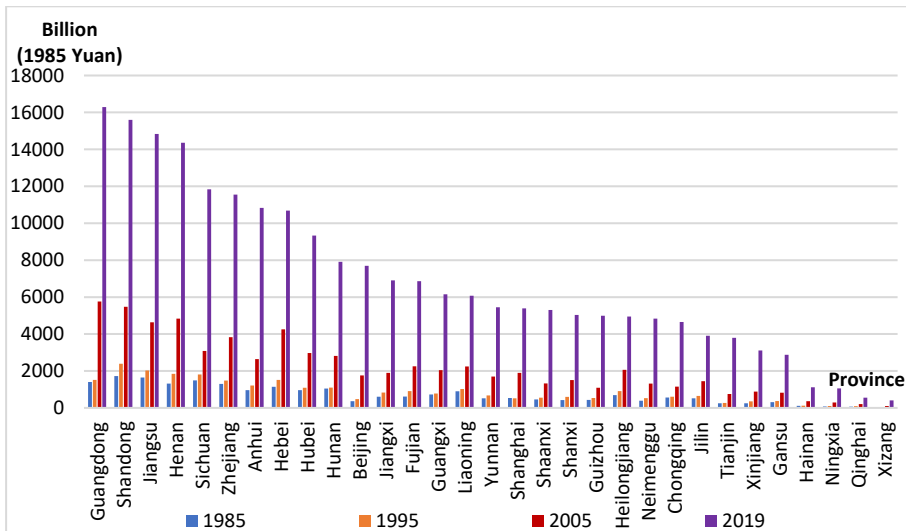
Figure 7.2.1 Provincial Real Labor Force Human Capital

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; Qinghai at the bottom.
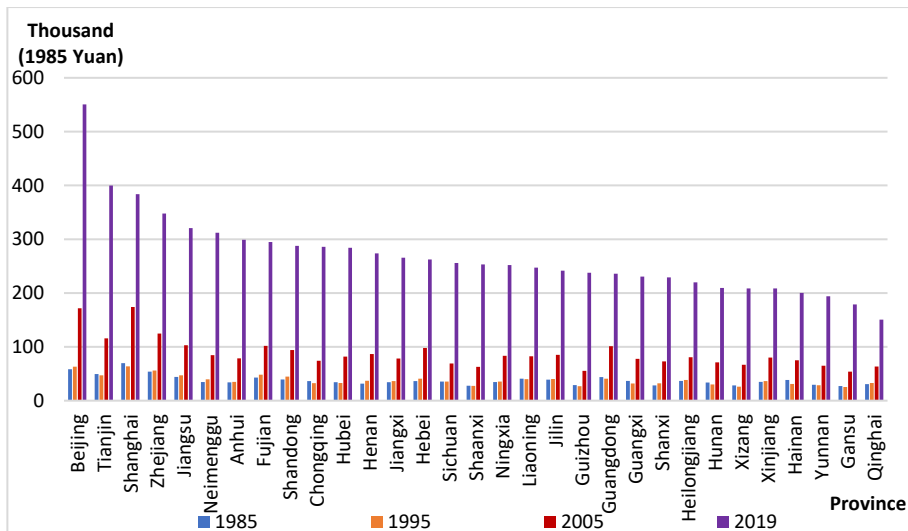
Figure 7.2.2 Provincial Real Average Labor Force Human Capital

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 proportion of young population, 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, which raises their ratios of labor-force to total human capital. In 2019, Heilongjiang ranks highest, followed by Qinghai and Gansu.
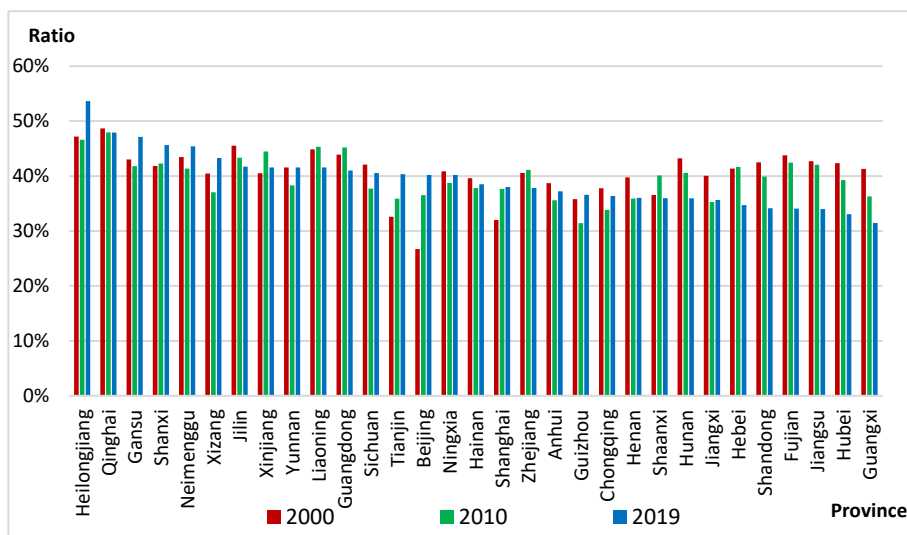
Figure 7.3.1 Ratio of Nominal Labor Force Human Capital to Total Nominal Human Capital

Figure 7.3.2 shows the comparison of human capital and human capital stock ratio of 0-15 years old in each province. 0-15 years old is the age that has not entered the labor market, and the human capital of this age group can be regarded as the reserve of human capital. To some extent, this ratio reflects the potential of local human capital in the future, which is mainly

102

affected by the birth population, the number of students in school and the per capita human capital. In most provinces, this ratio shows an upward trend after 2010, which to a certain extent indicates that the demographic dividend has not disappeared, while the population decreases, the amount of human capital continues to grow. In 2019, Fujian ranked first, followed by Guangxi, Jiangsu, and Hubei, and Heilongjiang ranked last.

Figure 7.3.3 shows the comparison of human capital and human capital stock ratio of 25-45 years old in each province. The age of 25-45 is the golden age for workers to work, and it is also the age of the most mobile population. Due to the great impact of population mobility, the ratio of human capital to human capital stock of 25-45 years old in some provinces with low ratio of 0-15 years old (such as Beijing) is also very high. In terms of the results, Heilongjiang, Beijing and Shanghai ranked first, while Guangxi and Guizhou ranked last.
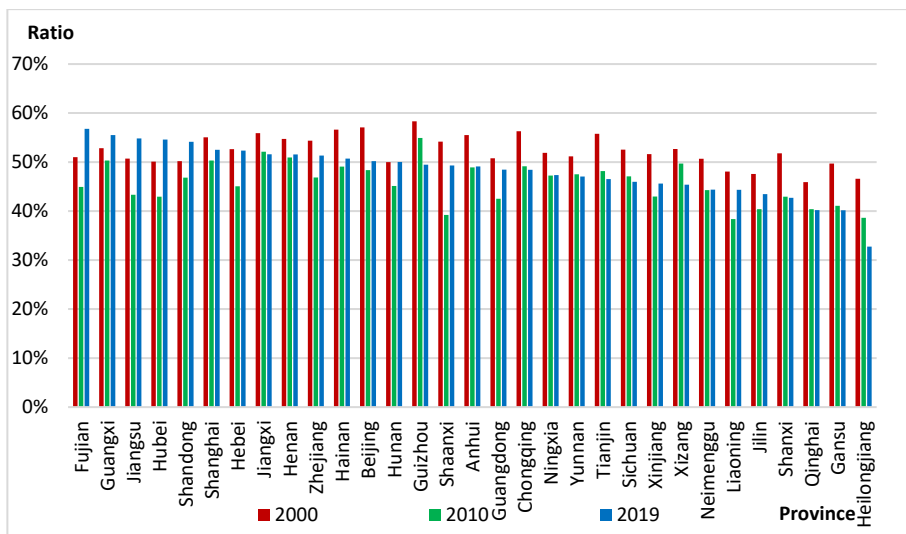
Figure 7.3.2 Ratio of Human Capital to Human Capital Stock Aged 0-15 in Each Province
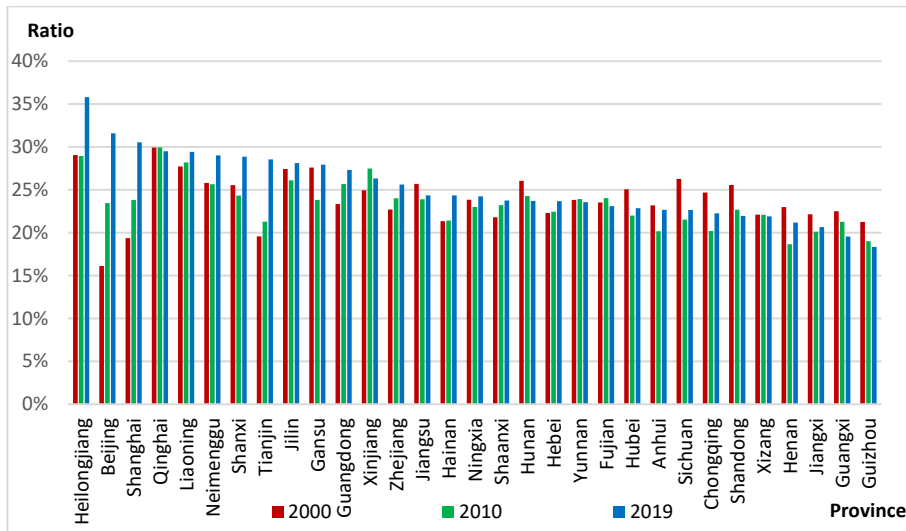
Figure 7.3.3 Ratio of Human Capital to Human Capital Stock Aged 25-45 in Each Province

Figure 7.3.4 shows the ratios of provincial nominal GDP to nominal labor force human capital. Jiangsu ranks at the top in 2019, followed by Fujian, Chongqing and Zhejiang; Gansu and Heilongjiang rank the bottom. These ratios reflect their persistent dispersion, and the continuing geographical disequilibrium in the allocation of labor and human capital in the Chinese economy.

Figure 7.3.5 shows the ratios of nominal physical capital to nominal labor force human capital. Qinghai ranks at the top in 2019, followed by Ningxia, Jilin and Neimenggu; Beijing and Anhui rank the bottom. 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.
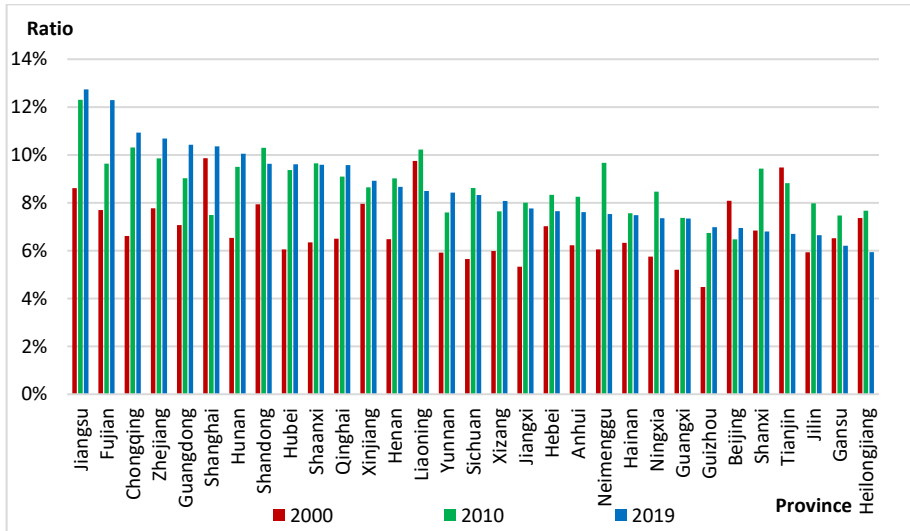
Figure 7.3.4 Ratio of Nominal GDP to Nominal Labor Force Human Capital
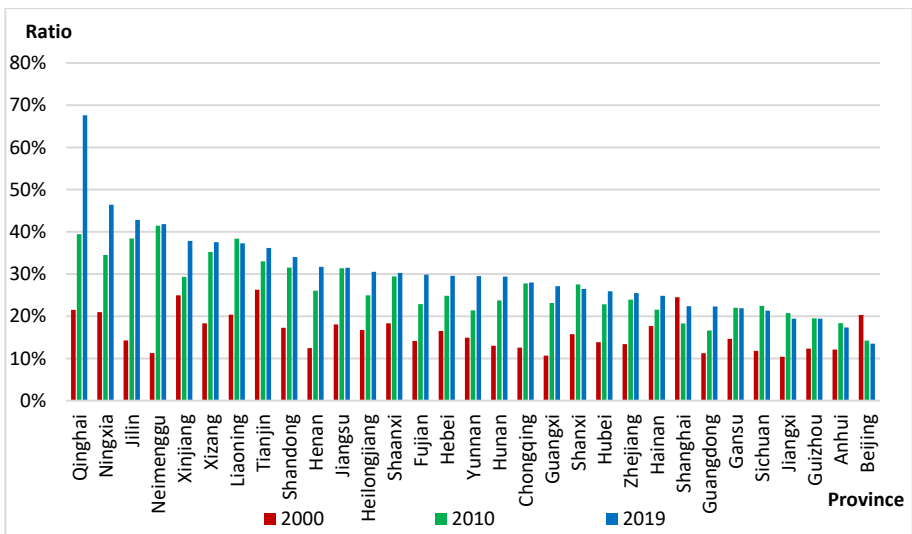
Figure 7.3.5 Ratio of Nominal Physical Capital to Nominal Labor Force Human Capital

Chapter 8   Human Capital for Beijing

8.1 Total human capital

Table BJ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Beijing. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Beijing.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	881	881	43
1986	992	929	51
1987	1185	1021	62
1988	1606	1150	75
1989	1916	1171	85
1990	2488	1442	99
1991	3056	1583	111
1992	3763	1774	128
1993	4516	1789	140
1994	5158	1636	160
1995	5334	1442	192
1996	6815	1651	222
1997	8297	1909	252
1998	10265	2306	287
1999	12917	2885	323
2000	15358	3314	364

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	17495	3662	410
2002	19637	4186	469
2003	21421	4557	544
2004	23996	5054	627
2005	27024	5607	721
2006	32893	6764	822
2007	39767	7986	934
2008	47570	9090	1036
2009	53168	10314	1149
2010	63575	12044	1296
2011	68677	12321	1432
2012	80564	13991	1600
2013	83407	14022	1767
2014	95255	15762	1937
2015	96614	15704	2119
2016	106520	17075	2351
2017	113987	17932	2604
2018	121045	18577	—
2019	127231	19088	—

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 the non-retired population. Table BJ-2.1 presents human capital per capita for Beijing by region. From 1985 to 2019, the nominal human capital per capita increased from 94.8 thousand Yuan to 7.2 million Yuan, an increase

of about 75 times; and the real human capital per capita increased from 94.8 thousand Yuan to 1.1 million Yuan, an increase of approximately 10 times.

Figure BJ-2.1 illustrates the trends of human capital per capita by gender for Beijing. The growth pattern of real human capital per capita of male is similar to that of female for Beijing. Both of them kept increasing from 1985 to 2019, and the growths of human capital for male and female both accelerated, with the male's growth rate significantly higher than the 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[37]，**1985-2019**

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	94.80	124.78	40.76	94.80	124.78	40.76

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[37] Note: The fluctuations for Beijing during 2010-2014 are probably caused by the drastic changes in high school admissions during this period. It affects the admission rates for high school and thus human capital values.

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1986	106.24	139.22	47.42	99.48	130.36	44.40
1987	124.02	162.28	54.97	106.93	139.92	47.39
1988	163.24	212.36	64.62	116.90	152.07	46.27
1989	193.27	246.02	75.31	118.09	150.32	46.01
1990	249.77	313.84	87.72	144.79	181.93	50.85
1991	299.13	375.15	99.31	154.96	194.35	51.45
1992	361.40	452.20	111.62	170.36	213.16	52.62
1993	426.17	529.53	124.80	168.82	209.76	49.43
1994	482.08	593.43	138.82	152.89	188.21	44.03
1995	493.32	596.10	152.87	133.38	161.17	41.33
1996	617.58	747.43	171.53	149.62	181.08	41.56
1997	741.52	897.54	193.73	170.61	206.51	44.57
1998	901.30	1092.10	217.48	202.51	245.38	48.87
1999	1111.63	1349.59	243.83	248.28	301.43	54.46
2000	1302.92	1578.76	274.57	281.16	340.69	59.25
2001	1451.55	1734.19	298.96	303.82	362.97	62.57
2002	1577.01	1854.00	321.48	336.13	395.16	68.52
2003	1678.21	1946.26	351.41	356.98	414.00	74.75
2004	1862.13	2143.50	382.04	392.18	451.44	80.46
2005	2059.35	2354.03	416.50	427.31	488.45	86.42
2006	2378.00	2705.74	467.62	489.03	556.43	96.17
2007	2711.72	3070.97	524.79	544.59	616.73	105.39
2008	3117.51	3525.65	587.45	595.70	673.69	112.25
2009	3318.12	3735.80	656.41	643.69	724.71	127.34
2010	3798.89	4270.38	724.49	719.68	809.00	137.25
2011	4004.99	4486.19	761.00	718.49	804.82	136.52
2012	4580.09	5124.42	804.05	795.41	889.95	139.64
2013	4681.54	5226.25	847.18	787.06	878.63	142.43

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2014	5337.79	5973.49	895.53	883.25	988.44	148.19
2015	5407.21	6047.83	942.65	878.92	983.05	153.22
2016	5952.55	6652.46	980.58	954.21	1066.40	157.19
2017	6377.26	7117.05	1023.45	1003.23	1119.61	161.00
2018	6809.41	7585.94	1065.55	1045.08	1164.26	163.54
2019	7192.37	7998.06	1100.36	1079.04	1199.91	165.08

Figure BJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
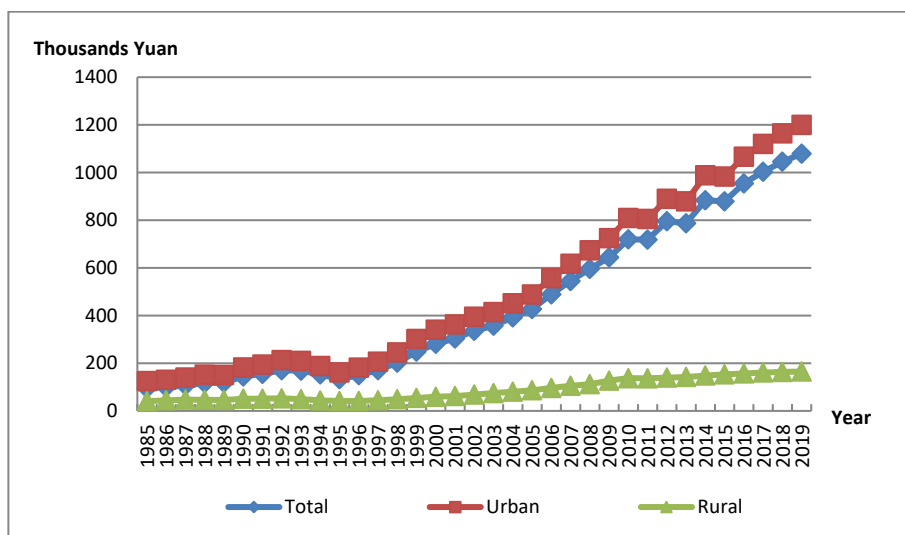
Figure BJ-2.2 Real Human Capital Per Capita by Region for Beijing, 1985-2019

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 2019, the nominal labor force human capital increased from 0.4 trillion Yuan to 51.02 trillion Yuan, an increase of more than 144 times; and the real labor force human capital increased from 0.4 billion Yuan to 7.7 trillion Yuan, an increase of approximately 20 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)
1985	351	351
1986	390	365
1987	467	402
1988	581	416
1989	692	423
1990	822	476
1991	1002	519
1992	1173	553
1993	1358	538
1994	1528	485
1995	1732	468
1996	2119	513
1997	2575	592
1998	3059	687
1999	3547	792

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	4055	875
2001	4789	1002
2002	5737	1223
2003	6694	1424
2004	7376	1553
2005	8377	1738
2006	10835	2228
2007	13717	2755
2008	16304	3115
2009	19574	3797
2010	23115	4379
2011	26702	4790
2012	30797	5349
2013	34415	5786
2014	37504	6206
2015	40873	6644
2016	43537	6979
2017	46247	7275
2018	48760	7484
2019	51023	7655

8.3.2 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. Tables BJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 56.4 thousand Yuan to 3.6 million Yuan, an increase of more than 64 times; and the real average labor force human capital increased from 56.4 thousand Yuan to 547.4 thousand Yuan, an increase of approximately 9 times.

112

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

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	56.43	68.62	32.95	56.43	68.62	32.95
1986	62.31	75.03	38.25	58.35	70.26	35.82
1987	72.31	86.85	44.38	62.34	74.88	38.26
1988	87.33	103.44	51.91	62.54	74.07	37.17
1989	102.40	119.12	60.08	62.57	72.78	36.71
1990	119.97	137.02	69.23	69.55	79.43	40.13
1991	140.46	161.11	78.52	72.77	83.46	40.68
1992	160.78	184.78	87.76	75.79	87.10	41.37
1993	183.50	211.11	97.47	72.69	83.63	38.61
1994	204.82	235.26	107.36	64.96	74.61	34.05
1995	229.49	263.11	116.74	62.05	71.14	31.56
1996	270.46	309.84	135.46	65.52	75.07	32.82
1997	317.65	363.97	156.51	73.08	83.74	36.01
1998	363.69	415.97	179.85	81.72	93.46	40.41
1999	407.79	465.39	204.49	91.08	103.94	45.67
2000	454.39	517.62	230.01	98.05	111.70	49.63
2001	520.95	591.33	252.69	109.04	123.77	52.89
2002	599.78	678.09	274.72	127.84	144.53	58.56
2003	676.82	760.58	302.51	143.97	161.79	64.35
2004	738.37	825.40	330.95	155.51	173.84	69.70
2005	817.42	909.00	361.58	169.61	188.61	75.03
2006	987.35	1097.25	408.64	203.05	225.65	84.04
2007	1168.75	1296.21	459.51	234.72	260.31	92.28
2008	1328.85	1471.80	517.64	253.92	281.23	98.91
2009	1512.35	1671.56	581.71	293.38	324.27	112.85

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
2010	1697.88	1873.18	645.24	321.65	354.86	122.24
2011	1927.30	2131.69	678.20	345.75	382.42	121.67
2012	2184.14	2420.51	715.87	379.31	420.36	124.32
2013	2426.77	2695.55	754.72	407.99	453.17	126.88
2014	2658.43	2961.72	792.55	439.89	490.08	131.14
2015	2893.56	3229.10	831.05	470.34	524.88	135.08
2016	3076.37	3429.58	854.33	493.15	549.77	136.95
2017	3272.67	3643.46	879.90	514.83	573.16	138.42
2018	3473.20	3860.69	904.60	533.05	592.52	138.83
2019	3648.97	4049.61	923.72	547.44	607.55	138.58

Chapter 9   Human Capital for Tianjin

9.1 Total human capital

Table TJ-1.1presents the estimates of nominal and real total human capital and real physical capital for Tianjin. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Tianjin.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	514	514	32
1986	613	574	37
1987	717	629	42
1988	845	634	47
1989	990	647	52
1990	1157	735	56
1991	1355	781	62
1992	1536	794	68
1993	1751	770	75
1994	1979	702	85
1995	2188	673	95
1996	2525	712	107
1997	2899	793	120
1998	3287	904	136
1999	4074	1133	151
2000	5209	1454	166

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	5816	1605	185
2002	6506	1802	208
2003	7022	1926	237
2004	7937	2128	271
2005	8703	2299	313
2006	11349	2953	363
2007	13807	3448	425
2008	16201	3839	508
2009	19167	4588	635
2010	21766	5034	788
2011	25153	5545	965
2012	28957	6216	1153
2013	32312	6728	1362
2014	36303	7418	1597
2015	39436	7923	1794
2016	41683	8202	1976
2017	45030	8679	2141
2018	48572	9178	—
2019	52173	9599	—

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 2019, the nominal human capital per capita increased from 69.9 thousand Yuan to 4.4 million Yuan, an increase

approximately 62 times; and the real human capital per capita increased from 69.9 thousand Yuan to 805.6 thousand Yuan, an increase of approximately 11 times.

Figure TJ-2.1 illustrates the trends of human capital per capita by gender for Tianjin. The growth pattern of real human capital per capita of male is similar to that of female for Tianjin. Both of them kept increasing from 1985 to 2019 and the growths of human capital for male and female both accelerated, with the male's growth rate significantly higher than the female's. As a result, the gender gap has been expanding, especially from 1997.
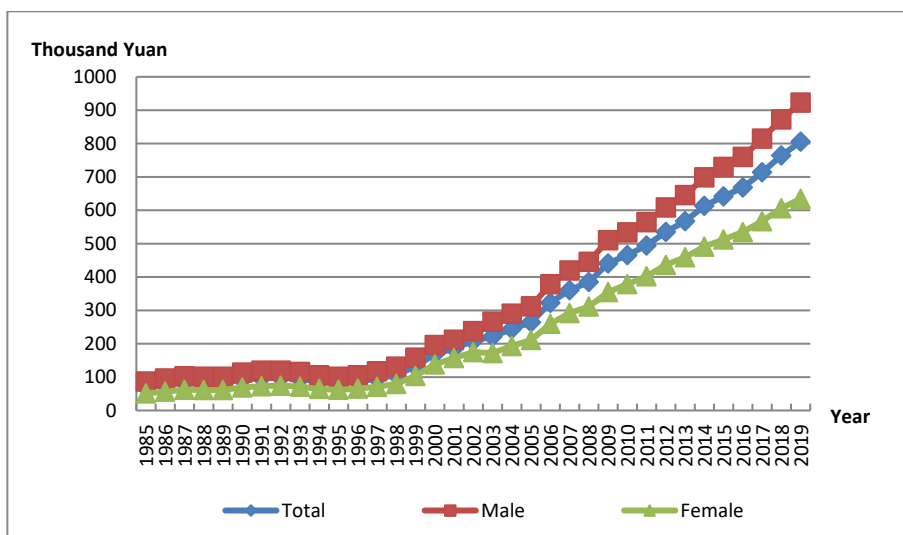
Figure TJ-2.1 Human Capital Per Capita by Gender for Tianjin，1985-2019

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	69.94	83.53	41.29	69.94	83.53	41.29
1986	82.40	98.61	48.58	77.15	92.33	45.48
1987	95.18	113.78	56.73	83.44	99.75	49.74
1988	109.52	129.11	66.78	82.14	96.83	50.09

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	126.09	146.74	77.87	82.45	95.94	50.92
1990	145.48	167.27	90.07	92.35	106.18	57.18
1991	168.80	194.14	104.93	97.24	111.83	60.45
1992	189.48	216.18	122.03	97.98	111.79	63.10
1993	214.77	244.04	140.01	94.44	107.31	61.56
1994	242.41	274.36	159.11	85.96	97.29	56.42
1995	267.72	300.72	178.34	82.34	92.49	54.85
1996	305.74	344.81	198.76	86.27	97.29	56.08
1997	347.94	392.34	224.12	95.22	107.37	61.34
1998	388.08	436.55	250.19	106.74	120.07	68.81
1999	475.51	543.30	276.39	132.24	151.10	76.87
2000	603.84	700.35	308.65	168.61	195.55	86.18
2001	674.70	782.17	335.32	186.16	215.81	92.52
2002	751.12	868.28	356.33	208.08	240.53	98.71
2003	808.20	926.93	385.31	221.67	254.24	105.68
2004	910.55	1043.17	413.46	244.13	279.69	110.85
2005	999.25	1143.01	443.14	263.95	301.93	117.06
2006	1240.32	1426.47	495.30	322.79	371.23	128.90
2007	1443.75	1661.70	548.55	360.59	415.02	137.00
2008	1624.15	1869.11	604.83	384.86	442.91	143.32
2009	1842.08	2122.25	668.49	440.91	507.97	160.01
2010	2013.56	2319.93	729.39	465.66	536.51	168.68
2011	2242.67	2575.24	763.86	494.41	567.73	168.40
2012	2493.94	2852.33	802.08	535.35	612.29	172.18
2013	2723.53	3107.17	838.63	567.06	646.94	174.61
2014	3001.14	3419.95	875.24	613.21	698.78	178.83
2015	3193.74	3628.35	914.74	641.65	728.97	183.78

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2016	3396.56	3856.81	940.21	668.37	758.93	185.01
2017	3704.45	4204.83	967.65	713.96	810.40	186.50
2018	4044.91	4588.15	990.04	764.29	866.93	187.07
2019	4378.67	4962.19	1000.00	805.60	912.96	183.98

Figure TJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
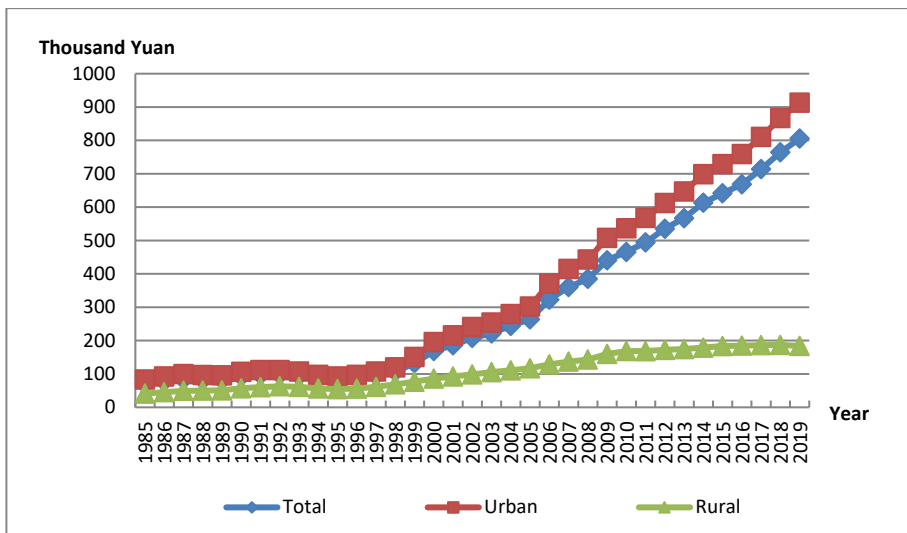
Figure TJ-2.2 Real Human Capital Per Capita by Region for Tianjin，1985-2019

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 2019, the nominal labor force human capital increased from 0.3 trillion Yuan to 21.0 trillion Yuan, an increase of more than 83 times; and the real labor force human capital increased from 0.3 trillion Yuan to 3.9 trillion 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)
1985	246	246
1986	280	262
1987	320	280
1988	372	279
1989	429	280
1990	488	310
1991	553	319
1992	626	324
1993	698	307
1994	774	274
1995	862	265
1996	990	279
1997	1142	313
1998	1312	361
1999	1484	413

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	1680	469
2001	1882	519
2002	2125	589
2003	2350	644
2004	2601	697
2005	2859	755
2006	3691	961
2007	4566	1140
2008	5531	1311
2009	6589	1577
2010	7744	1791
2011	9103	2007
2012	10675	2291
2013	12061	2511
2014	13742	2808
2015	15586	3131
2016	16727	3292
2017	18055	3480
2018	19421	3670
2019	20967	3858

9.3.2 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. Tables TJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 49.3 thousand Yuan to 2.21 million Yuan, an increase of more than 43 times; and

the real average labor force human capital from 49.3 thousand Yuan to 406.6 thousand Yuan, an increase of more than 7 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	49.31	56.77	30.30	49.31	56.77	30.30
1986	55.42	63.36	35.41	51.90	59.33	33.16
1987	62.24	70.65	41.22	54.57	61.94	36.14
1988	70.64	79.08	48.53	52.98	59.31	36.40
1989	79.53	87.86	56.29	52.00	57.45	36.81
1990	89.00	97.21	64.17	56.50	61.71	40.73
1991	99.58	107.94	74.40	57.36	62.18	42.86
1992	111.41	119.94	85.73	57.61	62.02	44.33
1993	123.69	132.28	97.78	54.39	58.16	42.99
1994	136.83	145.62	110.12	48.52	51.64	39.05
1995	151.70	161.07	122.63	46.66	49.54	37.72
1996	170.50	180.33	139.98	48.11	50.88	39.50
1997	192.85	203.86	158.32	52.78	55.79	43.33
1998	216.17	228.16	177.80	59.46	62.76	48.90
1999	239.28	252.33	196.38	66.54	70.18	54.62
2000	265.31	280.17	214.81	74.08	78.23	59.98
2001	294.87	312.28	235.49	81.36	86.16	64.97
2002	329.74	351.76	252.97	91.34	97.45	70.08
2003	363.08	388.46	272.26	99.58	106.55	74.68
2004	400.45	430.59	288.74	107.37	115.45	77.41
2005	439.38	474.84	302.59	116.06	125.43	79.93
2006	530.27	575.28	351.86	138.00	149.71	91.57
2007	618.64	672.47	401.00	154.51	167.95	100.15

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2008	709.09	772.25	450.67	168.03	182.99	106.79
2009	802.80	875.39	503.41	192.15	209.53	120.49
2010	900.83	984.68	553.33	208.33	227.72	127.96
2011	1019.79	1120.50	579.58	224.82	247.02	127.77
2012	1154.07	1271.95	613.00	247.73	273.04	131.59
2013	1275.57	1408.99	645.31	265.58	293.36	134.36
2014	1424.68	1579.16	672.29	291.10	322.66	137.37
2015	1577.57	1750.98	702.53	316.95	351.79	141.15
2016	1706.79	1900.89	717.56	335.86	374.05	141.20
2017	1862.02	2079.07	735.27	358.87	400.70	141.71
2018	2033.03	2275.44	750.18	384.14	429.95	141.75
2019	2209.75	2478.28	759.01	406.56	455.96	139.65

Chapter 10   Human Capital for Hebei

10.1 Total human capital

Table HeB-1.1 presents the estimates of nominal and real total human capital and real physical capital for Hebei. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Hebei.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	2139	2139	76
1986	2517	2384	84
1987	2901	2552	92
1988	3396	2531	101
1989	3953	2458	110
1990	4547	2817	118
1991	5272	3156	129
1992	6055	3428	142
1993	6926	3456	157
1994	7865	3214	175
1995	8819	3120	200
1996	10031	3303	232
1997	11429	3627	270
1998	12956	4172	313
1999	14788	4842	359
2000	16774	5494	402
2001	18750	6085	446

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2002	20999	6844	491
2003	23268	7402	548
2004	25843	7869	621
2005	28217	8434	723
2006	32635	9562	840
2007	37286	10411	976
2008	42214	11068	1155
2009	47507	12520	1353
2010	53525	13663	1562
2011	61443	14787	1825
2012	70143	16406	2105
2013	80014	18136	2393
2014	88598	19712	2679
2015	97679	21501	2955
2016	104658	22682	3243
2017	114826	24424	3491
2018	124861	25893	—
2019	135417	27269	—

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 2019, the nominal human capital per capita increased from 41.8 thousand Yuan to 2.3 million Yuan, an increase of more than 53 times; and the real human capital per capita increased from 41.8

thousand Yuan to 0.4 million Yuan, an increase of more than 9 times.

Figure HeB-2.1 illustrates the trends of human capital per capita by gender for Hebei. The trend of real human capital per capita of male is similar to that of female for Hebei. Both of them kept increasing from 1985 to 2019, and the growths of human capital for male and female both accelerated, with the male's growth rate significantly higher than the female's. As a result, the gender gap has been expanding, especially from 1997.
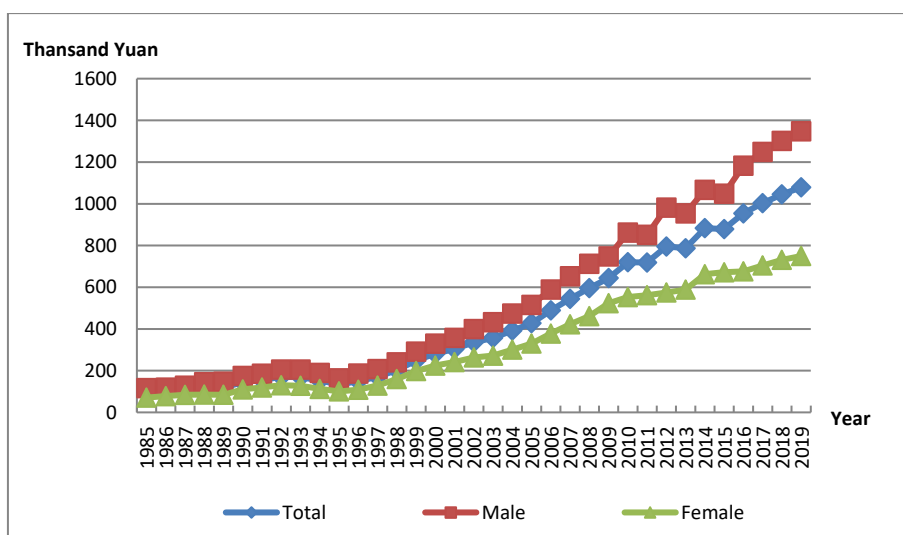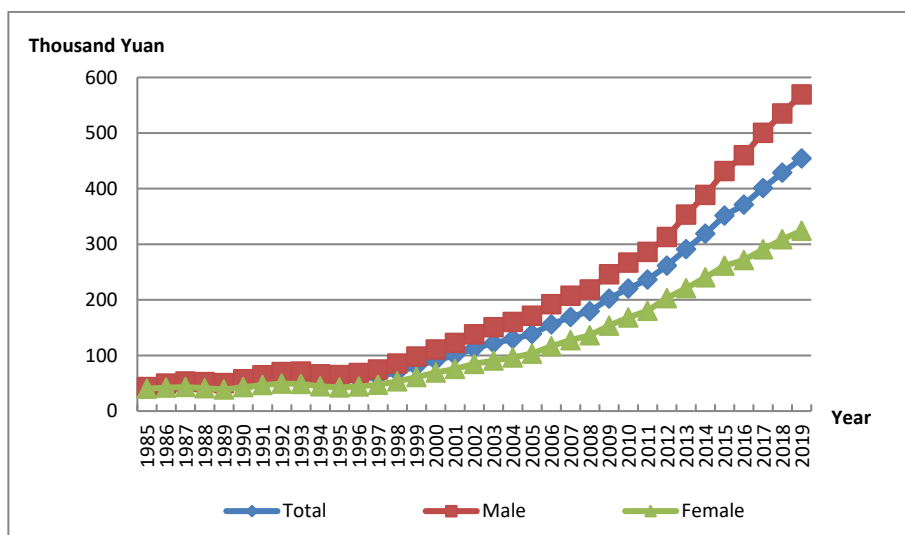

Figure HeB-2.1 Human Capital Per Capita by Gender for Hebei，1985-2019

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	41.83	74.33	35.14	41.83	74.33	35.14
1986	48.57	89.42	39.65	45.99	84.36	37.62
1987	55.12	100.25	44.75	48.48	87.41	39.53
1988	63.04	112.99	50.76	46.98	83.28	38.07
1989	72.16	127.25	57.87	44.87	80.92	35.51

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	81.76	141.31	65.63	50.65	88.80	40.31
1991	93.80	163.02	73.76	56.16	96.10	44.60
1992	106.76	185.53	82.59	60.44	100.80	48.06
1993	121.28	210.66	92.36	60.51	99.09	48.03
1994	136.87	237.12	103.12	55.92	89.30	44.69
1995	152.99	264.62	114.16	54.13	85.84	43.10
1996	172.53	299.60	126.06	56.81	90.32	44.56
1997	194.54	337.66	140.03	61.74	98.16	47.87
1998	217.71	376.86	154.88	70.11	111.00	53.97
1999	245.55	429.24	170.93	80.40	128.09	61.03
2000	277.54	486.44	190.16	90.90	144.44	68.51
2001	309.07	527.33	208.42	100.30	155.96	74.64
2002	346.01	583.96	225.51	112.76	175.16	81.16
2003	383.83	629.01	248.72	122.11	184.43	87.76
2004	426.00	684.01	273.21	129.71	193.40	91.99
2005	463.88	724.10	299.77	138.65	201.91	98.76
2006	532.12	816.37	338.39	155.91	223.83	109.62
2007	606.03	915.88	379.33	169.22	240.68	116.94
2008	684.61	1018.78	425.44	179.49	254.48	121.33
2009	768.00	1117.30	480.02	202.40	282.41	136.44
2010	863.59	1237.77	535.98	220.44	304.27	147.03
2011	982.49	1407.82	574.61	236.45	328.66	148.02
2012	1117.74	1597.12	617.84	261.43	363.18	155.33
2013	1284.19	1841.45	663.02	291.08	407.73	161.06
2014	1434.63	2047.25	713.44	319.19	445.72	170.24
2015	1597.14	2266.37	771.45	351.56	488.05	183.16
2016	1712.30	2402.25	822.37	371.10	509.67	192.37

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2017	1886.16	2630.03	884.67	401.19	547.59	204.09
2018	2066.83	2861.14	952.21	428.61	581.18	214.52
2019	2255.92	3103.96	1016.72	454.28	613.33	221.86

Figure HeB-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore the gap between urban and rural regions expanded rapidly.
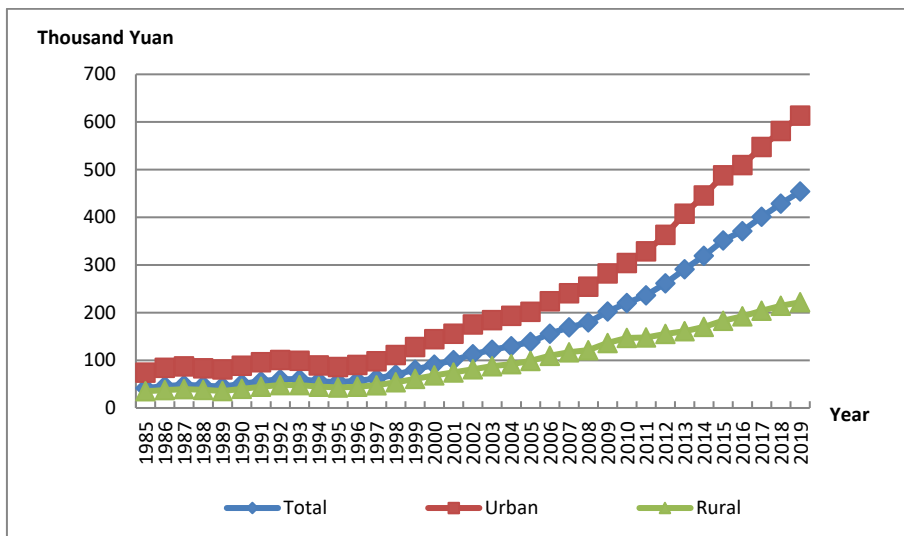
Figure HeB-2.2 Real Human Capital Per Capita by Region for Hebei，1985-2019

10.3 Labor force human capital

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

10.3.1 Total labor force human capital

The total labor force human capital for Hebei is reported in Table HeB-3.1 From 1985 to 2019, the nominal labor force human capital increased from 0.9 trillion Yuan to 45.7 trillion Yuan, an increase of more than 48 times; and the real labor force human capital increased from 0.9 trillion Yuan to 9.3 trillion Yuan, an increase of more than 9 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)
1985	921	921
1986	1072	1015
1987	1253	1102
1988	1452	1083
1989	1682	1044
1990	1938	1199
1991	2189	1312
1992	2454	1396
1993	2737	1376
1994	3059	1266
1995	3408	1223
1996	3880	1298
1997	4433	1431
1998	5067	1663
1999	5764	1931
2000	6589	2216
2001	7420	2471
2002	8243	2759
2003	9212	3013
2004	10272	3212
2005	11416	3498

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2006	13311	3991
2007	15159	4322
2008	17085	4552
2009	19246	5139
2010	21595	5575
2011	24215	5884
2012	26863	6343
2013	29028	6642
2014	31237	7015
2015	33411	7429
2016	36224	7926
2017	39205	8422
2018	42083	8814
2019	45711	9290

10.3.2 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. Tables HeB-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 29.2 thousand Yuan to 1.1 million Yuan, an increase of more than 37 times; and the real average labor force human capital increased from 29.2 thousand Yuan to 0.2 million Yuan, an increase of more than 6 times.

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

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	29.22	49.37	25.09	29.22	49.37	25.09

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
1986	33.20	55.72	28.29	31.45	52.57	26.84
1987	37.78	62.88	31.93	33.24	54.83	28.21
1988	42.80	69.15	36.32	31.92	50.97	27.24
1989	48.39	75.91	41.26	30.04	48.27	25.32
1990	54.56	82.85	46.89	33.77	52.06	28.81
1991	61.01	92.44	52.10	36.58	54.49	31.50
1992	67.88	102.02	57.83	38.60	55.43	33.65
1993	75.24	111.83	64.11	37.83	52.60	33.34
1994	83.20	121.59	71.28	34.42	45.79	30.89
1995	91.84	132.45	78.90	32.97	42.97	29.78
1996	103.08	150.13	87.52	34.50	45.26	30.94
1997	115.83	169.39	97.55	37.39	49.24	33.35
1998	129.58	187.98	109.22	42.53	55.37	38.06
1999	144.01	206.63	121.81	48.25	61.66	43.49
2000	160.83	229.21	136.04	54.08	68.06	49.01
2001	178.61	252.03	149.43	59.49	74.54	53.52
2002	196.21	274.35	162.61	65.67	82.29	58.53
2003	216.73	296.44	179.90	70.89	86.92	63.48
2004	238.89	320.96	198.27	74.70	90.75	66.76
2005	262.63	345.99	218.71	80.48	96.48	72.05
2006	303.39	402.78	246.20	90.96	110.43	79.75
2007	344.80	457.48	274.67	98.31	120.22	84.68
2008	388.40	512.30	305.39	103.49	127.97	87.09
2009	437.34	570.61	341.17	116.78	144.23	96.97
2010	490.34	634.75	377.74	126.59	156.04	103.63
2011	548.32	722.50	400.48	133.24	168.67	103.17
2012	609.76	810.34	425.80	143.99	184.27	107.05

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
2013	665.70	884.24	452.80	152.33	195.79	109.99
2014	725.40	963.26	481.43	162.90	209.72	114.88
2015	784.98	1033.69	517.05	174.54	222.60	122.76
2016	855.32	1133.85	548.23	187.14	240.56	128.24
2017	936.54	1246.16	587.18	201.20	259.46	135.46
2018	1023.13	1364.90	628.76	214.29	277.25	141.65
2019	1122.88	1505.08	670.71	228.21	297.40	146.36

Chapter 11   Human Capital for Shanxi

11.1 Total human capital

Table SX-1.1 presents the estimates of nominal and real total human capital and real physical capital for Shanxi. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Shanxi.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	798	798	43
1986	953	903	49
1987	1091	961	55
1988	1275	930	58
1989	1479	901	61
1990	1727	1029	64
1991	1993	1136	68
1992	2326	1241	72
1993	2699	1258	77
1994	3132	1165	82
1995	3572	1135	87
1996	4097	1206	92
1997	4651	1327	100
1998	5343	1544	111
1999	5900	1711	123
2000	6638	1850	135

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	7637	2124	149
2002	8900	2506	166
2003	10192	2813	188
2004	11425	3023	218
2005	12692	3278	256
2006	14557	3681	303
2007	16444	3970	359
2008	18217	4100	418
2009	20329	4593	504
2010	22923	5024	601
2011	26067	5426	716
2012	29332	5954	826
2013	32386	6378	948
2014	35758	6922	1065
2015	39097	7524	1173
2016	43189	8221	1262
2017	47208	8876	1304
2018	51262	9465	—
2019	55743	10023	—

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 the non-retired population. Table SX-2.1 presents human capital per capita for Shanxi by region. From 1985 to 2019, the nominal human capital per capita increased from 31.8 thousand Yuan to 1.9 million Yuan, an increase

134

of approximately 58 times; and the real human capital per capita increased from 31.8 thousand Yuan to 339.5 thousand Yuan, an increase of more than 10 times.

Figure SX-2.1 illustrates the trends of human capital per capita by gender for Shanxi. The trend of the real human capital per capita of male is similar to that of female for Shanxi. Both of them kept increasing from 1985 to 2019, and the growths of human capital for male and female both accelerated, with the male's growth rate significantly higher than the female's. As a result, the gender gap has been expanding, especially from 1997.
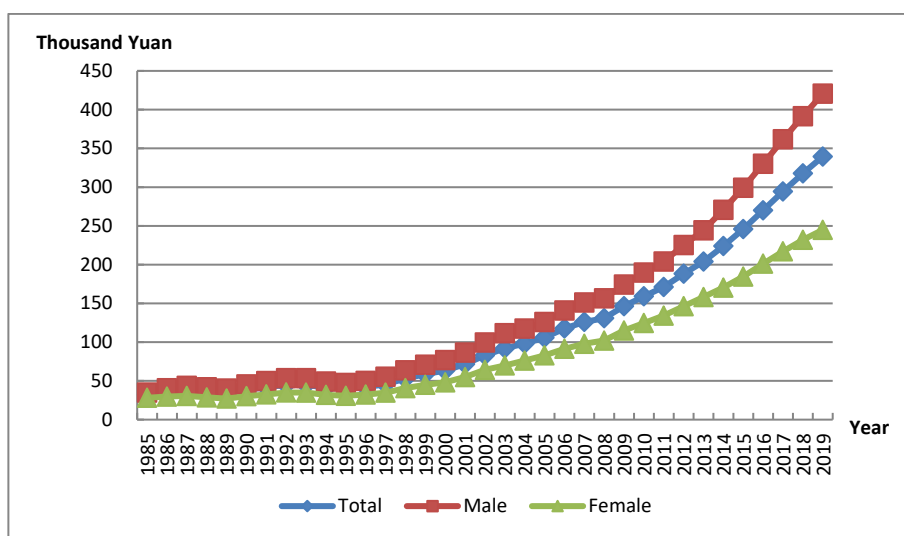
Figure SX-2.1 Human Capital Per Capita by Gender for Shanxi，1985-2019

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	31.88	58.30	23.33	31.88	58.30	23.33

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1986	37.66	69.66	26.67	35.68	65.47	25.45
1987	42.75	76.73	30.38	37.67	66.46	27.19
1988	48.97	86.09	34.92	35.72	61.07	26.12
1989	56.06	96.82	39.94	34.16	59.06	24.30
1990	64.45	109.66	45.73	38.40	65.90	27.02
1991	73.30	122.87	52.01	41.78	69.53	29.86
1992	84.31	141.20	59.05	44.97	73.24	32.41
1993	96.42	160.53	66.98	44.92	71.72	32.62
1994	110.41	184.03	75.76	41.07	65.30	29.66
1995	124.70	206.75	84.85	39.63	62.87	28.34
1996	141.84	236.29	94.54	41.75	66.35	29.43
1997	160.12	266.38	105.36	45.69	72.55	31.84
1998	183.05	306.92	117.45	52.88	84.69	36.04
1999	202.11	334.32	129.73	58.62	91.88	40.41
2000	227.01	371.37	144.63	63.26	97.48	43.74
2001	257.50	413.84	159.71	71.61	109.17	48.11
2002	294.61	469.57	175.11	82.95	126.60	53.13
2003	332.97	522.10	196.31	91.90	138.61	58.14
2004	370.64	574.05	218.07	98.07	147.09	61.30
2005	409.40	625.11	239.80	105.73	157.56	64.99
2006	465.08	702.34	268.45	117.60	173.86	70.98
2007	522.42	777.69	297.79	126.12	184.79	74.49
2008	581.27	855.19	328.02	130.83	189.91	76.21
2009	648.17	937.86	363.50	146.43	210.27	83.70
2010	726.12	1037.35	402.34	159.15	225.56	90.07
2011	822.67	1165.80	426.99	171.26	241.10	90.72
2012	927.38	1301.80	455.09	188.26	262.81	94.22

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
2013	1035.78	1443.21	483.90	203.98	282.92	97.04
2014	1156.84	1603.38	519.34	223.95	308.89	102.68
2015	1278.31	1761.10	564.41	246.00	337.42	110.82
2016	1419.27	1950.52	599.91	270.15	369.79	116.48
2017	1566.50	2144.29	644.40	294.52	401.07	124.48
2018	1720.86	2346.87	691.09	317.75	431.16	131.19
2019	1888.32	2567.01	739.88	339.54	459.61	136.38

Figure SX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in rural areas. Since 1997, the growths of human capital for rural and urban regions both accelerated, and the growth rate is significantly higher in urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
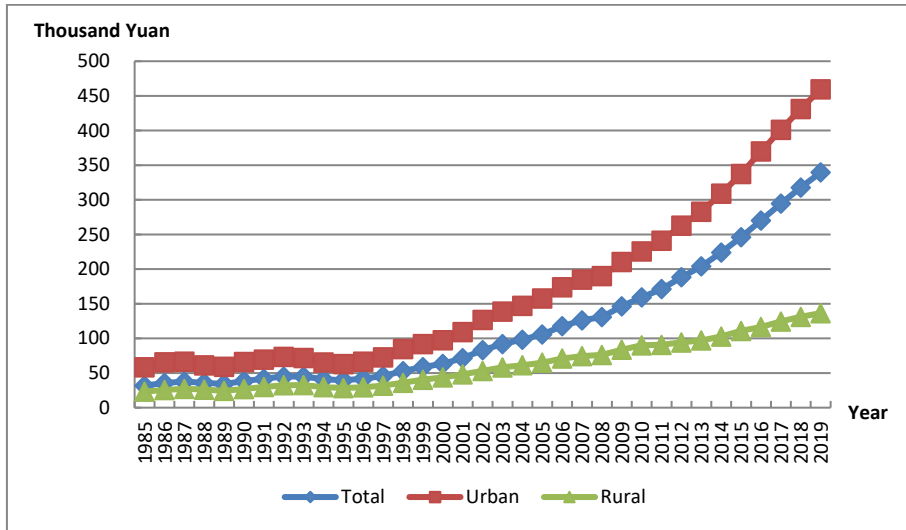
Figure SX-2.2 Real Human Capital Per Capita by Region for Shanxi，1985-2019

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 2019, the nominal labor force human capital increased from 0.4 trillion Yuan to 25 trillion Yuan, an increase of more than 70 times; and the real labor force human capital increased from 0.4 trillion Yuan to 4.5 trillion Yuan, an increase of approximately 11 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)
1985	351	351
1986	414	393
1987	489	431
1988	577	421
1989	676	412
1990	794	473
1991	920	524
1992	1057	564
1993	1208	564
1994	1381	516
1995	1563	499
1996	1752	519
1997	1961	563
1998	2191	638
1999	2419	709

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	2698	761
2001	3061	862
2002	3459	987
2003	3919	1096
2004	4392	1174
2005	4921	1281
2006	5605	1428
2007	6384	1550
2008	7240	1638
2009	8261	1872
2010	9442	2076
2011	10742	2243
2012	12171	2477
2013	13546	2674
2014	15097	2931
2015	16682	3218
2016	18661	3560
2017	20711	3905
2018	22772	4217
2019	24928	4493

11.3.2 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. Tables SX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 23.8 thousand Yuan to 1133.43 thousand Yuan, an increase of approximately 47

times; and the real average labor force human capital increased from 23.8 thousand Yuan to 204.3 thousand Yuan, an increase of more than 8 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	23.79	41.94	17.47	23.79	41.94	17.47
1986	27.27	46.59	20.08	25.84	43.79	19.16
1987	31.19	51.74	23.03	27.50	44.81	20.61
1988	35.86	58.26	26.55	26.16	41.33	19.85
1989	41.05	65.36	30.46	25.01	39.87	18.53
1990	47.01	73.32	34.94	28.01	44.07	20.64
1991	53.18	81.89	39.86	30.32	46.34	22.88
1992	59.99	91.36	45.17	32.04	47.39	24.79
1993	67.51	101.76	51.02	31.55	45.46	24.85
1994	75.89	113.33	57.54	28.35	40.22	22.53
1995	84.78	125.71	64.32	27.06	38.23	21.48
1996	94.02	138.19	71.41	27.84	38.80	22.23
1997	104.32	152.03	79.26	29.96	41.40	23.95
1998	115.28	166.07	87.88	33.57	45.82	26.97
1999	126.35	179.92	96.74	37.01	49.44	30.14
2000	139.49	196.88	106.64	39.32	51.68	32.25
2001	155.70	217.44	118.96	43.86	57.36	35.83
2002	173.31	241.14	131.25	49.47	65.01	39.82
2003	193.10	265.14	146.68	54.00	70.39	43.44
2004	214.41	293.11	161.39	57.34	75.10	45.37
2005	237.91	324.25	176.90	61.93	81.73	47.94
2006	267.90	362.48	198.07	68.24	89.73	52.37
2007	301.04	404.37	220.63	73.09	96.08	55.19

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
2008	337.35	450.01	245.60	76.30	99.93	57.06
2009	379.46	501.62	274.96	85.97	112.46	63.31
2010	427.16	560.94	306.52	93.92	121.97	68.62
2011	481.67	638.56	328.80	100.55	132.06	69.86
2012	542.45	721.68	355.87	110.41	145.69	73.68
2013	603.34	802.20	385.28	119.11	157.26	77.26
2014	673.03	894.52	418.31	130.64	172.33	82.71
2015	744.45	983.18	458.78	143.62	188.37	90.08
2016	829.30	1103.05	490.18	158.22	209.12	95.17
2017	925.21	1236.76	526.59	174.47	231.33	101.73
2018	1026.82	1378.58	563.09	190.13	253.27	106.90
2019	1133.43	1526.90	600.47	204.28	273.38	110.68

Chapter 12 Human Capital for Inner Mongolia

12.1 Total human capital

Table NMG-1.1 presents the estimates of nominal and real total human capital and real physical capital for Inner Mongolia. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Inner Mongolia.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	830	830	25
1986	987	940	28
1987	1123	996	31
1988	1291	986	35
1989	1470	965	38
1990	1679	1075	41
1991	1901	1164	45
1992	2155	1237	52
1993	2430	1225	60
1994	2734	1120	68
1995	3065	1068	76
1996	3507	1134	83
1997	4063	1254	92
1998	4655	1445	101
1999	5224	1622	111

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	6046	1849	123
2001	6776	2056	136
2002	7740	2293	157
2003	8443	2449	197
2004	9467	2667	254
2005	10499	2889	337
2006	12368	3352	435
2007	14155	3669	556
2008	16096	3951	700
2009	18139	4464	899
2010	21039	5022	1123
2011	24227	5478	1371
2012	26731	5857	1659
2013	29857	6331	2007
2014	33673	7024	2274
2015	36708	7574	2531
2016	40146	8191	2717
2017	43859	8800	2818
2018	47589	9377	—
2019	51261	9841	—

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 2019, the nominal human capital per capita increased from 42.7 thousand Yuan to 2.6 million Yuan, an

increase of more than 59 times; and the real human capital per capita increased from 42.7 thousand Yuan to 493.6 thousand Yuan, an increase of approximately 10 times.

Figure NMG-2.1 illustrates the trends of human capital per capita by gender for Inner Mongolia. The trend of real human capital per capita of male is similar to that of female for Inner Mongolia. Both of them kept increasing from 1985 to 2019, 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.
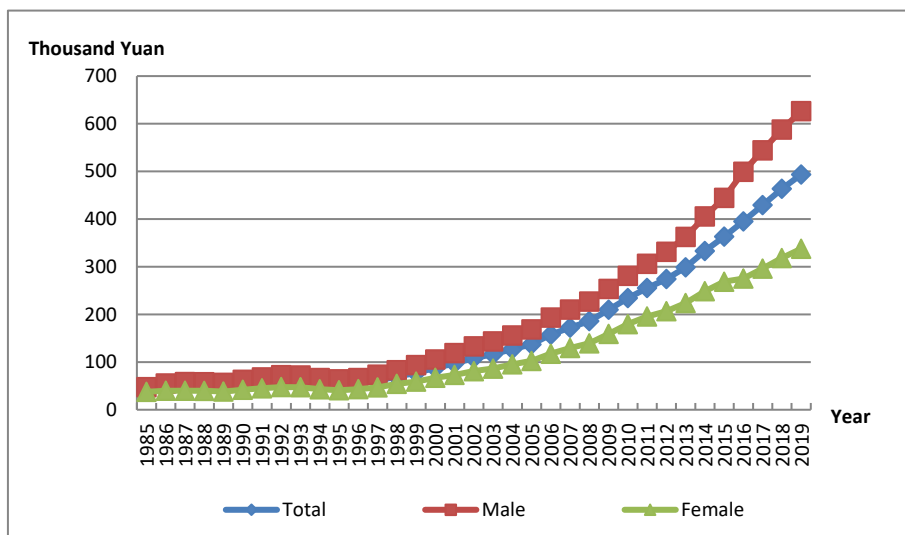
Figure NMG-2.1 Human Capital Per Capita by Gender for Inner Mongolia，1985-2019

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	42.69	65.33	31.32	42.69	65.33	31.32
1986	50.36	79.26	35.01	47.94	75.13	33.50
1987	55.74	86.77	38.75	49.42	75.81	34.98
1988	64.46	100.68	43.98	49.21	75.17	34.53
1989	73.04	114.15	49.14	47.94	74.31	32.61
1990	82.81	129.50	55.09	53.04	82.81	35.35
1991	93.44	146.34	61.56	57.25	88.28	38.55
1992	105.98	166.98	68.73	60.85	92.67	41.42
1993	119.77	189.46	76.71	60.41	91.67	41.09
1994	135.21	215.52	85.39	55.39	83.90	37.71
1995	151.84	242.98	94.55	52.90	80.77	35.38
1996	171.90	275.09	104.39	55.57	85.07	36.27
1997	197.34	317.82	115.18	60.91	93.96	38.37
1998	223.65	359.78	127.09	69.42	107.11	42.68
1999	248.88	397.04	140.02	77.27	117.85	47.45
2000	285.89	455.03	155.26	87.44	133.33	51.99
2001	320.49	505.41	168.96	97.24	147.21	56.30
2002	366.10	577.21	182.03	108.43	166.79	57.55
2003	401.08	619.32	199.35	116.33	176.31	60.89
2004	450.69	689.79	217.69	126.97	191.59	64.00
2005	498.16	752.87	238.47	137.10	205.01	67.86
2006	581.65	863.94	266.29	157.63	232.23	74.30
2007	664.82	968.97	297.08	172.35	249.72	78.79
2008	757.83	1087.56	330.19	186.02	265.93	82.38
2009	852.14	1197.61	374.16	209.74	293.72	93.54
2010	981.70	1361.11	423.76	234.34	324.09	102.36

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2011	1129.24	1551.16	452.77	255.36	350.09	103.46
2012	1251.39	1693.26	489.07	274.21	369.96	109.03
2013	1408.77	1888.41	532.50	298.73	399.03	115.48
2014	1597.37	2124.68	589.26	333.21	441.45	126.28
2015	1760.17	2320.04	662.83	363.18	476.79	140.50
2016	1937.13	2534.04	724.91	395.25	515.10	151.84
2017	2139.92	2776.64	801.15	429.34	554.98	165.16
2018	2352.38	3028.52	885.49	463.54	594.62	179.14
2019	2570.92	3285.71	979.23	493.56	627.55	195.18

Figure NMG-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the trend of real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban regions both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
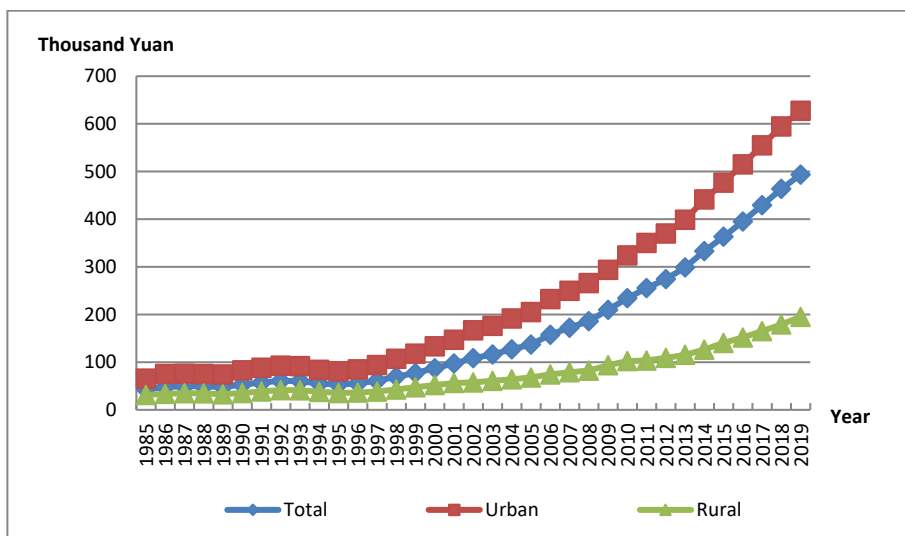
Figure NMG-2.2 Real Human Capital Per Capita by Region for Inner Mongolia，1985-2019

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 2019, the nominal labor force human capital increased from 0.3 trillion Yuan to 22.85 trillion Yuan, an increase about 68 times; and the real labor force human capital increased from 0.3 trillion Yuan to 4.4 trillion Yuan, an increase of approximately 12 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)
1985	333	333
1986	389	371
1987	459	407
1988	533	407
1989	621	408
1990	724	463
1991	818	502
1992	923	532
1993	1034	524
1994	1159	478
1995	1296	455
1996	1491	486
1997	1713	533
1998	1966	616

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	2235	702
2000	2543	788
2001	2843	875
2002	3149	942
2003	3469	1015
2004	3787	1074
2005	4182	1157
2006	4937	1344
2007	5696	1482
2008	6472	1592
2009	7370	1818
2010	8482	2028
2011	9670	2190
2012	11003	2416
2013	12253	2605
2014	13857	2899
2015	15486	3204
2016	17229	3524
2017	19095	3840
2018	20983	4144
2019	22851	4400

12.3.2 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. Tables NMG-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 29.6thousand Yuan to 1.5 million Yuan, an increase of more than 49 times, and the real average labor force human capital increased from 29.6 thousand

Yuan to 284.4 thousand Yuan, an increase of approximately 8 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	29.55	42.07	23.00	29.55	42.07	23.00
1986	33.54	47.46	25.84	31.94	44.98	24.72
1987	37.36	52.65	28.37	33.16	46.00	25.61
1988	43.49	61.65	32.55	33.25	46.04	25.56
1989	49.47	70.46	36.64	32.49	45.87	24.31
1990	56.15	80.13	41.37	35.97	51.24	26.55
1991	62.77	89.61	46.10	38.52	54.06	28.86
1992	70.16	100.28	51.32	40.44	55.65	30.92
1993	78.19	111.87	57.02	39.65	54.13	30.54
1994	87.16	124.92	63.45	35.97	48.63	28.02
1995	96.95	139.39	70.27	34.03	46.34	26.30
1996	109.04	156.92	77.79	35.52	48.52	27.03
1997	122.38	175.77	86.33	38.11	51.96	28.76
1998	136.97	195.65	95.90	42.93	58.25	32.21
1999	152.04	215.52	106.30	47.73	63.97	36.02
2000	169.00	238.07	117.64	52.34	69.76	39.39
2001	186.77	262.53	128.83	57.46	76.47	42.93
2002	205.10	288.36	139.48	61.38	83.32	44.09
2003	224.62	313.21	152.66	65.69	89.17	46.63
2004	244.89	339.07	165.78	69.48	94.18	48.74
2005	268.91	370.58	180.43	74.41	100.91	51.35
2006	312.88	428.71	203.95	85.17	115.24	56.90
2007	358.39	485.68	230.03	93.22	125.17	61.01

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
2008	405.03	540.94	259.54	99.66	132.27	64.76
2009	459.91	605.27	294.73	113.45	148.44	73.68
2010	524.27	680.45	334.41	125.35	162.02	80.77
2011	596.64	778.43	359.10	135.10	175.69	82.06
2012	679.10	885.71	390.87	149.10	193.52	87.14
2013	761.12	988.46	428.42	161.80	208.86	92.91
2014	863.13	1116.25	475.32	180.56	231.92	101.86
2015	968.68	1240.78	536.39	200.41	254.99	113.70
2016	1079.93	1380.43	584.92	220.89	280.61	122.51
2017	1206.52	1535.27	644.35	242.65	306.86	132.84
2018	1341.06	1698.83	708.40	264.83	333.55	143.32
2019	1476.91	1859.53	778.44	284.38	355.16	155.16

Chapter 13   Human Capital for Liaoning

13.1 Total human capital

Table LN-1.1 presents the estimates of nominal and real total human capital and real physical capital for Liaoning. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Liaoning.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	1638	1638	79
1986	1945	1831	96
1987	2219	1930	120
1988	2612	1922	152
1989	3020	1877	164
1990	3414	2051	186
1991	3853	2197	220
1992	4315	2324	294
1993	4828	2270	458
1994	5344	2025	591
1995	5848	1909	665
1996	6661	2015	727
1997	7533	2202	791
1998	8438	2476	842
1999	9573	2823	899
2000	11023	3236	976
2001	12107	3549	1056

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2002	13110	3882	1154
2003	14187	4101	1318
2004	15564	4324	1586
2005	16960	4623	1942
2006	19125	5147	2365
2007	21741	5553	2925
2008	24290	5923	3796
2009	26947	6560	4285
2010	30470	7185	5215
2011	33737	7544	6525
2012	37838	8207	7619
2013	41983	8872	8714
2014	45878	9514	9747
2015	49388	10090	10080
2016	58032	11650	10243
2017	62734	12415	10910
2018	67366	12994	—
2019	71826	13527	—

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 2019, the nominal human capital per capita increased from 47.8 thousand Yuan to 2.3 million Yuan, an increase of more than 47 times; and the real human capital per capita increased from

47.8 thousand Yuan to 431.6 thousand Yuan, an increase of approximately 8 times.

Figure LN-2.1 illustrates the trends of human capital per capita by gender for Liaoning. The trend of real human capital per capita of male is similar to that of female for Liaoning. Both of them kept increasing from 1985 to 2019, 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.
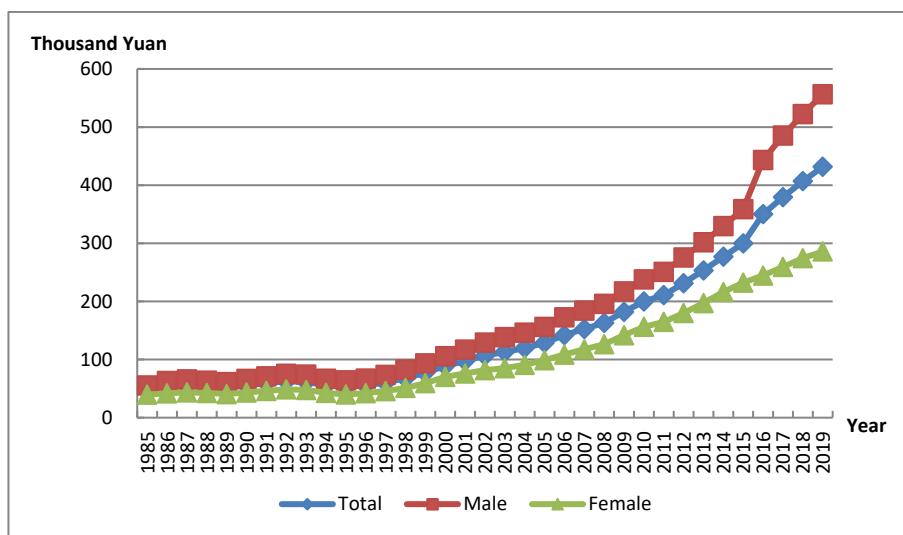
Figure LN-2.1 Real Human Capital Per Capita by Gender for Liaoning，1985-2019

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	47.81	64.34	34.28	47.81	64.34	34.28
1986	56.33	77.05	38.81	53.01	71.99	36.97
1987	63.46	86.03	43.91	55.21	73.22	39.60
1988	72.82	97.91	50.21	53.58	69.67	39.08

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	82.73	109.87	57.00	51.42	66.71	36.93
1990	92.60	120.68	64.40	55.62	71.08	40.09
1991	104.08	135.54	72.65	59.35	75.32	43.40
1992	116.55	151.47	81.58	62.76	77.86	47.64
1993	131.05	170.44	91.29	61.62	75.06	48.05
1994	146.34	190.24	101.56	55.45	66.44	44.23
1995	161.17	208.13	112.49	52.61	62.62	42.23
1996	182.99	238.58	124.54	55.35	66.34	43.79
1997	206.57	270.87	137.44	60.40	72.56	47.32
1998	230.97	303.03	151.25	67.77	81.34	52.76
1999	262.08	346.67	165.48	77.29	94.28	57.89
2000	302.68	405.15	180.99	88.85	110.19	63.50
2001	332.62	441.45	198.74	97.50	120.18	69.59
2002	360.11	472.40	215.51	106.62	130.04	76.47
2003	391.13	505.15	237.22	113.07	136.72	81.15
2004	431.10	552.37	258.56	119.76	145.43	83.22
2005	472.23	600.83	278.74	128.71	156.93	86.26
2006	528.36	670.43	310.87	142.19	173.21	94.69
2007	597.66	759.95	343.45	152.66	187.71	97.78
2008	668.59	850.90	377.10	163.02	201.35	101.74
2009	747.75	952.02	414.36	182.04	225.28	111.45
2010	848.24	1083.09	450.20	200.01	249.33	116.42
2011	942.78	1198.98	471.02	210.83	262.62	115.45
2012	1066.39	1352.94	492.38	231.30	287.99	117.74
2013	1198.72	1515.59	511.90	253.32	315.04	119.55
2014	1335.11	1684.29	536.50	276.87	343.91	123.56
2015	1468.02	1844.60	567.65	299.91	371.42	128.92

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2016	1744.00	2209.13	587.59	350.12	438.22	131.08
2017	1917.46	2426.25	615.72	379.46	474.67	135.85
2018	2109.53	2665.56	646.55	406.89	508.40	139.82
2019	2291.75	2889.01	672.20	431.59	538.49	141.72

Figure LN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban regions both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
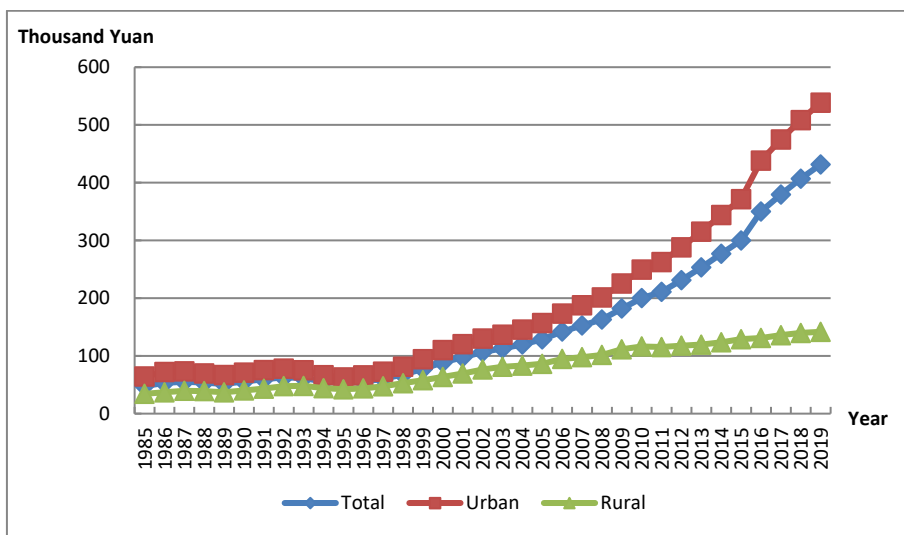
Figure LN-2.2 Real Human Capital Per Capita by Region for Liaoning，1985-2019

13.3 Labor force human capital

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

13.3.1 Total labor force human capital

The total labor force human capital for Liaoning is reported in Table LN-3.1 From 1985 to 2019, the nominal labor force human capital increased from 0.8 trillion Yuan to 29.3 thousand billion Yuan, an increase of more than 35 times; and the real labor force human capital increased from 0.8 trillion Yuan to 5.6 trillion Yuan, an increase of approximately 6 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)
1985	797	797
1986	914	860
1987	1054	917
1988	1236	910
1989	1431	890
1990	1643	988
1991	1844	1054
1992	2046	1106
1993	2252	1066
1994	2471	946
1995	2720	897
1996	3075	942
1997	3480	1032
1998	3920	1168
1999	4334	1300

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	4789	1433
2001	5228	1562
2002	5704	1720
2003	6193	1820
2004	6695	1887
2005	7244	1997
2006	8394	2283
2007	9599	2474
2008	10762	2645
2009	11961	2934
2010	13593	3226
2011	15246	3433
2012	16966	3708
2013	18565	3956
2014	19912	4165
2015	21462	4422
2016	23349	4731
2017	25289	5050
2018	27291	5312
2019	29256	5557

13.3.2 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. Tables LN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 3.6 thousand Yuan to 1.2 million Yuan, an increase about 32 times; and the real average labor force human capital increased from 36.2 thousand Yuan to 226.0 thousand Yuan, an increase of approximately 5 times.

157

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	36.23	46.97	26.36	36.23	46.97	26.36
1986	40.73	52.34	29.86	38.34	48.90	28.44
1987	45.87	58.49	33.76	39.91	49.78	30.45
1988	51.85	64.96	38.69	38.18	46.22	30.11
1989	58.21	71.68	44.03	36.21	43.52	28.52
1990	65.14	78.98	49.79	39.16	46.52	31.00
1991	72.20	86.87	56.24	41.25	48.27	33.60
1992	79.67	95.23	62.90	43.07	48.95	36.73
1993	87.72	104.31	69.86	41.52	45.94	36.78
1994	96.33	114.00	77.38	36.86	39.82	33.70
1995	105.88	125.00	85.34	34.92	37.61	32.04
1996	118.03	139.44	94.77	36.16	38.77	33.32
1997	131.84	156.20	104.73	39.11	41.84	36.06
1998	146.38	173.43	115.39	43.61	46.55	40.25
1999	160.46	189.87	125.72	48.13	51.64	43.98
2000	176.03	208.66	135.98	52.69	56.75	47.71
2001	191.83	225.99	148.36	57.31	61.52	51.95
2002	208.76	245.44	160.29	62.96	67.56	56.88
2003	226.51	264.08	174.97	66.58	71.47	59.86
2004	245.69	285.34	188.76	69.23	75.13	60.76
2005	266.45	309.26	201.75	73.47	80.77	62.43
2006	304.76	355.58	226.92	82.88	91.87	69.12
2007	345.32	405.38	251.45	88.99	100.13	71.58
2008	386.15	455.27	276.16	94.91	107.73	74.50
2009	430.90	509.64	303.37	105.71	120.60	81.60

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2010	488.26	582.65	329.69	115.89	134.13	85.26
2011	548.15	658.63	354.02	123.41	144.26	86.78
2012	614.62	742.46	379.56	134.34	158.04	90.76
2013	681.09	825.58	404.30	145.13	171.61	94.42
2014	745.32	905.29	427.07	155.91	184.85	98.36
2015	817.87	993.03	456.28	168.52	199.95	103.63
2016	896.76	1095.50	478.13	181.69	217.31	106.66
2017	986.20	1210.66	503.51	196.93	236.85	111.09
2018	1090.15	1344.85	531.68	212.17	256.50	114.98
2019	1190.07	1473.22	557.33	226.03	274.60	117.50

Chapter 14   Human Capital for Jilin

14.1 Total human capital

Table JL-1.1 presents the estimates of the estimates of nominal and real total human capital and real physical capital for Jilin. Column 1 gives the nominal human capital summed across six-education categories. Column 2 shows the totals real human capital for six-education categories. Column 3 displays the real physical capital of Jilin.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	1026	1026	32
1986	1205	1141	36
1987	1360	1204	40
1988	1581	1168	45
1989	1821	1141	48
1990	2078	1234	51
1991	2367	1321	55
1992	2676	1392	60
1993	3000	1397	66
1994	3323	1279	73
1995	3671	1224	80
1996	4135	1286	88
1997	4628	1387	95
1998	5117	1545	102
1999	5765	1771	111

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	6750	2093	122
2001	7769	2372	134
2002	8377	2568	149
2003	9056	2742	167
2004	9719	2829	191
2005	10404	2982	229
2006	11738	3316	289
2007	13454	3621	374
2008	15214	3891	493
2009	16823	4298	620
2010	19216	4735	776
2011	21706	5070	917
2012	24263	5520	1071
2013	26496	5851	1222
2014	30443	6579	1378
2015	32091	6819	1543
2016	35492	7414	1667
2017	38295	7871	1759
2018	40971	8246	—
2019	43657	8534	—

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 2019, the nominal human capital per capita increased from 46.9 thousand Yuan to 2.1 million Yuan, an increase of more

than 45 times; and the real human capital per capita increased from 46.9 thousand Yuan to 418.8 thousand Yuan, an increase of approximately 8 times.

Figure JL-2.1 illustrates the trends of human capital per capita by gender for Jilin. The pattern of growth in real human capital per capita for men is similar to for women in Jilin. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female both accelerated; however, since the male's growth rate was significantly higher than female's and men started out higher, the gender gap continues to expand, especially from 1997.
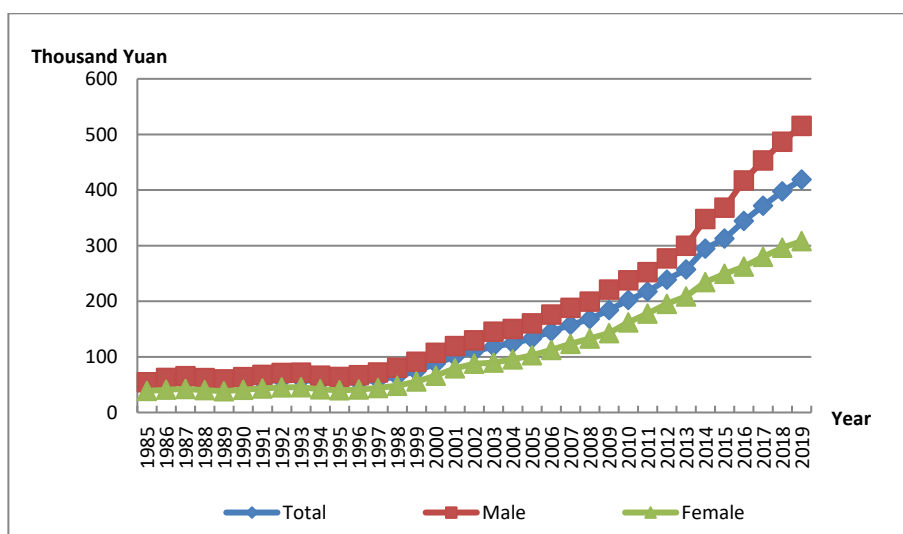
Figure JL-2.1 Human Capital Per Capita by Gender for Jilin，1985-2019

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	46.88	66.06	33.20	46.88	66.06	33.20
1986	54.95	79.56	37.18	52.02	75.06	35.38

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	61.49	88.46	41.62	54.44	77.27	37.61
1988	69.84	99.25	47.30	51.59	71.29	36.49
1989	78.96	110.96	53.76	49.49	68.18	34.77
1990	88.86	123.59	61.15	52.77	73.10	36.56
1991	100.42	138.50	68.39	56.05	76.48	38.86
1992	113.17	154.68	76.31	58.86	78.15	41.74
1993	127.15	172.27	84.97	59.22	76.89	42.71
1994	141.90	190.50	94.29	54.60	69.01	40.48
1995	157.15	208.77	104.56	52.39	65.71	38.83
1996	175.89	234.43	115.10	54.72	68.51	40.40
1997	195.82	261.49	126.66	58.68	73.69	42.87
1998	215.45	287.48	138.99	65.06	81.59	47.52
1999	241.90	326.28	151.97	74.31	94.59	52.69
2000	283.08	391.18	167.49	87.79	115.36	58.31
2001	328.80	461.40	182.77	100.39	134.06	63.31
2002	358.10	499.84	197.90	109.76	146.40	68.35
2003	392.20	543.38	218.17	118.75	157.42	74.23
2004	426.92	587.64	239.78	124.27	164.33	77.63
2005	463.91	635.67	261.08	132.95	175.30	82.95
2006	516.38	703.65	291.33	145.87	191.75	90.74
2007	585.38	799.69	323.52	157.54	208.74	94.98
2008	657.18	899.46	357.60	168.08	223.39	99.70
2009	721.15	979.04	397.32	184.26	243.39	110.00
2010	820.64	1121.91	437.06	202.21	269.74	116.24
2011	930.90	1282.46	461.02	217.44	293.10	116.33
2012	1049.87	1452.78	487.77	238.86	323.93	120.19
2013	1164.46	1615.55	515.58	257.14	350.07	123.46

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2014	1363.69	1922.20	548.59	294.70	407.95	129.43
2015	1471.23	2072.30	588.51	312.63	432.45	136.66
2016	1648.34	2327.41	616.45	344.35	478.51	140.48
2017	1808.75	2546.20	649.55	371.76	515.76	145.40
2018	1975.13	2771.10	683.37	397.51	550.31	149.53
2019	2142.42	2995.19	713.69	418.79	578.61	151.03

Figure JL-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban regions both accelerated; however, the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
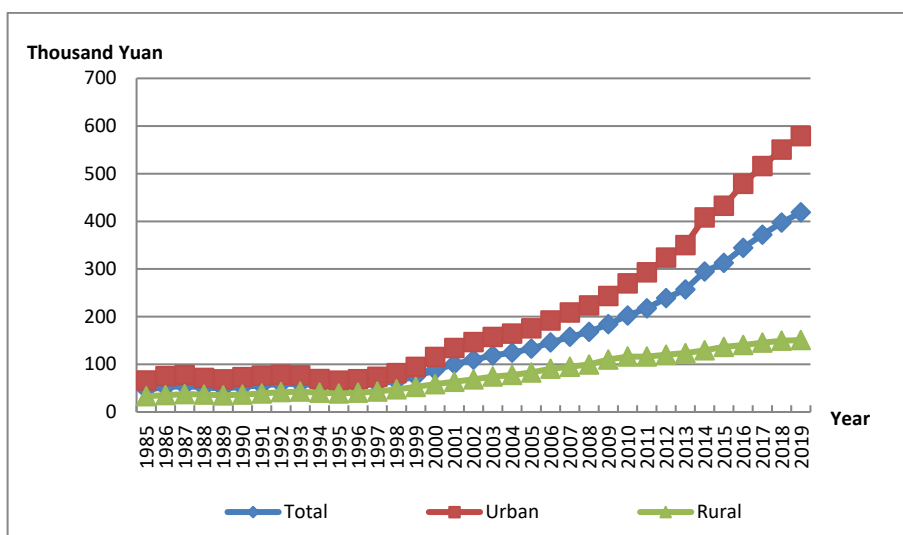
Figure JL-2.2 Real Human Capital Per Capita by Region for Jilin，1985-2019

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 2019, the nominal labor force human capital increased from 0.5 trillion Yuan to 17.7 trillion Yuan, an increase of more than 38 times; and the real labor force human capital increased from 0.5 trillion Yuan to 3.5 trillion Yuan, an increase of approximately 7 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)
1985	448	448
1986	513	486
1987	602	534
1988	701	519
1989	809	509
1990	931	553
1991	1073	600
1992	1214	634
1993	1355	635
1994	1502	584
1995	1666	561
1996	1891	596
1997	2134	648
1998	2395	733
1999	2659	830

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	2953	933
2001	3226	1007
2002	3501	1095
2003	3763	1163
2004	4004	1188
2005	4270	1248
2006	4941	1420
2007	5641	1541
2008	6340	1645
2009	7155	1852
2010	8036	2005
2011	8983	2123
2012	9979	2297
2013	10774	2408
2014	11484	2517
2015	12189	2627
2016	13459	2849
2017	14820	3083
2018	16194	3295
2019	17646	3484

14.3.2 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. Tables JL-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 33.8 thousand Yuan to 1.1 million Yuan, an increase of more than 31 times; and the real average labor force human capital increased from 33.8 thousand Yuan to 0.2 million Yuan, an increase of approximately 5 times.

166

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	33.76	45.94	25.02	33.76	45.94	25.02
1986	37.72	51.19	28.23	35.72	48.29	26.86
1987	42.75	58.25	31.78	37.91	50.88	28.72
1988	48.43	65.10	36.09	35.90	46.77	27.85
1989	54.41	71.92	41.12	34.19	44.19	26.60
1990	60.87	78.89	47.01	36.17	46.66	28.10
1991	68.63	88.32	52.44	38.36	48.77	29.80
1992	76.56	97.61	58.26	39.98	49.31	31.86
1993	84.83	107.00	64.59	39.76	47.76	32.47
1994	93.53	116.53	71.77	36.36	42.21	30.81
1995	103.03	126.87	79.70	34.71	39.93	29.59
1996	114.49	141.14	88.28	36.07	41.25	30.98
1997	126.93	156.80	97.31	38.54	44.19	32.94
1998	139.79	172.24	107.50	42.80	48.88	36.75
1999	152.61	187.16	118.39	47.62	54.26	41.05
2000	166.68	203.50	130.45	52.65	60.01	45.41
2001	182.67	222.98	142.00	57.02	64.79	49.19
2002	199.32	244.07	153.26	62.34	71.49	52.93
2003	216.05	262.29	168.08	66.76	75.99	57.19
2004	233.19	280.85	183.62	69.18	78.54	59.44
2005	251.58	300.55	200.61	73.50	82.88	63.74
2006	286.12	344.66	224.30	82.22	93.92	69.86
2007	322.53	391.43	248.80	88.10	102.17	73.04
2008	359.35	437.51	274.90	93.27	108.66	76.64

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2009	401.73	489.82	305.31	103.99	121.77	84.53
2010	447.19	546.98	336.25	111.58	131.51	89.42
2011	501.90	629.11	355.58	118.64	143.78	89.72
2012	560.85	714.58	378.46	129.11	159.33	93.26
2013	613.86	789.00	403.18	137.18	170.97	96.55
2014	665.65	860.27	430.27	145.89	182.58	101.51
2015	720.26	931.33	463.70	155.23	194.35	107.68
2016	799.70	1047.53	490.59	169.28	215.37	111.80
2017	890.52	1178.09	522.27	185.26	238.64	116.91
2018	989.02	1320.04	554.63	201.26	262.15	121.36
2019	1090.97	1465.78	587.37	215.38	283.16	124.30

Chapter 15　　Human Capital for Heilongjiang

15.1 Total human capital

Table HLJ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Heilongjiang. Column 1 shows nominal human capital aggregated across six-education categories. Column 2 gives the human capital in real terms across the same six-education categories. Column 3 displays the real physical capital of Heilongjiang.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	1391	1391	56
1986	1642	1540	63
1987	1874	1621	70
1988	2146	1579	77
1989	2436	1564	81
1990	2763	1675	86
1991	3139	1776	91
1992	3514	1838	97
1993	3944	1799	103
1994	4420	1656	111
1995	4917	1587	122
1996	5467	1650	134
1997	6000	1736	148
1998	6611	1904	164
1999	7390	2197	179

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	8438	2547	195
2001	9687	2897	213
2002	10593	3186	233
2003	11500	3426	254
2004	12645	3617	280
2005	13622	3844	310
2006	15488	4281	349
2007	17388	4556	399
2008	18949	4699	460
2009	21040	5204	537
2010	23773	5651	625
2011	25857	5799	720
2012	28317	6145	836
2013	31026	6576	973
2014	33193	6931	1097
2015	35049	7236	1226
2016	36698	7470	1342
2017	39351	7903	1457
2018	41377	8145	—
2019	43340	8270	—

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 the non-retired population. Table HLJ-2.1 presents human capital per capita for Heilongjiang by region. From 1985 to 2019, the nominal human capital per capita increased from 43.0 thousand Yuan to 1.6 million Yuan, an

increase of more than 36 times; and the real human capital per capita increased from 43.0 thousand Yuan to 0.3 million Yuan, an increase of approximately 6 times.

Figure HLJ-2.1 illustrates the trends of human capital per capita by gender for Heilongjiang. The growth pattern of real human capital per capita of male is similar to that of female for Heilongjiang. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female both accelerated, with the male's growth rate significantly higher than the female's. As a result, the gender gap has been expanding, especially from 1997.
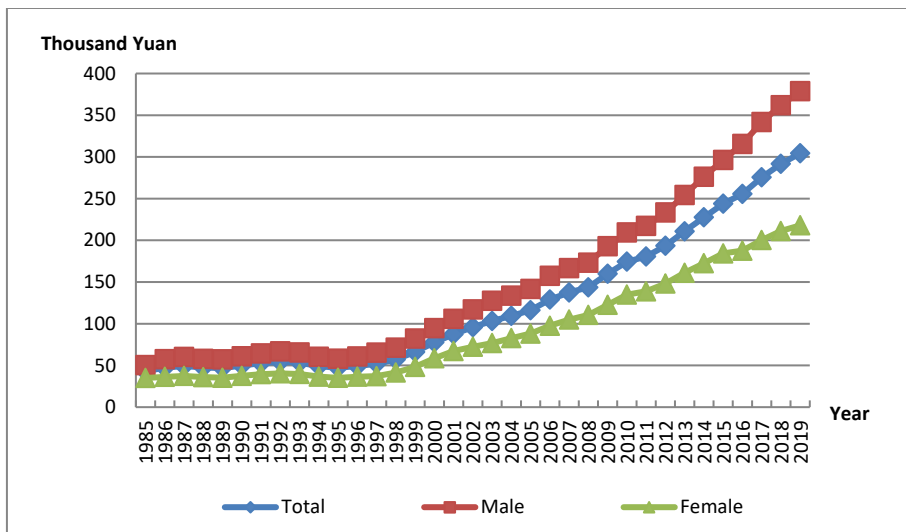
Figure HLJ-2.1 Human Capital Per Capita by Gender for Heilongjiang，1985-2019

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

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	42.96	56.16	33.06	42.96	56.16	33.06
1986	50.51	67.68	37.08	47.38	63.85	34.49
1987	57.01	75.95	41.63	49.32	65.32	36.32
1988	64.62	85.00	47.27	47.54	61.63	35.53
1989	73.03	94.85	53.59	46.86	60.02	35.15
1990	82.34	105.66	60.80	49.90	63.31	37.51
1991	93.13	119.65	68.15	52.70	66.26	39.93
1992	104.11	133.00	76.37	54.45	67.14	42.26
1993	117.07	149.66	85.32	53.39	65.58	41.52
1994	131.23	168.09	95.19	49.16	60.37	38.19
1995	146.29	187.43	105.73	47.22	58.08	36.50
1996	163.16	209.94	116.67	49.23	60.47	38.07
1997	179.83	231.10	128.18	52.04	63.69	40.30
1998	198.29	253.92	141.55	57.12	69.36	44.63
1999	222.47	287.36	154.94	66.13	80.92	50.73
2000	256.80	338.62	169.59	77.50	96.61	57.13
2001	292.45	391.07	185.78	87.46	110.69	62.34
2002	318.71	425.64	201.22	95.85	121.32	67.86
2003	346.88	459.62	220.83	103.35	129.97	73.58
2004	382.41	506.43	240.80	109.37	138.36	76.27
2005	411.76	540.40	259.47	116.19	146.47	80.34
2006	466.62	611.76	290.65	128.98	162.88	87.88
2007	524.64	686.92	323.06	137.47	173.53	92.68
2008	579.22	756.47	357.66	143.65	181.99	95.71
2009	646.10	840.42	397.18	159.82	202.60	105.03
2010	733.73	959.41	437.20	174.40	223.25	110.21

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2011	804.96	1053.81	458.01	180.54	232.21	108.51
2012	891.46	1169.15	481.55	193.45	249.39	110.87
2013	994.44	1310.68	504.37	210.77	274.10	112.64
2014	1090.06	1440.68	532.90	227.61	297.13	117.13
2015	1181.14	1558.90	568.14	243.86	318.01	123.52
2016	1255.74	1650.21	590.14	255.62	332.65	125.66
2017	1372.02	1803.52	618.26	275.56	359.29	129.29
2018	1481.41	1948.68	645.56	291.63	380.60	132.48
2019	1595.10	2101.87	670.56	304.38	398.10	133.40
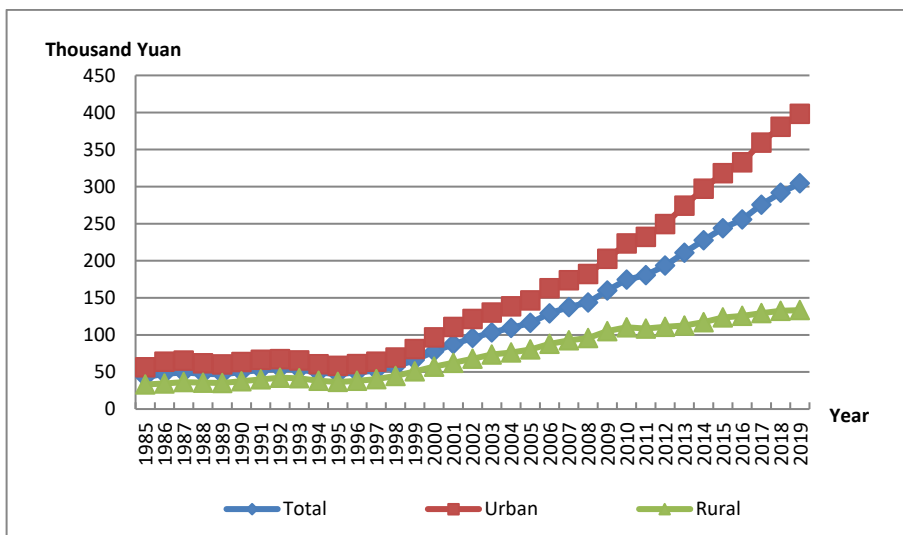
Figure HLJ-2.2 Real Human Capital Per Capita by Region for Heilongjiang，1985-2019

Figure HLJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban areas both accelerated, and the growth

rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions' human capital expanded rapidly.

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 2019, the nominal labor force human capital increased from 0.6 trillion Yuan to 22.8 trillion Yuan, an increase of approximately 37 times; and the real labor force human capital increased from 0.6 trillion Yuan to 4.4 trillion Yuan, an increase of approximately 6 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)
1985	597	597
1986	697	654
1987	818	708
1988	954	702
1989	1108	711
1990	1282	777
1991	1476	836
1992	1680	880

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1993	1902	870
1994	2147	807
1995	2407	780
1996	2663	808
1997	2958	861
1998	3257	944
1999	3546	1063
2000	3877	1185
2001	4369	1327
2002	4864	1484
2003	5322	1607
2004	5753	1666
2005	6224	1776
2006	7112	1987
2007	8024	2125
2008	8695	2177
2009	9694	2418
2010	10827	2592
2011	12064	2723
2012	13280	2902
2013	14378	3067
2014	15290	3213
2015	16369	3401
2016	17954	3673
2017	19599	3953
2018	21107	4173
2019	22823	4373

15.3.2 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. Tables HLJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 31.4 thousand Yuan to1.0 million Yuan, an increase of approximately 31 times; and the real average labor force human capital increased from 31.3 thousand Yuan to 0.2 million Yuan, an increase of approximately 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	31.34	40.01	24.31	31.34	40.01	24.31
1986	35.55	45.26	27.43	33.35	42.70	25.51
1987	40.34	51.24	30.90	34.90	44.06	26.96
1988	45.87	57.53	35.26	33.75	41.72	26.50
1989	51.92	64.23	40.25	33.33	40.64	26.40
1990	58.57	71.35	46.02	35.51	42.75	28.40
1991	65.95	80.24	51.80	37.36	44.44	30.35
1992	73.82	89.64	58.03	38.67	45.25	32.11
1993	82.50	100.05	64.82	37.72	43.84	31.54
1994	91.88	111.02	72.70	34.53	39.87	29.17
1995	101.90	122.92	80.87	33.01	38.09	27.92
1996	112.04	134.74	89.33	33.98	38.81	29.15
1997	123.62	148.48	98.50	35.97	40.92	30.96
1998	135.34	161.60	108.61	39.24	44.14	34.25

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1999	147.10	174.59	118.86	44.11	49.16	38.92
2000	160.44	189.66	130.00	49.06	54.11	43.79
2001	176.73	208.89	142.70	53.66	59.12	47.88
2002	193.37	229.59	154.24	58.99	65.44	52.01
2003	209.63	247.62	167.84	63.31	70.02	55.93
2004	226.00	266.12	181.03	65.46	72.71	57.34
2005	243.46	286.44	194.12	69.48	77.64	60.10
2006	276.71	326.74	218.20	77.31	87.00	65.98
2007	311.73	368.77	244.10	82.57	93.16	70.03
2008	342.22	403.07	270.51	85.69	96.97	72.39
2009	382.82	451.52	300.48	95.48	108.85	79.46
2010	428.17	507.51	330.80	102.51	118.09	83.39
2011	477.94	577.13	351.92	107.88	127.17	83.38
2012	529.82	647.17	376.26	115.78	138.05	86.63
2013	581.52	716.03	401.79	124.05	149.74	89.73
2014	630.86	780.83	427.70	132.57	161.04	94.01
2015	687.72	852.82	459.32	142.88	173.97	99.86
2016	759.64	952.89	485.98	155.41	192.08	103.48
2017	840.23	1063.08	517.56	169.48	211.78	108.23
2018	922.50	1176.17	549.17	182.38	229.72	112.70
2019	1014.24	1302.77	582.32	194.32	246.75	115.84

Chapter 16   Human Capital for Shanghai

16.1 Total human capital

Table SH-1.1 presents estimates of nominal and real total human capital and real physical capital stocks for Shanghai. Column 1 shows nominal human capital aggregated across six-education categories. Column 2 shows real human capital in the same six-education categories. Column 3 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)
1985	1233	1233	59
1986	1544	1452	68
1987	1850	1610	79
1988	2277	1650	91
1989	2669	1669	100
1990	3136	1844	110
1991	3712	1976	119
1992	4263	2063	131
1993	4804	1934	148
1994	5358	1741	175
1995	5996	1641	213
1996	7076	1774	256
1997	8339	2033	298
1998	9825	2396	339

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1999	11963	2874	378
2000	15247	3573	418
2001	16797	3937	461
2002	18276	4262	510
2003	20608	4801	564
2004	23953	5460	627
2005	27424	6190	699
2006	35467	7910	788
2007	43157	9326	892
2008	49010	10011	987
2009	57498	11792	1101
2016	63555	12641	1203
2011	68192	12893	1292
2012	73444	13508	1383
2013	77008	13845	1479
2014	82878	14508	1572
2015	83676	14305	1693
2016	88336	14633	1852
2017	91778	14949	2011
2018	94396	15134	—
2019	96501	15094	—

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. Table SH-2.1 presents human capital per capita for Shanghai. From 1985 to 2019, the nominal human capital per capita

increased from 114.5 thousand Yuan to 5.5 million Yuan, an increase of more than 47 times; and the real human capital per capita increased from 114.5 thousand Yuan to 855.0 thousand Yuan, an increase of approximately 6 times.

Figure SH-2.1 also illustrates the trends of human capital per capita for Shanghai by gender. The trend of real human capital per capita of male is similar to that of females for Shanghai. Both of them kept increasing at an accelerated rate from 1985 to 2019, with the males' growth rate significantly higher than females'. As a result, the gender gap has been expanding, especially from 1997.
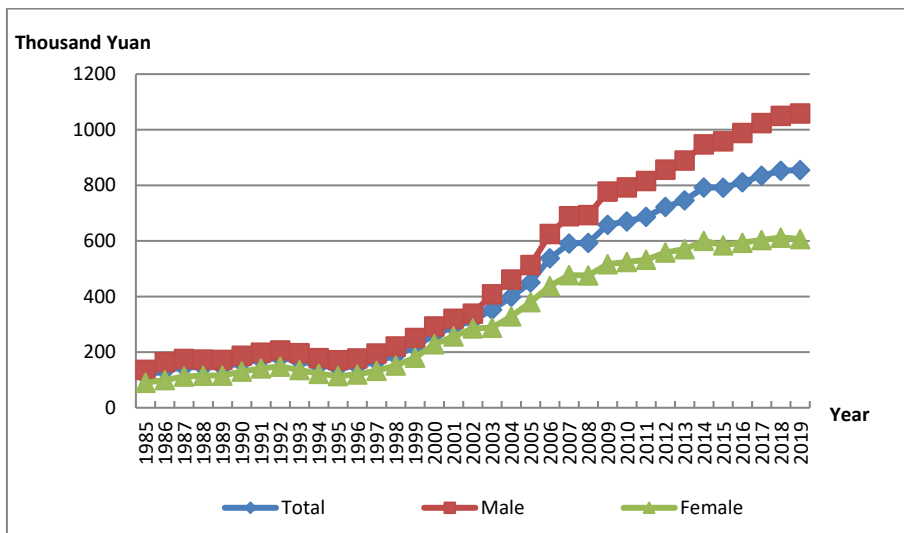
Figure SH-2.1 Human Capital Per Capita by Gender for Shanghai，1985-2019

Table SH-2.1 Nominal and Real Human Capital Per Capita for Shanghai

Year	Nominal Human Capital Per Capita (Thousands of Yuan)	Real Human Capital Per Capita (Thousands of 1985 Yuan)
1985	115	115
1986	142	133
1987	167	146

Year	Nominal Human Capital Per Capita (Thousands of Yuan)	Real Human Capital Per Capita (Thousands of 1985 Yuan)
1988	202	146
1989	234	146
1990	274	161
1991	324	172
1992	371	179
1993	418	168
1994	468	152
1995	526	144
1996	600	150
1997	682	166
1998	773	189
1999	909	218
2000	1122	263
2001	1240	291
2002	1345	314
2003	1511	352
2004	1750	399
2005	1997	451
2006	2410	538
2007	2734	591
2008	2904	593
2009	3209	658
2010	3370	670
2011	3634	687
2012	3927	722
2013	4149	746
2014	4525	792
2015	4631	792
2016	4897	811

Year	Nominal Human Capital Per Capita (Thousands of Yuan)	Real Human Capital Per Capita (Thousands of 1985 Yuan)
2017	5123	834
2018	5317	852
2019	5466	855

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 2019 the nominal labor force human capital increased from 0.6 trillion Yuan to 36.7 trillion Yuan, an increase of more than 63 times; and the real labor force human capital increased from 0.6 trillion Yuan to 5.7 trillion Yuan, an increase of approximately 9 times.

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

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1985	571	571
1986	655	616
1987	747	650
1988	880	638
1989	1021	639
1990	1161	683
1991	1313	699
1992	1477	715

182

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1993	1643	661
1994	1822	592
1995	2023	554
1996	2454	615
1997	2993	730
1998	3584	874
1999	4181	1004
2000	4880	1144
2001	5498	1289
2002	6258	1459
2003	7058	1644
2004	7979	1819
2005	8974	2025
2006	11357	2533
2007	14208	3070
2008	17286	3531
2009	20537	4212
2016	23935	4761
2011	25973	4911
2012	28295	5204
2013	30144	5419
2014	31810	5569
2015	33299	5693
2016	34411	5700
2017	35290	5748
2018	35979	5768
2019	36671	5736

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. Tables SH-3.2 reports the nominal and real average labor force human capital for Shanghai. From 1985 to 2019, the nominal average labor force human capital increased from 74.2 thousand Yuan to 2.6 million Yuan, an increase of more than 34 times; the real average labor force human capital increased from 74.2 thousand Yuan to 408.6 thousand Yuan, an increase of approximately 5 times.

Table SH-3.2 Nominal and Real Average Labor Force Human Capital for Shanghai

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)	Real Average Labor Force Human Capital (Thousands of 1985 Yuan)
1985	74.15	74.15
1986	84.33	79.33
1987	95.54	83.14
1988	110.06	79.75
1989	125.65	78.55
1990	141.49	83.22
1991	159.79	85.05
1992	179.64	86.92
1993	200.53	80.72
1994	223.03	72.46
1995	247.81	67.83
1996	284.66	71.35
1997	327.27	79.80
1998	369.98	90.21
1999	410.69	98.66
2000	456.35	106.95
2001	514.09	120.49

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)	Real Average Labor Force Human Capital (Thousands of 1985 Yuan)
2002	582.28	135.79
2003	653.70	152.29
2004	735.69	167.70
2005	821.81	185.48
2006	959.31	213.94
2007	1107.11	239.25
2008	1250.31	255.38
2009	1393.09	285.69
2010	1530.85	304.49
2011	1681.51	317.92
2012	1853.68	340.93
2013	2004.20	360.32
2014	2155.78	377.38
2015	2291.87	391.80
2016	2381.20	394.45
2017	2467.52	401.92
2018	2547.39	408.40
2019	2612.60	408.63

Chapter 17   Human Capital for Jiangsu

17.1 Total human capital

Table JS-1.1 presents estimates of nominal and real total human capital and real physical capital for Jiangsu. Column 1 presents estimates of the nominal human capital aggregated across six-education categories. Column 2 shows the real human capital summed across the same six-education categories. Column 3 gives 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 Stocks (Billions of 1985 Yuan)
1985	2810	2810	83
1986	3282	3059	98
1987	3739	3210	130
1988	4438	3126	172
1989	5229	3132	185
1990	6158	3574	211
1991	7241	4032	253
1992	8431	4411	335
1993	9687	4288	558
1994	10994	3939	741
1995	12125	3753	915
1996	14088	3977	1083
1997	16374	4516	1230
1998	18592	5126	1392
1999	21675	6012	1560
2000	24369	6731	1793

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital Stocks (Billions of 1985 Yuan)
2001	30566	8315	2033
2002	31601	8692	2324
2003	34714	9446	2818
2004	37984	9919	3597
2005	41041	10471	4244
2006	47717	11966	4980
2007	55934	13413	6054
2008	63256	14385	7681
2009	72826	16603	8668
2010	81959	17985	10552
2011	93773	19486	12992
2012	108396	21898	14481
2013	124130	24455	16257
2014	141704	27269	18112
2015	155971	29497	19017
2016	178292	32900	20598
2017	196869	35666	24385
2018	215074	38054	—
2019	233421	40018	—

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 2019, the nominal human capital per capita increased by more than 72 times; and the real human capital per capita

increased by approximately 11 times. Figure JS-2.1 illustrates the trends of human capital per capita by gender for Jiangsu. The real human capital per capita of men has followed the same pattern as that of women. Both men and women saw increasing human capital from 1985 to 2019, with the male's growth rate significantly higher than female's. As a result, the gender gap continues to expand, especially from 1997.
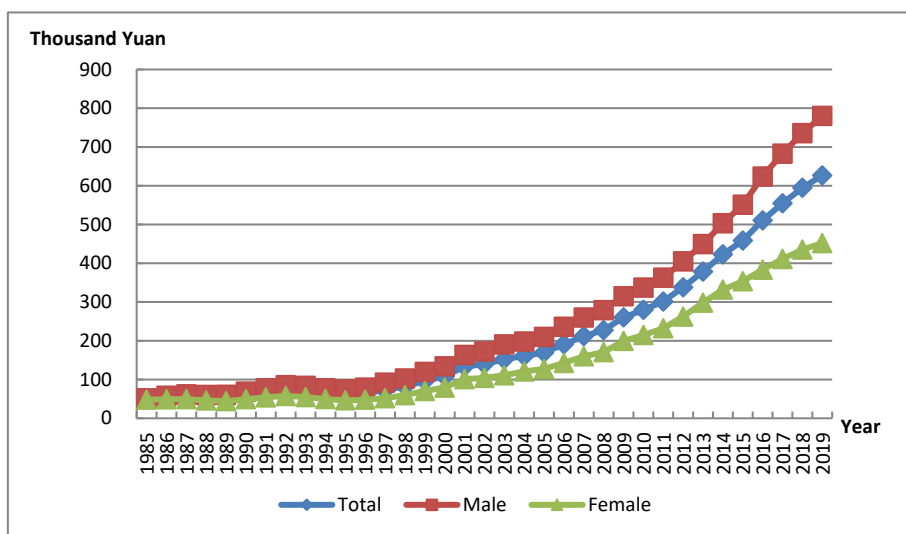
Figure JS-2.1 Real Human Capital Per Capita by Gender for Jiangsu，1985-2019

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	49.91	80.52	43.02	49.91	80.52	43.02
1986	57.85	96.93	48.70	53.93	91.10	45.22
1987	65.30	107.09	55.23	56.06	91.08	47.62
1988	76.03	124.10	63.05	53.56	86.09	44.77
1989	88.41	141.99	72.48	52.95	84.92	43.44
1990	102.76	164.94	83.02	59.65	95.40	48.30
1991	119.53	193.42	93.83	66.56	103.88	53.57
1992	138.07	224.57	105.37	72.23	110.85	57.63

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	157.86	255.13	118.25	69.88	106.10	55.13
1994	178.90	286.67	132.25	64.10	95.14	50.67
1995	196.95	307.70	146.62	60.95	87.88	48.72
1996	227.92	349.78	162.99	64.33	90.16	50.57
1997	263.95	396.17	182.73	72.79	100.81	55.58
1998	298.25	434.33	203.72	82.24	110.52	62.59
1999	347.37	505.54	224.73	96.34	130.47	69.88
2000	391.45	553.99	251.19	108.11	142.97	78.04
2001	491.18	720.22	278.96	133.62	185.69	85.38
2002	508.08	709.87	305.80	139.76	185.99	93.41
2003	559.51	760.48	342.96	152.25	197.48	103.52
2004	614.71	813.07	378.77	160.53	203.60	109.30
2005	665.22	853.70	413.02	169.72	209.58	116.39
2006	761.42	972.06	468.95	190.95	234.88	129.94
2007	883.94	1129.35	520.98	211.96	262.14	137.75
2008	1000.11	1274.04	578.33	227.44	281.11	144.80
2009	1141.70	1447.17	643.65	260.29	320.59	161.97
2010	1274.18	1602.20	709.19	279.60	342.60	171.10
2011	1450.47	1821.29	746.04	301.41	370.63	169.90
2012	1673.54	2096.75	790.63	338.09	416.02	175.50
2013	1921.78	2401.79	837.72	378.62	465.93	181.43
2014	2198.18	2738.58	896.60	423.01	519.75	190.02
2015	2423.77	2997.41	967.95	458.38	559.36	202.12
2016	2766.94	3424.74	1014.34	510.58	624.13	208.06
2017	3061.50	3773.89	1077.84	554.63	675.60	217.81
2018	3360.85	4125.30	1139.10	594.65	721.90	224.80
2019	3655.73	4468.33	1192.32	626.74	758.42	227.56

Figure JS-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remained larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban both accelerated, but the growth rate was significantly higher in the urban areas compared to rural areas. Therefore, the gap between urban and rural expanded rapidly.
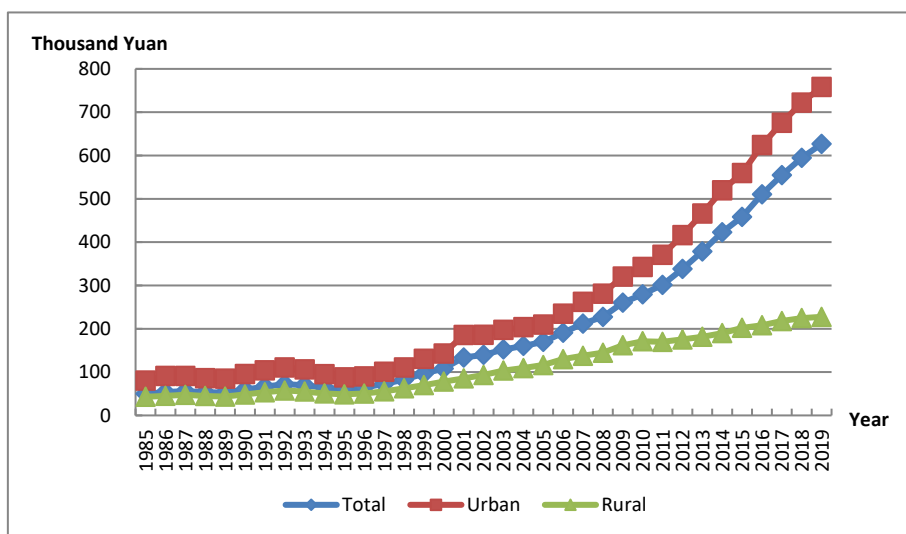
Figure JS-2.2 Real Human Capital Per Capita by Region for Jiangsu，1985-2019

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 2019, the nominal labor force human capital increased by more than 56 times; and the real labor force human capital increased by approximately 9 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)
1985	1350	1350
1986	1575	1467
1987	1836	1577
1988	2166	1528
1989	2506	1501
1990	2888	1677
1991	3317	1857
1992	3782	2000
1993	4256	1909
1994	4776	1741
1995	5338	1680
1996	6076	1754
1997	6944	1958
1998	7897	2227
1999	8871	2522
2000	9934	2810
2001	10979	3062
2002	12085	3376
2003	13254	3646
2004	14395	3792
2005	15796	4059
2006	18783	4752
2007	22040	5341
2008	24972	5740
2009	29193	6727
2010	33636	7451

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2011	38121	7997
2012	42884	8750
2013	47527	9459
2014	52641	10230
2015	57931	11059
2016	62485	11648
2017	67252	12308
2018	72106	12883
2019	77448	13399

17.3.2 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. Tables JS-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased by more than 45 times; the real average labor force human capital increased by approximately 7 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	36.16	54.57	32.08	36.16	54.57	32.08
1986	41.13	61.50	36.50	38.32	57.80	33.89
1987	46.74	69.27	41.49	40.14	58.91	35.77
1988	53.79	76.98	48.02	37.95	53.40	34.10
1989	61.47	85.79	54.90	36.82	51.31	32.90

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	70.03	95.15	62.71	40.67	55.04	36.49
1991	79.29	107.80	70.35	44.40	57.89	40.17
1992	89.37	121.22	78.68	47.25	59.84	43.03
1993	100.05	134.65	87.75	44.87	55.99	40.91
1994	111.69	149.08	97.75	40.72	49.48	37.45
1995	124.40	165.38	108.35	39.16	47.23	36.00
1996	140.42	184.18	120.45	40.54	47.48	37.37
1997	158.70	205.51	133.97	44.74	52.30	40.75
1998	178.22	226.09	149.21	50.25	57.53	45.84
1999	198.10	245.70	165.40	56.31	63.41	51.43
2000	219.69	266.35	183.64	62.14	68.74	57.05
2001	242.53	293.58	198.14	67.64	75.69	60.64
2002	266.85	324.02	210.78	74.54	84.90	64.38
2003	293.09	354.02	225.58	80.62	91.93	68.09
2004	319.92	382.31	243.13	84.27	95.73	70.16
2005	350.49	414.10	263.16	90.07	101.66	74.16
2006	408.17	477.58	311.94	103.26	115.40	86.44
2007	471.47	549.67	360.60	114.25	127.59	95.34
2008	532.95	620.53	405.64	122.51	136.91	101.56
2009	613.17	715.23	457.55	141.29	158.44	115.14
2010	695.81	812.62	508.38	154.14	173.76	122.65
2011	784.53	923.00	549.10	164.58	187.83	125.05
2012	883.28	1043.92	592.25	180.22	207.13	131.46
2013	982.82	1163.49	636.90	195.60	225.71	137.94
2014	1093.41	1296.42	680.93	212.49	246.04	144.32
2015	1205.80	1425.97	732.34	230.18	266.11	152.92

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2016	1307.20	1551.82	766.47	243.69	282.80	157.21
2017	1423.39	1692.96	809.06	260.50	303.07	163.50
2018	1546.88	1843.99	849.57	276.37	322.69	167.66
2019	1674.17	2000.42	885.54	289.64	339.54	169.01

Chapter 18   Human Capital for Zhejiang

18.1 Total human capital

Table ZJ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Zhejiang province. Column 1 shows the nominal human capital across six-education categories. Column 2 gives real human capital estimates aggregated for the same six-education categories. Column 3 shows 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)
1985	2309	2309	12.5
1986	2686	2529	14.5
1987	3076	2679	16.8
1988	3579	2573	19.4
1989	4135	2506	22.1
1990	4765	2829	25.9
1991	5556	3186	30.2
1992	6292	3371	34.6
1993	7255	3244	61.4
1994	8278	2955	95.3
1995	9169	2797	136.1
1996	10928	3035	182.5
1997	12994	3459	228.6
1998	15418	4074	278.3
1999	18056	4786	330.2

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	20950	5492	388.8
2001	23555	6156	456.5
2002	26199	6886	540.8
2003	29136	7556	656.8
2004	33007	8279	791.6
2005	36212	8964	941.0
2006	42321	10341	1103.1
2007	48975	11485	1273.6
2008	55580	12416	1434.8
2009	62750	14217	1631.4
2010	70031	15264	1848.2
2011	79797	16438	2083.3
2012	88822	17860	2322.5
2013	97703	19171	2583.2
2014	106964	20539	2847.6
2015	116589	22055	3135.2
2016	129100	23900	3469.6
2017	139368	25231	3784.4
2018	148556	26266	—
2019	157914	27118	—

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 2019, the nominal human capital per

capita increased from 64.0 thousand Yuan to 3.5 million Yuan, an increase of more than 54 times; and the real human capital per capita increased from 64.0 thousand Yuan to 607.5 thousand Yuan, an increase of approximately 8 times. Figure ZJ-2.1 illustrates the trends of human capital per capita by gender for Zhejiang. The overall trends in real human capital per capita of males are similar to that of females for Zhejiang. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female both accelerated, however, males' growth rate was significantly higher than that of females. As a result, the gender gap has been expanding, especially from 1997.
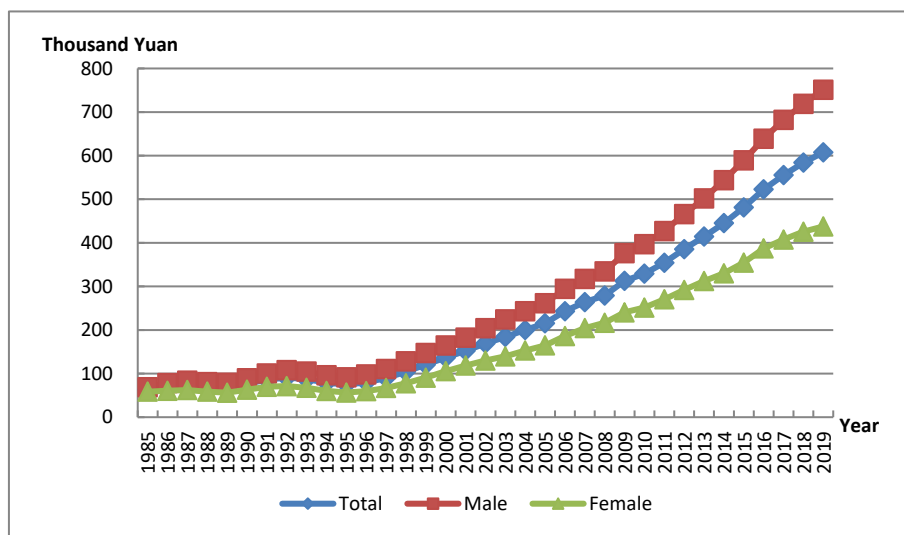
Figure ZJ-2.1 Human Capital Per Capita by Gender for Zhejiang，1985-2019

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	63.98	84.92	56.22	63.98	84.92	56.22
1986	74.29	102.15	63.49	69.97	96.09	59.84
1987	84.48	115.25	72.04	73.58	97.76	63.81

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	97.73	130.08	83.94	70.25	89.40	62.08
1989	112.71	148.05	96.82	68.31	87.14	59.84
1990	129.74	170.32	110.62	77.01	98.17	67.04
1991	150.05	206.95	121.34	86.03	112.97	72.44
1992	169.30	230.78	135.00	90.70	115.39	76.92
1993	194.66	268.49	149.99	87.03	110.54	72.81
1994	221.58	305.71	167.22	79.11	100.96	64.99
1995	245.07	343.34	179.92	74.76	96.91	60.07
1996	287.91	401.19	196.31	79.96	103.11	61.25
1997	337.52	465.37	216.11	89.85	114.91	66.05
1998	394.66	535.88	243.54	104.27	131.67	74.96
1999	454.46	607.28	274.33	120.46	149.95	85.70
2000	521.46	678.81	321.04	136.70	166.13	99.21
2001	582.23	752.15	344.86	152.17	184.80	106.57
2002	643.28	824.92	366.84	169.08	205.15	114.17
2003	709.92	898.45	403.04	184.12	222.33	121.91
2004	797.91	1003.51	448.69	200.14	241.58	129.76
2005	870.15	1081.86	504.69	215.39	256.61	144.24
2006	994.77	1234.78	561.59	243.08	289.72	158.91
2007	1125.75	1392.77	622.69	264.00	314.54	168.80
2008	1249.52	1535.90	693.43	279.12	330.94	178.49
2009	1380.51	1683.05	778.50	312.77	367.40	204.06
2010	1510.43	1829.73	860.65	329.21	384.07	217.56
2011	1720.35	2101.02	900.65	354.39	418.86	215.57
2012	1917.03	2343.09	951.39	385.46	457.28	222.70
2013	2112.08	2580.74	1008.29	414.42	492.51	230.52
2014	2318.88	2832.89	1073.60	445.26	529.91	240.18

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2015	2544.67	3112.97	1147.33	481.38	574.24	253.05
2016	2823.06	3465.89	1190.76	522.63	626.86	257.96
2017	3067.06	3760.08	1249.52	555.27	665.85	265.23
2018	3302.67	4042.20	1306.36	583.94	699.71	271.42
2019	3537.72	4324.92	1355.34	607.53	728.22	272.92

Figure ZJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the trend of real human capital per capita in the urban areas remained larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban areas both accelerated, with the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions within Zhejiang expanded rapidly.
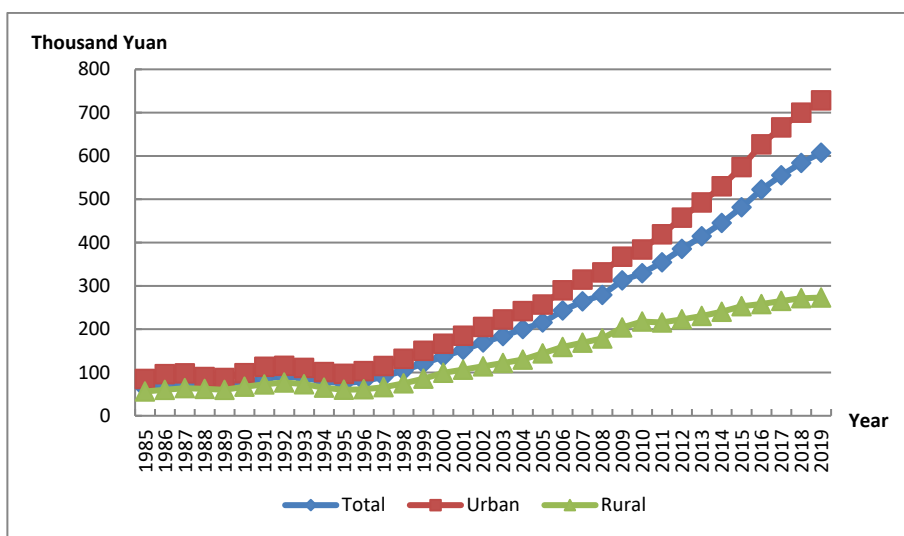
Figure ZJ-2.2 Real Human Capital Per Capita by Region for Zhejiang，1985-2019

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 2019, the nominal labor force human capital increased from 1.1 trillion Yuan to 58.4 trillion Yuan, an increase of more than 53 times; and the real labor force human capital increased from 1.07 trillion Yuan to 10.2 trillion Yuan, an increase of approximately 8 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)
1985	1074	1074
1986	1247	1174
1987	1445	1260
1988	1667	1201
1989	1925	1169
1990	2210	1315
1991	2497	1444
1992	2810	1530
1993	3138	1441
1994	3486	1284
1995	3855	1219
1996	4508	1306
1997	5272	1469
1998	6122	1695
1999	7008	1949

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	7936	2173
2001	8694	2374
2002	9472	2599
2003	10448	2814
2004	11543	2994
2005	12758	3261
2006	15157	3811
2007	17776	4277
2008	20728	4737
2009	24172	5593
2010	27798	6181
2011	30487	6404
2012	33602	6882
2013	37039	7394
2014	40651	7933
2015	44079	8471
2016	47586	8947
2017	51306	9423
2018	54856	9828
2019	58442	10155

18.3.2 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. Tables ZJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 44.8 thousand Yuan to 1.76 million Yuan, an increase of more than 38 times; and the real average labor force human capital increased from 44.8 thousand

Yuan to 305.9 thousand Yuan, an increase of approximately 6 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	44.78	57.82	39.73	44.78	57.82	39.73
1986	50.85	65.33	45.00	47.89	61.46	42.41
1987	57.65	73.27	51.06	50.25	62.15	45.23
1988	66.03	80.11	59.83	47.56	55.06	44.25
1989	75.61	88.67	69.63	45.91	52.19	43.03
1990	86.27	97.95	80.73	51.35	56.46	48.93
1991	96.22	108.37	90.41	55.65	59.16	53.97
1992	107.45	119.50	101.60	58.50	59.75	57.89
1993	119.53	130.55	114.15	54.87	53.75	55.41
1994	132.22	141.19	127.86	48.69	46.63	49.69
1995	145.73	152.88	142.24	46.07	43.15	47.49
1996	166.82	183.54	157.02	48.32	47.17	48.99
1997	190.52	214.08	174.23	53.09	52.86	53.25
1998	215.82	242.28	194.65	59.74	59.53	59.91
1999	241.14	266.72	218.08	67.05	65.86	68.13
2000	267.61	291.64	243.31	73.27	71.38	75.19
2001	291.91	319.01	262.50	79.69	78.38	81.12
2002	316.84	347.87	280.92	86.94	86.51	87.43
2003	347.02	378.98	307.71	93.47	93.78	93.07
2004	380.40	413.49	337.29	98.67	99.54	97.54
2005	416.02	447.88	372.54	106.33	106.23	106.47
2006	481.34	530.11	410.51	121.03	124.38	116.16
2007	550.30	612.61	454.98	132.41	138.35	123.33
2008	624.37	698.28	505.80	142.68	150.46	130.19

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	707.76	792.16	566.39	163.78	172.92	148.46
2010	791.42	885.45	628.14	175.97	185.86	158.78
2011	872.36	991.32	656.69	183.25	197.63	157.18
2012	966.28	1110.49	693.36	197.91	216.72	162.30
2013	1068.30	1238.40	734.92	213.26	236.34	168.02
2014	1177.30	1373.79	782.40	229.75	256.97	175.03
2015	1283.59	1502.16	836.32	246.69	277.10	184.45
2016	1389.20	1639.69	862.39	261.20	296.56	186.83
2017	1511.02	1794.85	895.50	277.52	317.84	190.09
2018	1636.19	1955.19	924.10	293.14	338.44	192.00
2019	1760.11	2115.25	946.20	305.85	356.16	190.54

Chapter 19   Human Capital for Anhui

19.1 Total human capital

Table AH-1.1 presents estimates of nominal and real total human capital and real physical capital stocks for Anhui. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Anhui.

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

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital Stocks (Billions of 1985 Yuan)
1985	1787	1787	38
1986	2079	1956	44
1987	2346	2028	50
1988	2716	1957	56
1989	3154	1932	61
1990	3712	2213	66
1991	4281	2422	71
1992	4874	2546	76
1993	5546	2518	84
1994	6291	2253	94
1995	7064	2208	107
1996	8061	2291	121
1997	9240	2590	136
1998	10571	2955	152
1999	11693	3339	166
2000	13324	3771	182
2001	15312	4300	200

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital Stocks (Billions of 1985 Yuan)
2002	17346	4915	220
2003	19504	5422	243
2004	21788	5787	277
2005	24395	6384	316
2006	28244	7298	363
2007	32094	7871	420
2008	36429	8412	487
2009	40985	9550	566
2010	46311	10458	664
2011	52991	11325	778
2012	60917	12718	908
2013	69362	14126	1049
2014	77604	15537	1202
2015	86044	16999	1359
2016	97361	18890	1530
2017	108666	20812	1701
2018	120193	22560	—
2019	132686	24237	—

Note that human capital is the term applied to human capital stocks throughout this report, accordingly in the text the word "stocks" in human capital stocks is skipped. Similarly, the adjective "wealth" in physical capital wealth stocks is skipped in the text.

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 total human capital per capita for Anhui. From 1985 to 2019, the nominal human capital per capita increased from 36.8 thousand Yuan to 2.6 million Yuan, an increase of

approximately 69 times; and the real human capital per capita increased from 36.8 thousand Yuan to 473.2 thousand Yuan, an increase of approximately 12 times.

Figure AH-2.1 also illustrates the trends of human capital per capita for Anhui by gender. The trend of real human capital per capita of males is similar to that of females for Anhui. Both of them kept increasing at an accelerated rate from 1985 to 2019, with the males' growth rate significantly higher than females'. As a result, the gender gap has been expanding, especially from 1997.
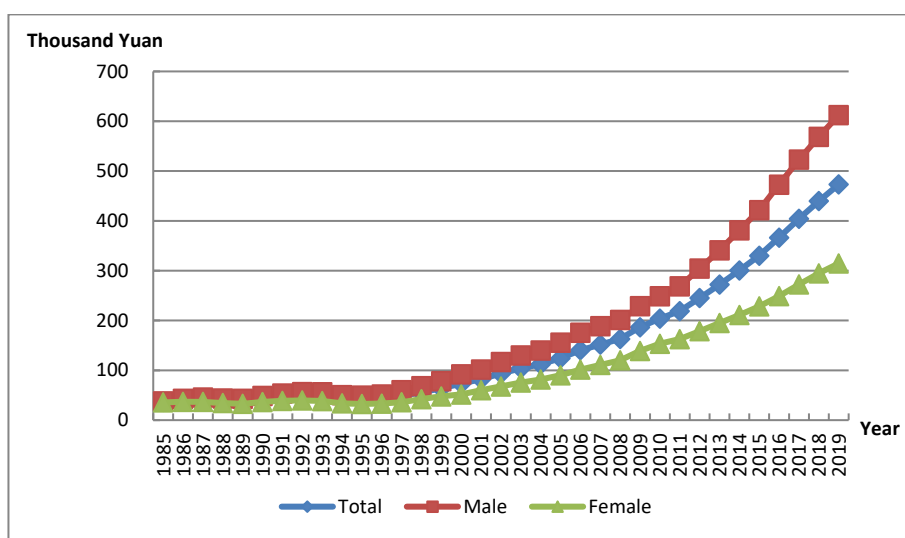
Figure AH-2.1 Human Capital Per Capita by Gender for Anhui，1985-2019

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	36.77	82.32	28.32	36.77	82.32	28.32
1986	42.60	98.40	31.83	40.10	93.00	29.89
1987	47.81	107.79	35.84	41.32	92.71	31.07

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	54.62	120.50	40.93	39.36	85.37	29.79
1989	62.48	135.47	46.75	38.28	82.95	28.65
1990	72.15	156.23	53.44	43.03	93.24	31.86
1991	82.33	178.25	60.51	46.58	99.05	34.65
1992	93.13	198.75	68.36	48.64	101.51	36.24
1993	105.48	223.06	77.18	47.90	99.58	35.46
1994	118.97	251.00	86.62	42.62	87.96	31.51
1995	132.46	278.05	96.22	41.40	84.07	30.78
1996	151.46	315.40	107.58	43.04	86.61	31.38
1997	174.25	359.88	120.65	48.84	96.99	34.94
1998	200.22	411.58	134.78	55.98	110.58	39.07
1999	223.49	446.00	149.14	63.82	122.78	44.12
2000	258.31	511.41	166.48	73.10	139.53	49.00
2001	292.35	551.37	185.56	82.10	150.43	53.92
2002	329.80	597.77	203.68	93.44	164.57	59.96
2003	374.26	650.57	227.67	104.05	175.94	65.90
2004	421.94	704.25	252.27	112.07	182.61	69.68
2005	474.50	760.82	277.46	124.17	195.32	75.21
2006	543.21	861.88	314.71	140.37	218.21	84.55
2007	618.61	971.84	351.12	151.72	233.67	89.67
2008	706.05	1104.58	391.65	163.04	250.55	94.00
2009	800.20	1243.34	437.61	186.45	285.22	105.64
2010	902.89	1391.69	485.35	203.90	309.95	113.31
2011	1024.54	1559.67	522.51	218.96	329.56	115.19
2012	1174.25	1769.80	562.59	245.15	365.91	121.12
2013	1336.44	1996.25	604.29	272.17	403.06	126.92
2014	1501.52	2226.74	652.07	300.62	442.08	134.94

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	1670.89	2462.31	706.55	330.11	482.58	144.33
2016	1888.32	2778.04	755.61	366.38	534.83	151.92
2017	2111.39	3087.85	817.36	404.37	586.84	162.55
2018	2343.05	3409.08	881.79	439.78	635.19	171.93
2019	2590.54	3749.69	944.74	473.20	680.29	179.18

Figure AH-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
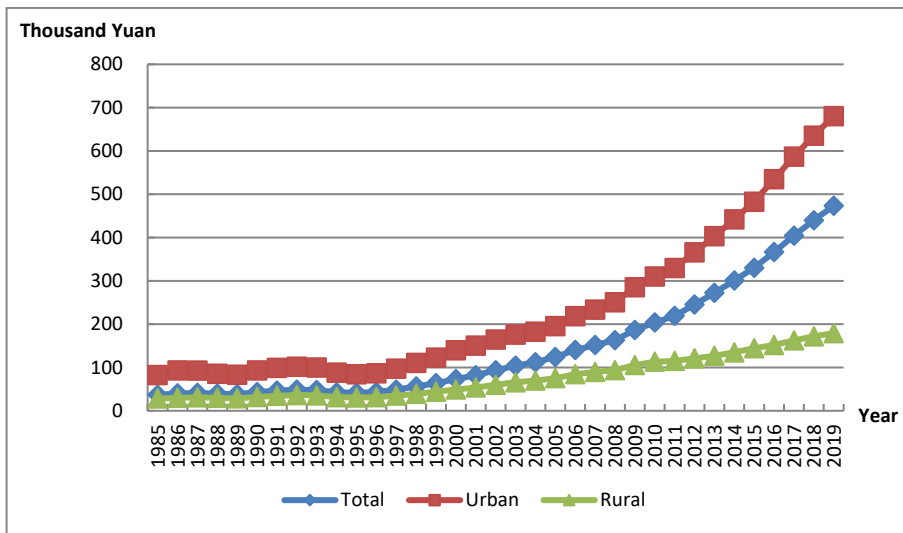
Figure AH-2.2 Real Human Capital Per Capita by Region for Anhui，1985-2019

208

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 2019, the nominal labor force human capital increased by approximately 66 times; the real labor force human capital increased by approximately 11 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)
1985	721	721
1986	851	801
1987	1002	866
1988	1165	840
1989	1364	836
1990	1594	951
1991	1806	1023
1992	2040	1068
1993	2288	1041
1994	2575	925
1995	2893	908
1996	3257	930
1997	3673	1036
1998	4111	1158
1999	4544	1306
2000	5017	1430

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2001	5626	1589
2002	6207	1770
2003	6618	1852
2004	7121	1902
2005	7887	2072
2006	9458	2455
2007	11059	2726
2008	12575	2919
2009	14020	3284
2010	16061	3644
2011	18730	4019
2012	21670	4541
2013	24776	5064
2014	27830	5593
2015	30781	6104
2016	34824	6783
2017	39200	7536
2018	43793	8248
2019	48407	8871

19.3.2 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. Tables AH-3.2 reports the nominal and real average labor force human capital for Anhui. From 1985 to 2019, the nominal average labor force human capital increased by approximately 52 times; the real average labor force human capital increased by approximately 9 times.

210

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	25.38	51.95	20.00	25.38	51.95	20.00
1986	28.90	58.06	22.77	27.20	54.87	21.38
1987	32.83	64.60	25.94	28.38	55.56	22.49
1988	37.31	71.72	29.63	26.91	50.81	21.57
1989	42.51	79.56	33.98	26.04	48.71	20.82
1990	48.33	87.80	39.00	28.82	52.40	23.24
1991	53.96	96.68	43.67	30.58	53.72	25.01
1992	60.18	106.12	48.94	31.50	54.20	25.95
1993	66.93	115.92	54.81	30.45	51.75	25.18
1994	74.52	126.67	61.55	26.77	44.39	22.39
1995	83.05	139.58	68.75	26.07	42.20	21.99
1996	93.47	155.11	76.60	26.69	42.59	22.34
1997	105.36	172.61	85.41	29.72	46.52	24.73
1998	118.09	190.01	94.93	33.25	51.05	27.52
1999	131.15	207.20	104.49	37.69	57.04	30.91
2000	145.77	225.78	115.20	41.57	61.60	33.91
2001	162.03	243.77	126.63	45.77	66.51	36.80
2002	178.71	264.46	136.46	50.95	72.81	40.17
2003	193.56	277.07	147.77	54.16	74.93	42.78
2004	211.25	296.87	157.61	56.42	76.98	43.54
2005	234.98	326.28	169.12	61.74	83.76	45.84
2006	276.68	384.51	197.31	71.81	97.35	53.01
2007	320.13	444.31	226.94	78.91	106.83	57.95
2008	363.44	503.08	256.82	84.36	114.11	61.64
2009	406.23	556.96	289.87	95.15	127.76	69.97

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
2010	461.79	636.03	321.55	104.76	141.65	75.07
2011	530.86	738.74	351.39	113.90	156.10	77.47
2012	608.68	852.23	384.48	127.56	176.20	82.78
2013	690.72	970.57	418.15	141.18	195.97	87.83
2014	772.62	1084.74	454.17	155.28	215.36	93.98
2015	852.08	1189.52	494.11	168.98	233.13	100.94
2016	956.20	1346.46	527.98	186.24	259.22	106.16
2017	1077.55	1525.94	569.33	207.14	290.00	113.22
2018	1208.02	1720.33	611.15	227.52	320.54	119.16
2019	1337.14	1910.88	654.23	245.05	346.68	124.08

Chapter 20   Human Capital for Fujian

20.1 Total human capital

Table FJ-1.1 presents estimates of nominal and real total human capital and real physical capital for Fujian. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 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 Stocks (Billions of 1985 Yuan)
1985	1401	1401	25
1986	1635	1544	33
1987	1850	1606	41
1988	2145	1473	55
1989	2492	1440	69
1990	2910	1696	88
1991	3432	1932	104
1992	4004	2126	131
1993	4581	2102	199
1994	5320	1940	253
1995	6143	1934	316
1996	7120	2099	395
1997	8125	2341	467
1998	9169	2640	539
1999	10259	2977	612
2000	11617	3286	693

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital Stocks (Billions of 1985 Yuan)
2001	13421	3824	769
2002	14862	4242	854
2003	16212	4582	979
2004	17760	4817	1158
2005	19367	5132	1348
2006	22291	5852	1607
2007	25817	6428	2017
2008	29398	6993	2548
2009	33041	8001	2952
2010	37621	8809	3563
2011	43532	9632	4424
2012	48778	10499	5141
2013	55076	11522	5937
2014	61323	12544	6832
2015	67576	13575	7647
2016	76833	15127	8660
2017	85276	16582	10280
2018	94158	18018	—
2019	103366	19253	—

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 2019, the nominal human capital per capita increased by approximately 53 times; and the real human capital per capita

increased by approximately 9 times. Figure FJ-2.1 illustrates the trends of human capital per capita by gender for Fujian. The trend of real human capital per capita of male is similar to that of female. Both of them kept increasing from 1985 to 2019, with the male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially from 1997.

Figure FJ-2.1 Human Capital Per Capita by Gender for Fujian，1985-2019

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	55.94	81.62	48.93	55.94	81.62	48.93
1986	64.52	97.84	55.32	60.93	91.53	52.49
1987	72.92	110.89	62.25	63.30	93.79	54.74
1988	83.11	126.35	70.53	57.09	84.15	49.22
1989	94.91	143.50	80.37	54.84	80.45	47.17
1990	108.66	164.70	91.67	63.33	92.24	54.57
1991	126.67	193.57	103.06	71.32	103.64	59.91
1992	145.90	221.24	115.50	77.49	109.68	64.50

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	164.49	244.85	127.71	75.47	103.92	62.45
1994	187.04	271.90	143.01	68.20	92.25	55.72
1995	211.82	300.56	159.50	66.67	87.61	54.32
1996	241.81	340.35	176.61	71.30	92.80	57.07
1997	271.89	374.71	196.58	78.34	99.68	62.71
1998	303.54	410.45	218.47	87.39	109.18	70.04
1999	337.03	448.20	241.68	97.82	120.80	78.11
2000	379.96	500.55	270.98	107.47	130.72	86.45
2001	436.86	583.69	296.45	124.49	155.07	95.24
2002	484.74	648.14	318.13	138.34	173.58	102.41
2003	530.00	696.73	349.07	149.79	185.30	111.26
2004	580.87	754.70	380.00	157.53	193.37	116.12
2005	630.64	809.02	413.34	167.11	203.42	122.87
2006	716.65	913.02	469.29	188.14	227.08	139.09
2007	820.15	1043.17	526.80	204.22	246.85	148.13
2008	923.24	1167.37	589.48	219.62	264.35	158.47
2009	1024.41	1278.72	661.87	248.06	294.57	181.75
2010	1151.61	1430.56	732.59	269.65	319.64	194.55
2011	1317.78	1649.89	774.23	291.58	350.43	195.26
2012	1465.10	1824.36	825.60	315.34	378.31	203.24
2013	1653.52	2059.23	883.09	345.93	416.19	212.51
2014	1841.14	2286.15	952.51	376.60	452.55	224.94
2015	2026.25	2503.22	1035.23	407.03	487.24	240.39
2016	2281.16	2829.69	1110.19	449.12	540.53	253.99
2017	2517.18	3114.20	1202.04	489.48	587.83	272.82
2018	2770.45	3417.82	1298.90	530.15	635.60	290.45
2019	3026.62	3724.31	1390.43	563.75	675.05	302.74

Figure FJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.

Figure FJ-2.2 Real Human Capital Per Capita by Region for Fujian，1985-2019

20.3 Labor force human capital

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

20.3.1 Total labor force human capital

The total labor force human capital for Fujian is reported in Table FJ-3.1 From 1985 to 2019, the nominal labor force human capital increased by approximately 63 times; and the real labor force human capital increased by approximately 11 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)
1985	539	539
1986	623	589
1987	724	629
1988	853	586
1989	1010	584
1990	1203	703
1991	1392	787
1992	1607	860
1993	1853	859
1994	2170	801
1995	2512	802
1996	2878	864
1997	3306	971
1998	3805	1117
1999	4305	1273
2000	4891	1412
2001	5397	1569
2002	5916	1720
2003	6457	1855
2004	7008	1929
2005	7650	2053
2006	8857	2356
2007	10254	2587
2008	11807	2843
2009	13577	3325
2010	15571	3690

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2011	17351	3891
2012	19207	4187
2013	20845	4417
2014	22605	4682
2015	24645	5010
2016	26936	5369
2017	29552	5814
2018	32094	6209
2019	34439	6483

20.3.2 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. Tables FJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased by more than 38 times; the real average labor force human capital increased by more than 6 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	37.59	54.24	32.71	37.59	54.24	32.71
1986	42.41	60.57	37.05	40.05	56.66	35.15
1987	47.88	67.56	42.04	41.58	57.14	36.97
1988	54.64	75.87	48.23	37.57	50.53	33.66
1989	62.47	85.18	55.52	36.14	47.75	32.59

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	71.44	94.92	64.27	41.74	53.16	38.26
1991	81.24	108.32	71.88	45.95	57.99	41.78
1992	92.08	122.24	80.39	49.28	60.60	44.89
1993	104.24	136.95	90.17	48.31	58.13	44.09
1994	118.40	152.87	102.30	43.68	51.87	39.86
1995	133.50	170.45	114.58	42.63	49.68	39.02
1996	149.62	189.01	127.41	44.91	51.54	41.17
1997	167.85	209.49	141.92	49.28	55.73	45.27
1998	187.84	230.34	158.93	55.13	61.27	50.95
1999	207.78	250.08	176.64	61.46	67.40	57.09
2000	230.10	271.85	196.89	66.44	71.00	62.81
2001	251.13	297.76	210.95	73.02	79.11	67.77
2002	272.77	326.13	223.05	79.30	87.34	71.80
2003	295.87	352.62	239.01	84.99	93.78	76.18
2004	320.04	380.83	254.97	88.08	97.58	77.92
2005	346.55	410.33	274.22	93.03	103.17	81.52
2006	396.01	466.69	312.86	105.34	116.07	92.73
2007	451.43	530.91	353.80	113.90	125.63	99.49
2008	511.72	600.60	396.88	123.22	136.01	106.69
2009	578.96	675.91	447.93	141.80	155.71	123.00
2010	651.28	756.36	503.20	154.32	169.00	133.63
2011	722.08	848.82	533.99	161.92	180.28	134.67
2012	800.65	950.12	565.00	174.54	197.02	139.09
2013	876.20	1045.63	594.02	185.68	211.33	142.95
2014	958.61	1147.36	630.05	198.54	227.12	148.79
2015	1046.79	1249.01	679.18	212.81	243.11	157.71

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
2016	1139.22	1366.66	716.24	227.07	261.06	163.86
2017	1251.87	1507.49	762.16	246.29	284.55	172.98
2018	1369.31	1654.09	808.75	264.90	307.61	180.85
2019	1479.11	1790.82	853.63	278.45	324.59	185.86

Chapter 21   Human Capital for Jiangxi

21.1 Total human capital

Table JX-1.1 presents the estimates of nominal and real total human capital and real physical capital for Jiangxi. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 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)
1985	1273	1273	34
1986	1488	1392	39
1987	1678	1480	42
1988	1929	1406	44
1989	2209	1355	48
1990	2564	1536	51
1991	2944	1722	54
1992	3384	1884	60
1993	3889	1899	68
1994	4436	1706	76
1995	4993	1639	85
1996	5726	1728	95
1997	6495	1908	108
1998	7433	2158	120
1999	8541	2509	134
2000	9868	2876	148
2001	11428	3329	165
2002	12910	3741	190

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2003	14464	4149	223
2004	16080	4453	264
2005	17482	4753	312
2006	20178	5422	371
2007	23189	5935	441
2008	26224	6330	523
2009	29893	7265	615
2010	34224	8062	715
2011	39030	8691	822
2012	44849	9677	930
2013	50744	10636	1040
2014	55497	11341	1136
2015	61465	12348	1249
2016	67489	13270	1391
2017	74889	14410	1523
2018	82635	15545	—
2019	91319	16668	—

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 2019, the nominal human capital per capita increased from 39.1 thousand Yuan to 2.4 million Yuan, an increase of more than 60 times; and the real human capital per capita increased from 39.2 thousand Yuan to 434.1 thousand Yuan, an increase of approximately 11

times.

Figure JX-2.1 illustrates the trends of human capital per capita by gender for Jiangxi. The trend of real human capital per capita of male is similar to that of female for Jiangxi. Both of them kept increasing from 1985 to 2019, 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.
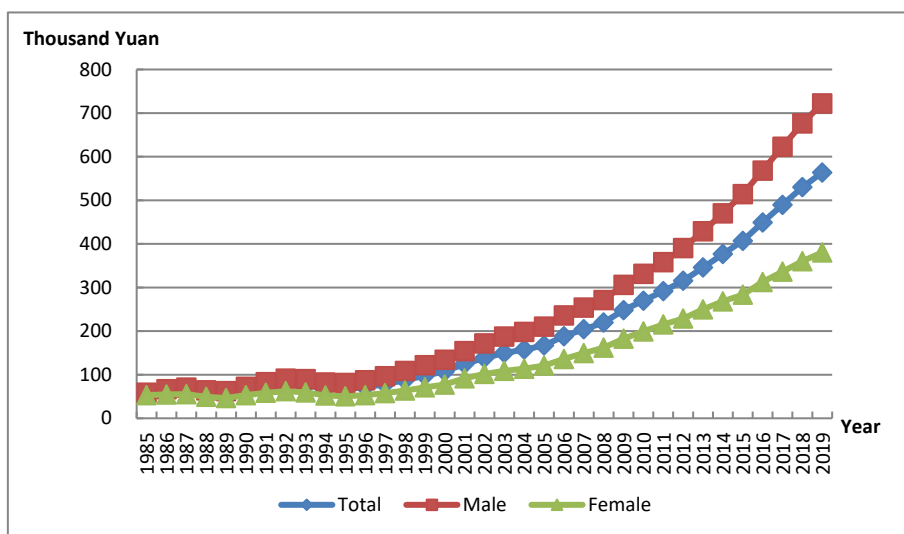
Figure JX-2.1 Human Capital Per Capita by Gender for Jiangxi，1985-2019
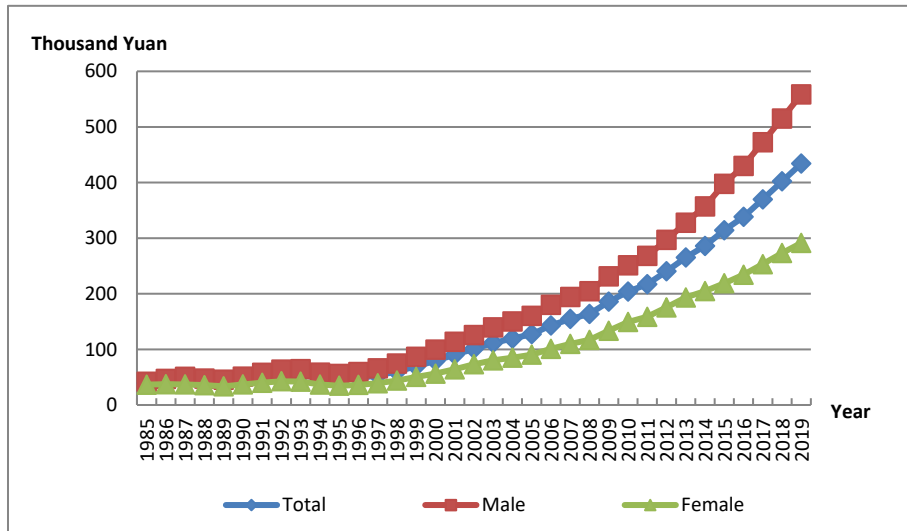
Table JX-2.1 Nominal and Real Human Capital Per Capita by Region for Jiangxi

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	39.18	68.29	32.36	39.18	68.29	32.36
1986	45.44	83.01	36.60	42.50	78.31	34.07
1987	50.06	89.38	40.67	44.15	78.15	36.03
1988	57.64	100.55	47.24	42.00	71.07	34.96
1989	65.14	110.31	53.88	39.94	66.53	33.32

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	74.24	124.11	61.53	44.47	73.74	37.01
1991	84.52	141.47	68.76	49.43	80.52	40.83
1992	96.67	162.83	76.95	53.80	86.21	44.14
1993	110.42	186.23	86.14	53.92	85.14	43.93
1994	124.96	209.92	96.26	48.06	75.63	38.74
1995	139.19	233.95	105.44	45.68	72.10	36.27
1996	159.61	268.02	117.09	48.17	76.41	37.09
1997	181.27	298.83	131.47	53.26	82.71	40.79
1998	206.64	338.58	147.15	59.99	92.79	45.20
1999	236.89	389.47	164.53	69.59	107.70	51.52
2000	271.95	446.86	185.78	79.27	121.03	58.70
2001	310.21	501.77	204.03	90.37	136.18	64.99
2002	348.17	554.52	221.28	100.88	150.19	70.55
2003	388.65	601.80	246.15	111.48	161.55	78.01
2004	431.09	650.91	273.21	119.39	169.15	83.66
2005	468.15	686.77	300.66	127.28	175.83	90.08
2006	532.03	772.48	344.72	142.97	196.01	101.65
2007	604.60	873.75	391.36	154.74	212.36	109.08
2008	678.54	974.32	443.09	163.80	223.61	116.18
2009	764.49	1089.50	502.34	185.81	251.55	132.78
2010	865.27	1236.86	560.45	203.83	277.51	143.39
2011	974.99	1389.17	596.09	217.12	296.58	144.42
2012	1114.38	1585.36	635.45	240.45	329.87	149.52
2013	1265.29	1794.31	674.97	265.22	364.62	154.29
2014	1399.67	1970.18	718.01	286.02	390.99	160.60
2015	1563.90	2190.76	769.20	314.18	428.30	169.51
2016	1720.57	2399.96	810.29	338.31	460.03	175.23

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2017	1921.90	2679.02	861.09	369.82	503.34	182.74
2018	2138.01	2975.75	912.73	402.19	547.59	189.53
2019	2378.14	3304.35	960.24	434.07	590.92	193.97

Figure JX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
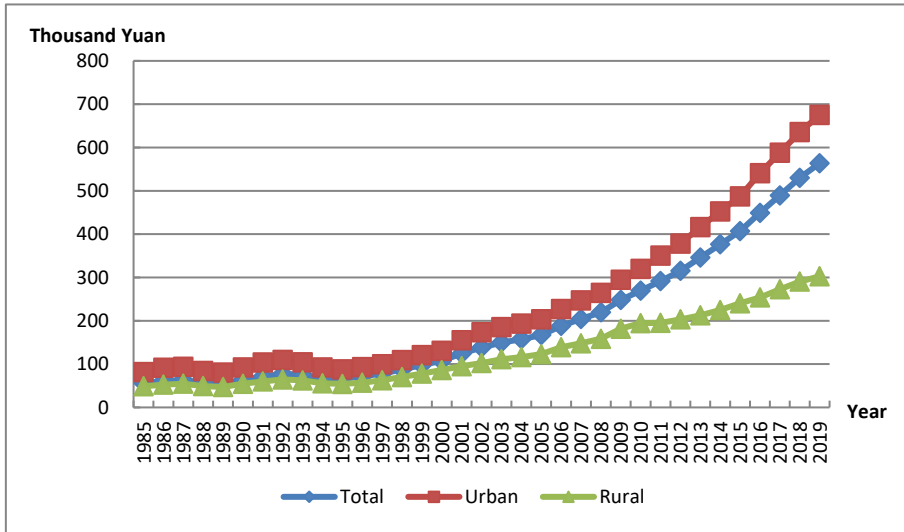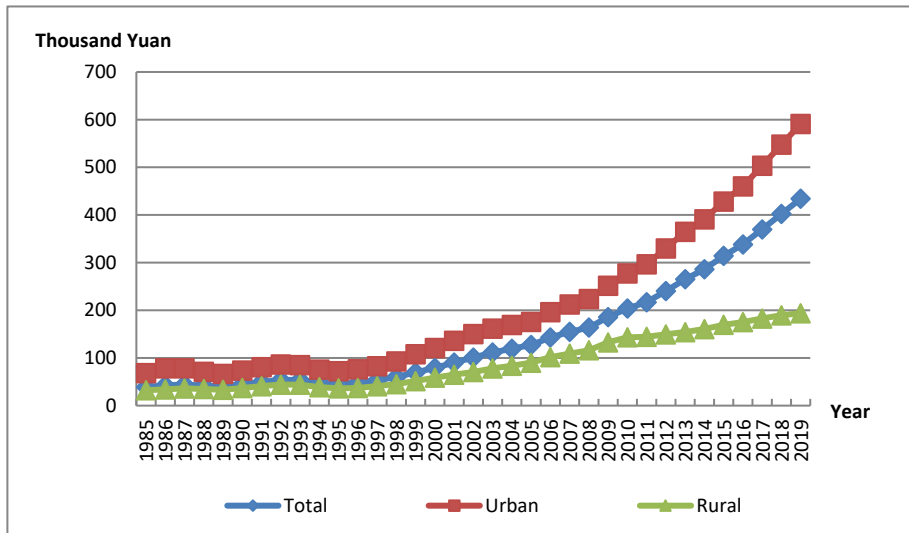

Figure JX-2.2 Real Human Capital Per Capita by Region for Jiangxi，1985-2019

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 2019, the nominal labor force human capital increased from 0.5 trillion Yuan to 31.8 trillion Yuan, an increase of more than 64 times; and the real labor force human capital increased from 0.5 trillion Yuan to 5.9 trillion Yuan, an increase of approximately 11 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)
1985	486	486
1986	568	531
1987	661	583
1988	768	560
1989	908	557
1990	1082	648
1991	1232	721
1992	1393	779
1993	1569	773
1994	1778	691
1995	1991	662
1996	2278	697
1997	2598	775
1998	2952	871

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	3333	999
2000	3756	1124
2001	4137	1240
2002	4470	1333
2003	4813	1420
2004	5143	1461
2005	5550	1542
2006	6647	1819
2007	7800	2027
2008	8943	2190
2009	10236	2523
2010	11715	2798
2011	13312	3002
2012	14934	3264
2013	16435	3491
2014	17921	3710
2015	19431	3955
2016	21949	4371
2017	24897	4848
2018	27988	5324
2019	31785	5862

21.3.2 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. Tables JX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 27.6 thousand Yuan to 1.2 million Yuan, an increase of more than 43 times; and the real average labor force human capital increased from 27.6 thousand

228

Yuan to 225.5 thousand Yuan, an increase of approximately 7 times.

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

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	27.58	45.90	22.80	27.58	45.90	22.80
1986	31.19	51.50	25.94	29.17	48.58	24.15
1987	34.26	56.02	28.64	30.22	48.98	25.37
1988	39.81	62.91	33.64	29.02	44.46	24.90
1989	45.28	68.98	38.74	27.77	41.60	23.95
1990	51.64	75.55	44.87	30.94	44.89	26.99
1991	57.56	83.46	50.09	33.72	47.50	29.74
1992	63.97	91.71	55.81	35.77	48.55	32.02
1993	70.97	100.22	62.25	34.97	45.82	31.74
1994	78.89	109.95	69.49	30.67	39.61	27.97
1995	87.22	120.56	76.85	28.98	37.15	26.44
1996	98.78	135.80	86.51	30.22	38.71	27.40
1997	111.49	152.06	97.23	33.27	42.09	30.16
1998	125.16	168.05	109.25	36.94	46.05	33.56
1999	139.43	183.41	122.40	41.78	50.72	38.32
2000	155.19	200.21	137.06	46.44	54.23	43.31
2001	169.39	217.53	147.72	50.77	59.04	47.05
2002	182.72	234.94	156.65	54.50	63.64	49.94
2003	197.21	250.72	167.74	58.18	67.30	53.16
2004	212.24	268.45	178.19	60.30	69.76	54.56
2005	229.33	287.70	190.76	63.72	73.66	57.15
2006	269.65	340.27	220.72	73.79	86.34	65.09
2007	312.10	394.12	253.02	81.10	95.79	70.52
2008	354.45	443.44	288.85	86.79	101.77	75.74

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	401.38	496.42	329.50	98.95	114.62	87.10
2010	452.38	557.28	370.44	108.05	125.03	94.78
2011	508.30	643.69	392.77	114.62	137.42	95.16
2012	567.79	728.59	420.05	124.10	151.60	98.84
2013	626.04	808.23	447.98	132.97	164.24	102.41
2014	687.08	891.13	475.71	142.25	176.85	106.40
2015	750.43	971.51	509.05	152.76	189.93	112.18
2016	843.12	1112.30	541.47	167.88	213.21	117.10
2017	956.76	1283.44	579.79	186.31	241.13	123.05
2018	1079.39	1467.91	618.51	205.31	270.12	128.44
2019	1222.68	1683.59	657.82	225.50	301.08	132.88

Chapter 22   Human Capital for Shandong

22.1 Total human capital

Table SD-1.1 presents the estimates of nominal and real total human capital and real physical capital for Shandong. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 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)
1985	3363	3363	100
1986	4007	3836	115
1987	4691	4153	132
1988	5455	4076	148
1989	6340	4029	162
1990	7232	4444	176
1991	8314	4867	193
1992	9424	5189	214
1993	10598	5192	237
1994	12020	4771	260
1995	13533	4564	287
1996	15235	4674	319
1997	17031	5074	356
1998	19449	5812	399
1999	21961	6584	450
2000	24957	7431	509
2001	28491	8292	574

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2002	32547	9480	652
2003	36193	10388	749
2004	39983	11063	875
2005	45252	12300	1041
2006	52091	14008	1240
2007	59117	15246	1455
2008	67121	16459	1689
2009	76337	18715	1980
2010	85078	20266	2302
2011	96957	21940	2647
2012	108980	24112	3012
2013	122199	26452	3397
2014	134913	28604	3792
2015	150585	31484	4234
2016	168890	34536	4651
2017	185546	37330	4982
2018	202173	39682	—
2019	219620	41761	—

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 2019, the nominal human capital per capita increased from 46.7 thousand Yuan to 2.8 million Yuan, an increase of more than 59 times; and the real human capital per capita increased from 46.7 thousand Yuan to 534.8 thousand Yuan, an increase of more than 10

times.

Figure SD-2.1 illustrates the trends of human capital per capita by gender for Shandong. The trend of real human capital per capita of male is similar to that of female for Shandong. Both of them kept increasing from 1985 to 2019, 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.
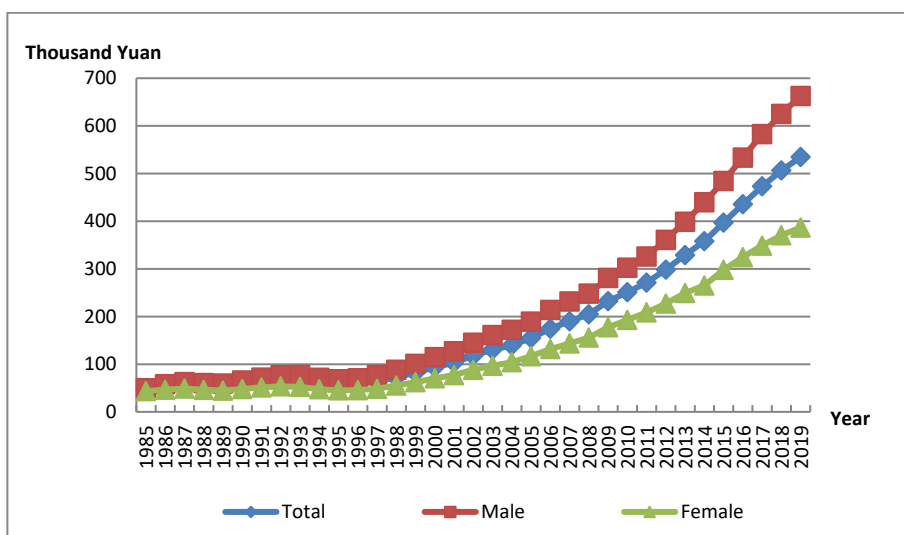
Figure SD-2.1 Human Capital Per Capita by Gender for Shandong，1985-2019

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	46.71	77.29	37.72	46.71	77.29	37.72
1986	55.02	94.70	42.65	52.67	90.19	40.97
1987	63.23	108.69	48.38	55.98	94.88	43.28
1988	72.07	121.39	55.34	53.85	87.87	42.30
1989	82.53	138.08	63.03	52.44	86.38	40.53
1990	93.21	152.34	71.63	57.28	92.89	44.28

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1991	106.24	174.11	81.13	62.20	99.97	48.23
1992	119.81	193.85	91.58	65.97	102.49	52.04
1993	134.23	213.35	102.90	65.76	98.42	52.83
1994	151.60	239.61	115.17	60.16	88.15	48.58
1995	170.26	270.55	126.95	57.42	85.22	45.42
1996	191.46	304.88	140.02	58.74	86.91	45.96
1997	213.57	336.45	154.71	63.63	92.93	49.59
1998	243.08	385.43	170.79	72.64	106.78	55.30
1999	274.61	434.84	187.82	82.33	120.47	61.68
2000	314.08	492.30	209.85	93.52	134.77	69.40
2001	354.86	544.38	229.27	103.28	147.41	74.04
2002	404.95	616.05	245.65	117.95	169.01	79.41
2003	454.56	675.60	266.34	130.46	184.06	84.83
2004	505.18	735.95	289.44	139.79	195.04	88.13
2005	568.84	815.86	316.34	154.62	213.86	94.06
2006	649.65	927.00	358.27	174.70	240.59	105.48
2007	736.53	1049.01	404.32	189.95	262.29	113.04
2008	835.01	1188.73	454.11	204.76	283.88	119.55
2009	947.24	1343.19	511.95	232.22	320.95	134.68
2010	1053.98	1483.21	571.87	251.06	344.42	146.20
2011	1197.97	1676.08	611.26	271.08	371.74	147.57
2012	1349.46	1868.12	653.53	298.57	405.80	154.68
2013	1520.47	2085.60	697.98	329.13	445.08	160.39
2014	1689.40	2296.04	751.27	358.19	479.87	170.01
2015	1899.90	2566.41	815.28	397.23	528.97	182.85
2016	2130.12	2868.72	869.69	435.58	578.55	191.60
2017	2351.91	3144.22	938.50	473.18	624.13	203.91

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
2018	2580.70	3421.93	1013.09	506.53	663.34	214.33
2019	2812.23	3701.87	1087.97	534.75	696.03	222.17

Figure SD-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
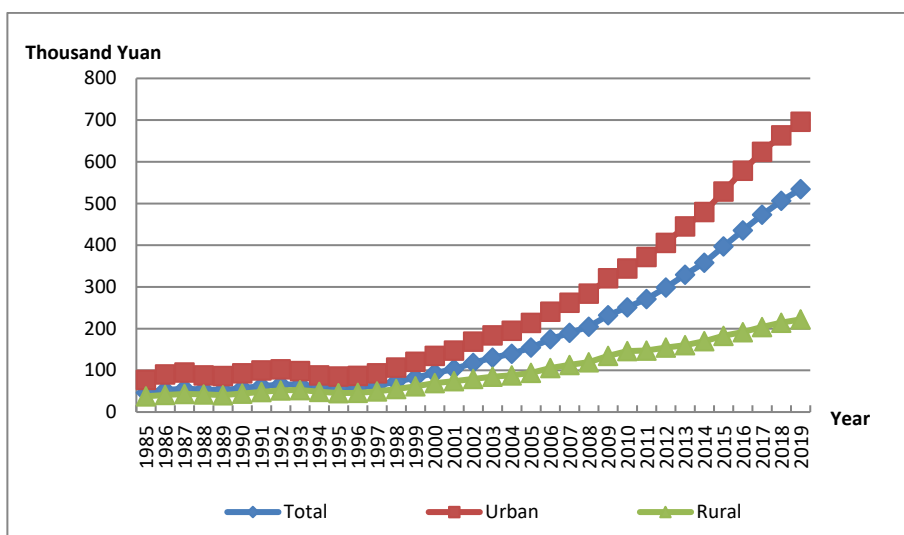
Figure SD-2.2 Real Human Capital Per Capita by Region for Shandong，1985-2019

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 2019, the nominal labor force human capital increased from 1.4 trillion Yuan to 73.3 trillion Yuan, an increase of more than 50 times; and the real labor force human capital increased from 1.4 trillion Yuan to 14.0 trillion Yuan, an increase of approximately 9 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)
1985	1427	1427
1986	1676	1605
1987	1984	1757
1988	2326	1739
1989	2717	1727
1990	3142	1931
1991	3605	2111
1992	4114	2267
1993	4648	2280
1994	5256	2090
1995	5911	2000
1996	6618	2038
1997	7454	2229
1998	8376	2515
1999	9325	2814
2000	10433	3131
2001	11786	3472
2002	13106	3880
2003	14295	4184
2004	15336	4321
2005	17045	4707

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2006	20040	5466
2007	22853	5964
2008	25744	6378
2009	29178	7225
2010	32935	7919
2011	36667	8363
2012	40514	9034
2013	44567	9713
2014	48330	10320
2015	52068	10971
2016	57023	11755
2017	62439	12661
2018	67759	13394
2019	73252	14017

22.3.2 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. Tables SD-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 32.5 thousand Yuan to 1350.4 thousand Yuan, an increase of more than 40 times; and the real average labor force human capital increased from 32.5 thousand Yuan to 258.4 thousand Yuan, an increase of approximately 7 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	32.50	51.90	26.72	32.50	51.90	26.72
1986	37.15	58.86	30.20	35.57	56.06	29.01
1987	42.55	66.72	34.23	37.69	58.25	30.62
1988	48.65	75.03	38.87	36.37	54.31	29.72
1989	55.34	83.42	44.35	35.17	52.19	28.52
1990	62.58	91.69	50.72	38.46	55.91	31.36
1991	70.51	102.17	57.22	41.30	58.66	34.02
1992	79.28	113.79	64.29	43.69	60.16	36.54
1993	88.69	125.87	72.01	43.50	58.07	36.97
1994	99.20	139.47	80.40	39.45	51.31	33.92
1995	110.57	154.46	89.32	37.40	48.65	31.96
1996	122.87	171.00	98.44	37.84	48.74	32.31
1997	137.21	190.80	108.45	41.03	52.70	34.77
1998	152.67	211.29	119.29	45.85	58.53	38.63
1999	168.70	232.13	130.27	50.90	64.31	42.78
2000	187.32	256.49	142.58	56.21	70.21	47.15
2001	207.14	277.16	159.15	61.02	75.05	51.40
2002	227.01	299.38	174.19	67.21	82.13	56.31
2003	247.06	319.18	191.72	72.30	86.95	61.06
2004	265.89	337.89	206.24	74.92	89.55	62.80
2005	293.29	370.72	223.00	81.00	97.18	66.31
2006	342.18	438.82	251.41	93.33	113.89	74.02
2007	390.59	503.44	282.81	101.94	125.88	79.07
2008	440.10	566.77	317.18	109.04	135.35	83.50
2009	498.20	640.98	356.66	123.36	153.16	93.83

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
2010	561.37	722.16	397.72	134.98	167.70	101.68
2011	627.26	814.57	421.78	143.07	180.66	101.82
2012	698.40	909.65	450.33	155.74	197.60	106.59
2013	774.38	1008.83	481.47	168.76	215.29	110.64
2014	849.60	1104.97	514.45	181.41	230.94	116.42
2015	925.07	1193.04	555.43	194.91	245.90	124.57
2016	1016.38	1316.04	590.07	209.52	265.41	130.00
2017	1123.91	1457.79	631.99	227.89	289.37	137.31
2018	1237.54	1605.95	675.66	244.63	311.31	142.94
2019	1350.40	1752.54	717.15	258.41	329.51	146.45

Chapter 23   Human Capital for Henan

23.1 Total human capital

Table HeN-1.1 presents the estimates of nominal and real total human capital and real physical capital for Henan. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 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)
1985	2641	2641	80
1986	3074	2927	90
1987	3508	3150	99
1988	4102	3092	112
1989	4801	3020	122
1990	5632	3515	132
1991	6456	3966	143
1992	7333	4316	155
1993	8254	4398	168
1994	9210	3934	187
1995	10223	3746	212
1996	12079	3983	242
1997	14249	4527	276
1998	16347	5318	315
1999	18657	6247	354
2000	20206	6826	396

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	23829	7962	441
2002	26456	8806	493
2003	29503	9664	554
2004	32912	10213	631
2005	36404	11052	744
2006	42830	12819	899
2007	49568	14056	1101
2008	56525	14947	1339
2009	64463	17118	1654
2010	71278	18264	2021
2011	83001	20064	2417
2012	94628	22256	2865
2013	106064	24196	3354
2014	115753	25881	3861
2015	124934	27550	4376
2016	138152	29853	4898
2017	150986	32155	5352
2018	163926	34104	—
2019	177553	35837	—

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 2019, the nominal human capital per capita increased from 37.3 thousand Yuan to 2.2 million Yuan, an increase of more

than 57 times; and the real human capital per capita increased from 37.3 thousand Yuan to 448.0 thousand Yuan, an increase of approximately 11 times.

Figure HeN-2.1 illustrates the trends of human capital per capita by gender for Henan. The trend of real human capital per capita of male is similar to that of female for Henan. Both of them kept increasing from 1985 to 2019, 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.
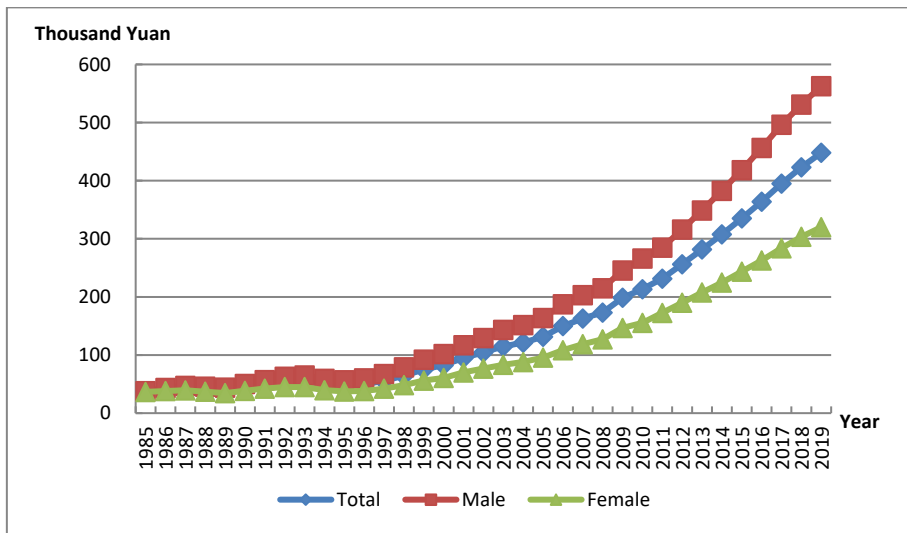
Figure HeN-2.1 Human Capital Per Capita by Gender for Henan，1985-2019

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

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	37.30	68.43	31.76	37.30	68.43	31.76
1986	42.91	82.92	35.64	40.85	77.64	34.17
1987	48.36	93.40	40.06	43.42	81.13	36.47

242

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	55.15	104.98	45.64	41.57	75.05	35.18
1989	62.82	118.33	51.96	39.51	73.62	32.83
1990	71.63	134.41	59.17	44.70	83.21	37.06
1991	81.61	155.33	66.71	50.14	91.50	41.78
1992	92.45	177.13	75.11	54.41	96.88	45.72
1993	104.28	200.97	84.17	55.56	99.38	46.45
1994	116.80	225.97	93.90	49.89	87.71	41.96
1995	129.73	252.01	103.77	47.54	83.68	39.87
1996	150.46	292.99	115.23	49.62	88.84	39.92
1997	174.97	336.74	129.53	55.59	99.72	43.19
1998	198.43	375.42	144.42	64.55	113.56	49.59
1999	224.59	418.60	160.19	75.20	131.07	56.65
2000	244.13	428.46	178.47	82.47	135.38	63.62
2001	283.82	500.38	199.58	94.84	157.00	70.65
2002	313.91	535.84	219.75	104.49	168.48	77.33
2003	350.78	578.00	247.41	114.90	178.74	85.86
2004	391.11	624.85	275.73	121.36	183.29	90.80
2005	432.60	671.45	305.24	131.33	192.97	98.47
2006	500.80	763.55	352.84	149.89	216.92	112.15
2007	574.63	860.02	404.58	162.95	231.77	121.95
2008	654.54	962.43	461.65	173.08	243.56	128.93
2009	747.94	1081.12	530.06	198.61	276.86	147.44
2010	832.55	1167.94	598.03	213.33	289.23	160.26
2011	957.65	1344.65	653.11	231.50	315.96	165.04
2012	1089.44	1517.16	714.69	256.23	347.46	176.29
2013	1235.05	1710.84	778.14	281.74	380.92	186.50
2014	1375.60	1888.38	848.48	307.57	412.13	200.08

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	1519.82	2062.47	929.13	335.14	444.21	216.41
2016	1684.07	2270.99	1003.19	363.91	480.19	229.01
2017	1854.46	2475.96	1093.90	394.94	516.00	246.78
2018	2033.60	2687.55	1191.08	423.09	547.02	263.41
2019	2219.60	2907.36	1286.59	448.00	574.86	275.90

Figure HeN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
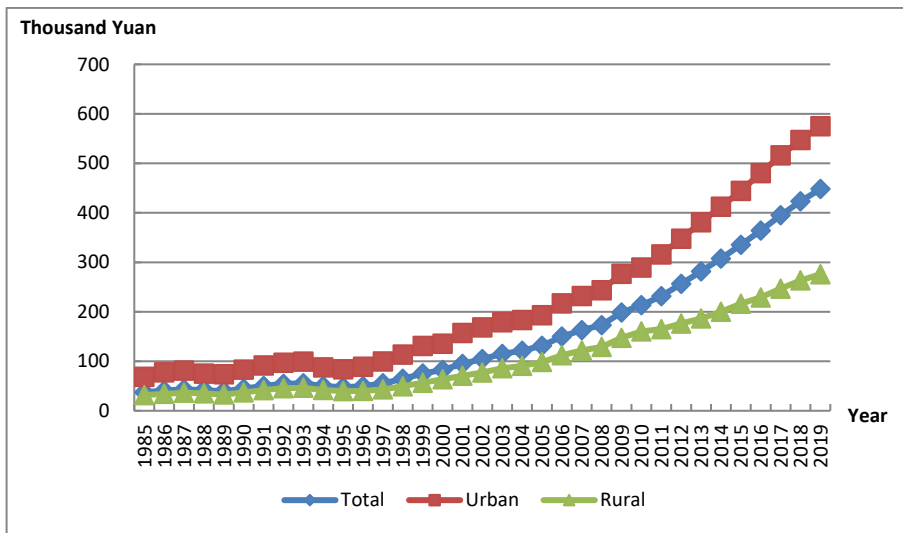
Figure HeN-2.2 Real Human Capital Per Capita by Region for Henan，1985-2019

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 2019, the nominal labor force human capital increased from 1.1 trillion Yuan to 62.0 trillion Yuan, an increase of more than 57 times; and the real labor force human capital increased from 1.1 trillion Yuan to 12.6 trillion Yuan, an increase of approximately 11 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)
1985	1072	1072
1986	1247	1187
1987	1456	1308
1988	1692	1277
1989	1991	1253
1990	2362	1474
1991	2622	1614
1992	2920	1727
1993	3233	1734
1994	3596	1552
1995	4003	1485
1996	4636	1548
1997	5348	1720
1998	6056	1997
1999	6895	2340

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	7799	2663
2001	8797	2975
2002	9699	3263
2003	10696	3542
2004	11798	3701
2005	13199	4050
2006	15485	4678
2007	17818	5096
2008	20079	5350
2009	22219	5938
2010	25113	6467
2011	28671	6965
2012	32045	7578
2013	35145	8066
2014	37521	8449
2015	40044	8900
2016	44933	9787
2017	50216	10782
2018	55843	11717
2019	61969	12612

23.3.2 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. Tables HeN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 25.8 thousand Yuan to 1180.8 thousand Yuan, an increase of more than 44 times; and the real average labor force human capital increased from 25.8 thousand Yuan to 240.3 thousand Yuan, an increase of approximately 8 times.

246

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

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	25.76	46.92	21.84	25.76	46.92	21.84
1986	29.15	53.32	24.62	27.76	49.92	23.60
1987	32.99	60.35	27.79	29.64	52.42	25.31
1988	37.21	66.26	31.54	28.08	47.37	24.32
1989	42.22	73.25	36.03	26.56	45.58	22.77
1990	48.02	80.86	41.40	29.98	50.06	25.93
1991	53.25	89.40	45.96	32.79	52.66	28.79
1992	59.07	98.48	51.21	34.94	53.86	31.17
1993	65.36	107.94	57.01	35.05	53.38	31.46
1994	72.37	117.73	63.70	31.23	45.70	28.46
1995	80.21	129.17	71.05	29.76	42.89	27.30
1996	91.34	149.32	78.86	30.50	45.28	27.32
1997	103.72	169.17	87.78	33.35	50.10	29.27
1998	115.96	184.57	97.75	38.24	55.83	33.57
1999	129.62	201.85	108.43	43.98	63.20	38.35
2000	144.78	220.56	120.31	49.43	69.69	42.89
2001	161.23	241.05	132.60	54.52	75.63	46.94
2002	176.78	259.55	144.42	59.48	81.61	50.82
2003	194.09	275.60	159.83	64.27	85.23	55.46
2004	213.21	295.58	175.67	66.88	86.70	57.85
2005	236.41	320.06	195.07	72.54	91.98	62.93
2006	275.81	374.23	224.12	83.32	106.32	71.24
2007	317.63	428.96	255.79	90.85	115.60	77.10
2008	360.36	480.27	290.56	96.01	121.54	81.15
2009	405.03	529.26	329.67	108.25	135.53	91.70

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
2010	460.82	597.69	371.04	118.67	148.01	99.43
2011	521.76	683.74	404.44	126.76	160.66	102.20
2012	584.46	765.41	441.56	138.21	175.29	108.92
2013	645.87	839.61	481.04	148.23	186.94	115.29
2014	700.90	896.95	524.87	157.83	195.75	123.77
2015	760.97	953.53	579.70	169.13	205.37	135.02
2016	848.37	1069.12	633.80	184.80	226.06	144.69
2017	950.11	1200.06	699.20	204.01	250.10	157.74
2018	1062.80	1345.26	770.38	222.99	273.81	170.37
2019	1180.77	1495.57	845.02	240.31	295.71	181.21

Chapter 24   Human Capital for Hubei

24.1 Total human capital

Table HuB-1.1 presents the estimates of nominal and real total human capital and real physical capital for Hubei. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 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)
1985	1835	1835	56
1986	2177	2079	62
1987	2507	2227	69
1988	2939	2196	75
1989	3405	2189	80
1990	3959	2473	85
1991	4587	2729	91
1992	5208	2832	98
1993	5932	2726	108
1994	6705	2450	123
1995	7517	2287	145
1996	8387	2335	171
1997	9739	2625	199
1998	11097	3036	229
1999	12939	3617	261
2000	14279	4016	294

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	17554	4904	330
2002	18239	5113	367
2003	20601	5647	406
2004	22610	5906	453
2005	24408	6197	509
2006	27547	6884	583
2007	31219	7436	672
2008	35252	7913	772
2009	39967	9013	900
2010	45586	9985	1053
2011	52446	10856	1243
2012	62651	12594	1445
2013	71514	13979	1671
2014	80379	15397	1917
2015	92310	17421	2178
2016	106670	19705	2459
2017	119027	21629	2750
2018	132135	23541	—
2019	146461	25327	—

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 2019, the nominal human capital per capita increased from 39.0 thousand Yuan to 3.2 million Yuan, an increase of more

than 81 times; and the real human capital per capita increased from 39.0 thousand Yuan to 553.6 thousand Yuan, an increase of approximately 13 times.

Figure HuB-2.1 illustrates the trends of human capital per capita by gender for Hubei. The trend of real human capital per capita of male is similar to that of female for Hubei. Both of them kept increasing from 1985 to 2019, 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 2000.
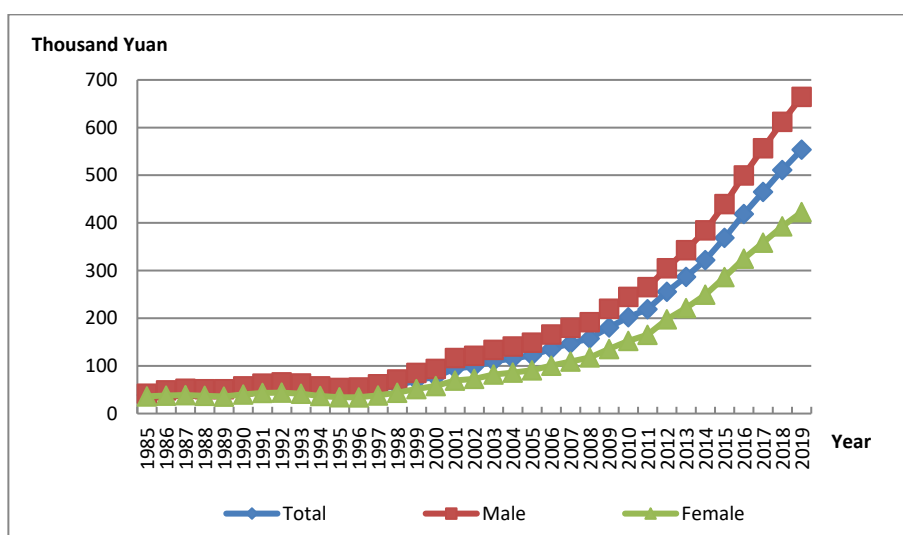
Figure HuB-2.1 Real Human Capital Per Capita by Gender for Hubei，1985-2019

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

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	39.00	74.10	28.58	39.00	74.10	28.58
1986	45.58	87.49	32.22	43.51	83.01	30.92
1987	51.68	96.75	36.34	45.90	84.44	32.78

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	59.69	109.99	41.24	44.60	79.67	31.74
1989	68.46	123.52	46.90	44.01	78.42	30.54
1990	78.77	140.68	53.36	49.20	87.30	33.57
1991	90.39	161.39	60.00	53.78	94.30	36.43
1992	102.09	180.04	67.30	55.52	95.21	37.81
1993	115.68	202.01	75.41	53.16	89.92	36.02
1994	130.57	225.55	84.32	47.72	79.05	32.45
1995	146.32	248.91	93.84	44.51	72.64	30.12
1996	162.03	269.78	103.63	45.10	71.44	30.83
1997	188.02	312.70	116.22	50.67	80.71	33.37
1998	214.37	356.30	129.09	58.65	93.94	37.45
1999	248.95	414.69	142.67	69.60	112.48	42.10
2000	274.22	442.88	158.05	77.12	120.13	47.49
2001	338.78	565.30	174.18	94.64	152.72	52.45
2002	352.73	562.25	189.95	98.88	153.12	56.74
2003	400.79	634.21	212.79	109.85	168.34	62.75
2004	441.96	687.89	236.60	115.45	174.73	65.94
2005	480.81	737.35	261.18	122.08	182.37	70.47
2006	542.81	822.13	293.86	135.64	200.53	77.81
2007	617.83	926.73	329.02	147.16	215.89	82.89
2008	701.93	1042.89	368.70	157.56	230.29	86.49
2009	801.78	1178.72	415.51	180.80	262.12	97.47
2010	922.39	1349.05	464.70	202.04	291.83	105.73
2011	1058.46	1533.55	500.70	219.10	314.44	107.17
2012	1270.93	1838.74	541.84	255.48	366.75	112.59
2013	1467.75	2102.18	584.74	286.90	408.27	117.97
2014	1681.72	2389.28	633.17	322.14	454.93	125.36

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2015	1953.55	2757.97	689.64	368.68	517.88	134.26
2016	2267.13	3193.64	745.96	418.81	587.36	142.09
2017	2560.00	3575.87	820.08	465.18	646.66	154.36
2018	2868.95	3977.09	901.49	511.12	705.11	166.68
2019	3201.17	4400.87	986.08	553.58	757.52	177.01

Figure HuB-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 2010, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
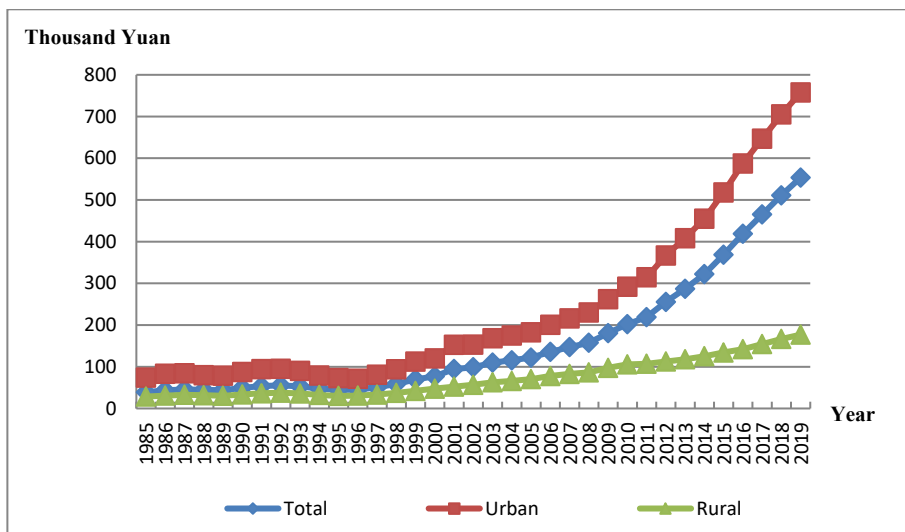
Figure HuB-2.2 Real Human Capital Per Capita by Region for Hubei，1985-2019

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 2019, the nominal labor force human capital increased from 0.8 trillion Yuan to 47.3 trillion Yuan, an increase of more than 60 times; and the real labor force human capital increased from 0.8 trillion Yuan to 8.2 trillion Yuan, an increase of approximately 10 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)
1985	773	773
1986	909	869
1987	1067	949
1988	1238	927
1989	1438	926
1990	1661	1038
1991	1879	1121
1992	2113	1153
1993	2356	1088
1994	2616	963
1995	2894	887
1996	3377	948
1997	3931	1068
1998	4443	1225
1999	5096	1437

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	5858	1663
2001	6535	1853
2002	7297	2068
2003	8007	2226
2004	8804	2328
2005	9624	2470
2006	10828	2733
2007	12157	2924
2008	13567	3068
2009	15352	3484
2010	17315	3815
2011	20065	4172
2012	23131	4669
2013	26083	5118
2014	28678	5514
2015	31564	5977
2016	35162	6517
2017	38965	7106
2018	42896	7670
2019	47261	8202

24.3.2 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. Tables HUB-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 27.5 thousand Yuan to 1.4 million Yuan, an increase of more than 51 times; and the real average labor force human capital increased from 27.5 thousand Yuan to 249.8 thousand Yuan, an increase of approximately 8 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	27.54	47.72	21.48	27.54	47.72	21.48
1986	31.41	53.23	24.29	30.00	50.51	23.31
1987	35.72	59.20	27.41	31.76	51.67	24.72
1988	40.67	65.74	31.12	30.48	47.62	23.95
1989	46.33	73.03	35.39	29.82	46.36	23.04
1990	52.49	80.46	40.24	32.81	49.93	25.32
1991	58.52	88.57	44.84	34.90	51.75	27.23
1992	65.02	97.16	49.80	35.50	51.38	27.97
1993	71.94	105.80	55.33	33.23	47.09	26.43
1994	79.32	114.74	61.37	29.20	40.22	23.62
1995	87.47	125.26	67.43	26.81	36.55	21.64
1996	99.79	142.31	75.84	28.01	37.69	22.56
1997	113.78	161.54	85.11	30.91	41.69	24.44
1998	126.94	177.53	95.30	35.02	46.81	27.64
1999	142.39	196.88	106.19	40.14	53.40	31.34
2000	159.92	218.54	118.49	45.41	59.28	35.61
2001	177.75	241.12	131.90	50.39	65.14	39.72
2002	197.94	268.63	145.39	56.11	73.16	43.43
2003	218.10	292.14	162.45	60.62	77.54	47.90
2004	241.21	321.42	179.62	63.78	81.64	50.06
2005	265.13	351.65	196.67	68.04	86.97	53.06
2006	298.65	394.30	220.60	75.38	96.18	58.41
2007	336.87	443.31	246.63	81.01	103.28	62.13
2008	377.79	493.76	275.56	85.44	109.03	64.64
2009	429.13	558.35	309.37	97.39	124.16	72.57

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
2010	485.97	631.05	343.41	107.06	136.51	78.13
2011	560.26	739.17	370.47	116.49	151.56	79.29
2012	646.92	860.29	402.10	130.59	171.59	83.56
2013	735.85	981.79	434.25	144.38	190.68	87.61
2014	824.05	1098.96	466.02	158.44	209.25	92.26
2015	918.32	1219.30	500.29	173.88	228.96	97.39
2016	1025.95	1365.22	541.35	190.15	251.08	103.12
2017	1154.05	1533.57	593.81	210.47	277.33	111.77
2018	1291.17	1715.35	647.50	230.87	304.12	119.72
2019	1439.70	1910.54	704.10	249.84	328.86	126.39

Chapter 25   Human Capital for Hunan

25.1 Total human capital

Table HUN-1.1 presents the estimates of nominal and real total human capital and real physical capital for Hunan. Column1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Hunan.

Table HUN-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Hunan

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	1805	1805	39
1986	2096	1990	43
1987	2384	2063	48
1988	2769	1908	54
1989	3180	1850	57
1990	3704	2148	58
1991	4291	2384	61
1992	4863	2451	66
1993	5457	2351	70
1994	6112	2101	76
1995	6779	1957	82
1996	7707	2061	91
1997	8817	2290	100
1998	10000	2586	110
1999	11539	2968	121
2000	12988	3294	133

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	14535	3719	148
2002	16345	4198	164
2003	18175	4558	182
2004	20386	4882	205
2005	22575	5282	234
2006	25551	5893	270
2007	28809	6282	318
2008	32654	6699	377
2009	36614	7549	447
2010	40910	8181	537
2011	47231	8959	633
2012	53930	10032	742
2013	60903	11051	859
2014	68259	12153	982
2015	76539	13439	1096
2016	85368	14716	1210
2017	94181	15994	1316
2018	102883	17137	—
2019	112021	18143	—

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 2019, the nominal human capital per capita increased from 34.6 thousand Yuan to 2.1 million Yuan, an increase of more than 58 times; and the real human capital per capita increased from 34.6

thousand Yuan to 0.3 million Yuan, an increase of approximately 9 times.

Figure HUN-2.1 illustrates the trends of human capital per capita by gender for Hunan. The growth pattern of real human capital per capita of male is similar to that of female for Hunan. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
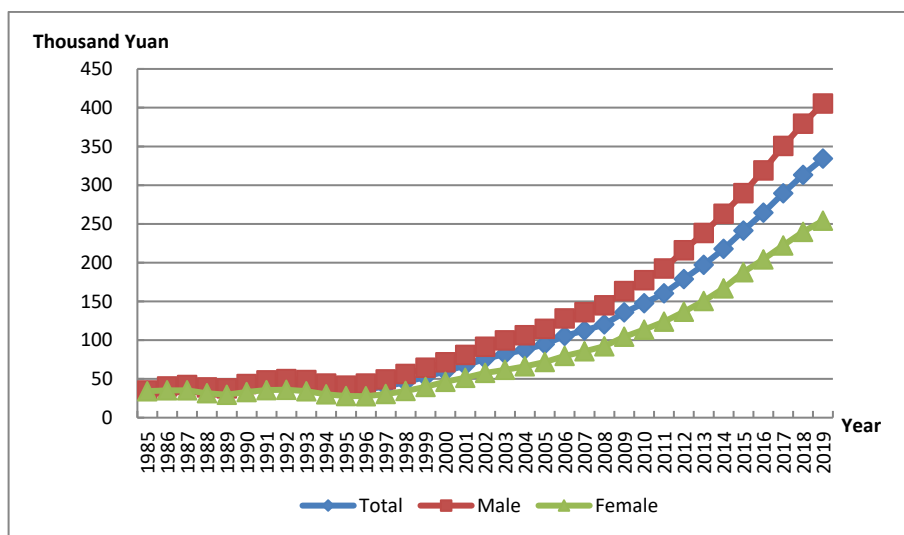
Figure HUN-2.1 Human Capital Per Capita by Gender for Hunan，1985-2019

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	34.61	68.30	27.98	34.61	68.30	27.98
1986	39.96	81.20	31.33	37.94	77.04	29.75
1987	45.02	89.94	35.18	38.96	76.67	30.70
1988	51.62	103.28	39.51	35.57	70.02	27.50
1989	58.38	115.05	44.58	33.98	66.50	26.06

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1990	66.52	130.93	50.48	38.58	75.25	29.45
1991	76.07	148.45	56.42	42.26	81.17	31.70
1992	86.15	166.74	63.04	43.41	80.32	32.83
1993	96.96	184.95	70.13	41.78	75.89	31.38
1994	109.07	205.79	78.03	37.49	67.67	27.80
1995	121.41	226.81	85.55	35.04	63.14	25.48
1996	135.36	251.67	91.96	36.20	65.35	25.32
1997	155.53	287.90	101.76	40.40	72.57	27.33
1998	177.29	328.05	112.80	45.85	82.28	30.27
1999	204.63	382.00	124.74	52.63	96.20	33.01
2000	235.52	434.57	141.46	59.73	108.02	36.92
2001	262.82	471.20	156.32	67.24	118.42	41.08
2002	295.14	520.33	171.28	75.81	131.30	45.29
2003	327.21	558.45	191.84	82.06	138.99	48.73
2004	366.29	612.21	213.58	87.73	146.36	51.32
2005	405.11	662.27	235.34	94.79	155.06	55.00
2006	457.38	734.26	264.99	105.49	169.22	61.20
2007	516.39	813.60	296.52	112.60	178.22	64.06
2008	586.63	910.98	333.14	120.35	188.61	67.00
2009	658.97	1000.91	376.23	135.87	208.31	75.98
2010	738.69	1103.34	421.87	147.71	222.72	82.54
2011	845.57	1253.66	453.90	160.40	239.89	84.10
2012	961.69	1407.30	490.97	178.90	263.49	89.54
2013	1086.93	1571.92	529.74	197.22	286.85	94.26
2014	1223.09	1753.06	573.84	217.76	313.33	100.69
2015	1374.84	1956.25	626.51	241.41	344.47	108.75
2016	1534.07	2173.30	674.27	264.44	375.68	114.83

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2017	1704.87	2394.95	733.36	289.53	407.44	123.52
2018	1880.99	2618.49	798.15	313.31	436.92	131.82
2019	2063.86	2847.95	861.86	334.26	462.25	138.05

Figure HUN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
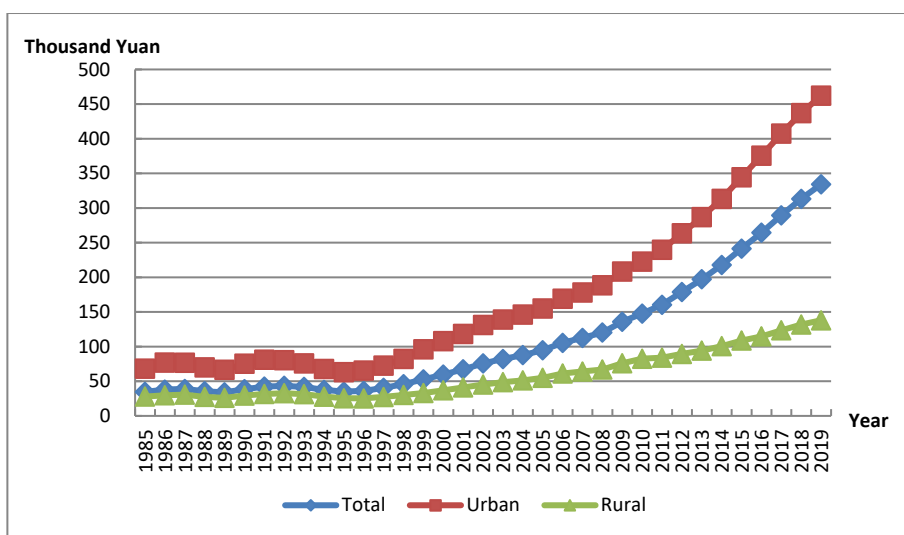
Figure HUN-2.2 Real Human Capital Per Capita by Region for Hunan，1985-2019

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 2019, the nominal labor force human capital increased from 0.8 trillion Yuan to 39.7 trillion Yuan, an increase of more than 48 times; and the real labor force human capital increased from 0.80 trillion Yuan to 6.4 trillion Yuan, an increase of approximately 7 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)
1985	801	801
1986	934	887
1987	1087	942
1988	1253	864
1989	1447	842
1990	1697	985
1991	1930	1074
1992	2155	1092
1993	2394	1039
1994	2650	917
1995	2922	849
1996	3356	903
1997	3827	1002
1998	4284	1119

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	4832	1253
2000	5433	1389
2001	6070	1565
2002	6719	1740
2003	7527	1894
2004	8436	2022
2005	9439	2208
2006	10741	2478
2007	12008	2614
2008	13346	2728
2009	14823	3045
2010	16386	3265
2011	18552	3507
2012	20854	3869
2013	23107	4182
2014	25223	4482
2015	27463	4815
2016	30298	5214
2017	33331	5654
2018	36364	6050
2019	39679	6417

25.3.2 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. Tables HUN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 25.7 thousand Yuan to 1.1 million Yuan, an increase of more than 39 times; and

the real average labor force human capital increased from 25.7 thousand Yuan to 169.8 thousand Yuan, an increase of approximately 6 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	25.68	46.29	21.52	25.68	46.29	21.52
1986	29.06	51.64	24.32	27.59	48.99	23.10
1987	32.88	57.47	27.46	28.48	49.00	23.96
1988	37.23	64.65	30.94	25.69	43.83	21.53
1989	41.99	71.77	34.96	24.46	41.49	20.43
1990	47.68	80.32	39.76	27.68	46.16	23.20
1991	53.57	89.72	43.99	29.81	49.05	24.71
1992	59.38	97.47	48.80	30.10	46.95	25.42
1993	65.80	106.04	54.00	28.55	43.51	24.16
1994	72.67	114.97	59.67	25.15	37.81	21.26
1995	79.97	124.27	65.66	23.23	34.60	19.56
1996	87.67	136.95	70.84	23.59	35.56	19.50
1997	99.00	154.42	79.17	25.92	38.93	21.26
1998	110.14	169.13	88.58	28.76	42.42	23.77
1999	122.48	185.75	98.50	31.76	46.78	26.07
2000	139.98	209.34	112.64	35.80	52.04	29.40
2001	155.97	230.86	124.24	40.20	58.02	32.65
2002	172.44	253.27	135.86	44.64	63.91	35.92
2003	192.41	278.23	150.87	48.41	69.25	38.32
2004	214.93	307.49	166.90	51.51	73.51	40.10
2005	239.04	338.83	183.57	55.92	79.33	42.90
2006	270.14	378.17	205.77	62.32	87.16	47.52

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2007	302.48	417.29	229.29	65.84	91.41	49.53
2008	337.27	457.98	254.85	68.93	94.82	51.26
2009	376.78	503.20	284.35	77.40	104.72	57.42
2010	418.91	551.89	314.73	83.47	111.40	61.58
2011	472.20	631.23	335.78	89.26	120.79	62.22
2012	531.01	713.13	361.09	98.52	133.52	65.86
2013	589.21	789.61	388.31	106.64	144.09	69.09
2014	645.99	860.27	418.29	114.80	153.76	73.40
2015	704.79	927.90	455.02	123.57	163.39	78.98
2016	776.48	1025.97	491.34	133.64	177.35	83.68
2017	862.18	1140.16	537.30	146.26	193.97	90.50
2018	953.95	1261.65	587.05	158.72	210.52	96.95
2019	1050.02	1388.08	638.32	169.82	225.30	102.25

Chapter 26   Human Capital for Guangdong

26.1 Total human capital

Table GD-1.1 presents the estimates of nominal and real total human capital and real physical capital for Guangdong. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Guangdong.

Table GD-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Guangdong

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	3602	3602	78
1986	4238	4036	89
1987	4715	4039	99
1988	5453	3610	112
1989	6348	3439	121
1990	7333	4073	134
1991	8431	4631	149
1992	9670	4954	174
1993	11152	4704	218
1994	12470	4321	272
1995	13827	4198	332
1996	16716	4738	393
1997	20277	5631	453
1998	24637	6950	524
1999	29142	8358	607

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	34721	9790	685
2001	38589	10946	772
2002	44019	12640	875
2003	49474	14103	1005
2004	54496	15087	1151
2005	59631	16145	1336
2006	70075	18628	1542
2007	81268	20822	1777
2008	91005	22079	2016
2009	102629	25490	2326
2010	113447	27319	2683
2011	127996	29220	3081
2012	143626	31859	3516
2013	158319	34260	3998
2014	174698	36947	4520
2015	189842	39525	5057
2016	210818	42855	5674
2017	225858	45174	6348
2018	241129	47188	—
2019	256934	48678	—

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 2019, the nominal human capital per

capita increased from 65.6 thousand Yuan to 2.7 million Yuan, an increase of more than 39 times; and the real human capital per capita increased from 65.6 thousand Yuan to 0.5 million Yuan, an increase of approximately 7 times.

Figure GD-2.1 illustrates the trends of human capital per capita by gender for Guangdong. The growth pattern of real human capital per capita of male is similar to that of female for Guangdong. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
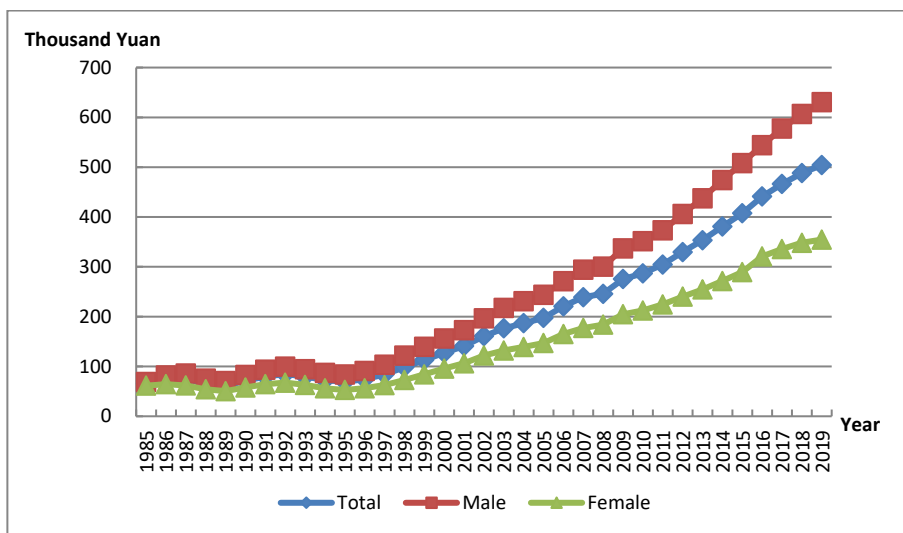
Figure GD-2.1 Human Capital Per Capita by Gender for Guangdong，1985-2019

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	65.64	101.89	52.17	65.64	101.89	52.17

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1986	77.72	121.85	59.22	74.00	116.38	56.24
1987	87.10	129.69	67.11	74.61	109.81	58.10
1988	98.94	146.26	76.06	65.49	95.63	50.92
1989	113.19	167.03	85.83	61.31	89.59	46.95
1990	128.16	186.14	96.83	71.19	102.51	54.27
1991	145.49	212.11	109.00	79.92	114.18	61.15
1992	165.19	241.31	122.34	84.63	119.83	64.81
1993	188.92	278.27	136.95	79.69	113.27	60.16
1994	209.02	301.33	152.92	72.43	101.37	54.83
1995	228.11	320.40	169.25	69.25	95.30	52.64
1996	262.76	364.90	187.77	74.48	101.25	54.83
1997	302.78	414.22	208.35	84.08	112.57	59.94
1998	348.99	471.53	230.06	98.44	130.36	67.47
1999	394.03	523.44	251.72	113.01	147.06	75.56
2000	451.36	588.57	281.50	127.26	161.80	84.50
2001	497.00	643.23	307.21	140.97	178.25	92.59
2002	560.05	725.40	331.21	160.82	203.88	101.24
2003	619.15	789.30	363.88	176.49	220.29	110.78
2004	674.96	848.20	394.90	186.86	230.73	115.94
2005	729.05	902.36	424.58	197.39	240.65	121.37
2006	830.48	1026.91	469.10	220.77	269.03	131.99
2007	933.08	1148.47	512.99	239.07	290.14	139.46
2008	1013.12	1232.47	559.55	245.79	295.13	143.77
2009	1109.12	1337.00	613.27	275.48	328.03	161.12
2010	1191.77	1422.65	666.25	286.99	338.55	169.61
2011	1334.11	1599.15	693.02	304.56	361.40	167.07
2012	1485.93	1783.68	724.77	329.61	392.12	169.80

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2013	1633.24	1962.08	760.68	353.43	421.23	173.53
2014	1800.60	2169.89	802.32	380.81	455.37	179.27
2015	1957.42	2366.20	851.58	407.53	488.75	187.83
2016	2170.90	2629.11	888.28	441.30	530.33	192.08
2017	2331.36	2815.51	933.99	466.30	558.43	200.37
2018	2494.34	3004.01	977.93	488.13	582.99	205.88
2019	2661.34	3196.20	1016.98	504.21	601.64	204.68

Figure GD-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
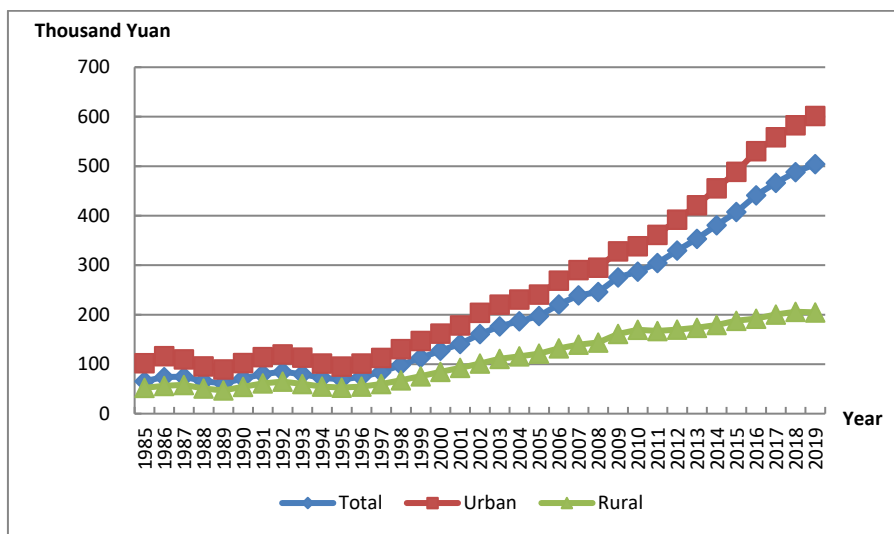
Figure GD-2.2 Real Human Capital Per Capita by Region for Guangdong, 1985-2019

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 2019, the nominal labor force human capital increased from 1.5 trillion Yuan to 103.6 trillion Yuan, an increase of more than 67 times; and the real labor force human capital increased from 1.5 trillion Yuan to 19.7 trillion Yuan, an increase of approximately 12 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)
1985	1513	1513
1986	1735	1652
1987	1989	1702
1988	2327	1539
1989	2733	1480
1990	3207	1781
1991	3593	1972
1992	3998	2046
1993	4413	1861
1994	4893	1694
1995	5535	1680
1996	6877	1948
1997	8608	2388
1998	10669	3006
1999	12893	3694

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	15303	4310
2001	16676	4728
2002	18447	5299
2003	20460	5835
2004	22675	6279
2005	25116	6802
2006	28778	7658
2007	33265	8536
2008	38420	9334
2009	44352	11032
2010	50902	12274
2011	55227	12633
2012	60366	13424
2013	66075	14337
2014	71870	15245
2015	77795	16249
2016	84269	17191
2017	90888	18247
2018	97235	19099
2019	103615	19688

26.3.2 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. Tables GD-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 47.4 thousand Yuan to 1.5 million Yuan, an increase of more than 30 times; and the real average labor force human capital increased from 47.4 thousand Yuan to 0.3 million Yuan, an increase of approximately 5 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	47.39	69.53	37.70	47.39	69.53	37.70
1986	54.38	77.88	42.59	51.79	74.38	40.45
1987	62.31	86.95	48.10	53.34	73.62	41.64
1988	70.47	96.83	54.65	46.61	63.31	36.59
1989	79.85	108.28	61.81	43.23	58.08	33.81
1990	90.43	120.87	69.84	50.20	66.56	39.14
1991	100.14	132.70	77.83	54.96	71.44	43.66
1992	110.67	145.70	86.11	56.64	72.36	45.62
1993	121.87	159.48	94.73	51.38	64.92	41.61
1994	134.32	174.89	104.24	46.51	58.83	37.38
1995	149.45	193.17	116.20	45.35	57.46	36.14
1996	173.56	222.40	130.26	49.16	61.71	38.04
1997	201.48	255.16	145.31	55.89	69.34	41.81
1998	230.58	286.81	161.66	64.97	79.29	47.41
1999	258.60	315.30	179.19	74.09	88.58	53.79
2000	286.97	343.29	198.10	80.83	94.37	59.46
2001	310.28	368.98	214.90	87.97	102.25	64.77
2002	338.58	402.31	230.05	97.25	113.07	70.32
2003	369.68	436.52	249.48	105.44	121.83	75.95
2004	404.19	475.75	267.17	111.93	129.42	78.44
2005	440.87	516.71	286.64	119.39	137.80	81.94
2006	490.89	573.22	320.22	130.62	150.17	90.10
2007	547.99	638.18	355.32	140.62	161.22	96.59
2008	610.16	708.44	392.03	148.24	169.64	100.73

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**
2009	678.70	784.73	435.07	168.81	192.53	114.30
2010	749.70	863.47	479.76	180.77	205.48	122.14
2011	812.26	940.57	503.59	185.80	212.56	121.41
2012	884.31	1028.23	533.62	196.65	226.05	125.02
2013	962.86	1123.60	567.52	208.92	241.22	129.47
2014	1043.74	1221.98	603.48	221.40	256.44	134.84
2015	1125.82	1321.12	644.90	235.15	272.88	142.24
2016	1211.74	1425.49	671.65	247.19	287.54	145.24
2017	1307.76	1540.50	703.68	262.55	305.55	150.96
2018	1403.89	1656.09	732.67	275.75	321.40	154.25
2019	1500.28	1772.26	760.73	285.07	333.60	153.11

Chapter 27 Human Capital for Guangxi

27.1 Total human capital

Table GX-1.1 presents the estimates of nominal and real total human capital and real physical capital for Guangxi. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Guangxi.

Table GX-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Guangxi

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	1515	1515	35
1986	1744	1642	38
1987	1960	1723	41
1988	2215	1624	42
1989	2520	1511	44
1990	2878	1686	44
1991	3248	1849	46
1992	3636	1953	50
1993	4095	1824	56
1994	4630	1635	63
1995	5183	1546	71
1996	5881	1644	79
1997	6689	1856	87
1998	7613	2178	97
1999	8609	2520	108
2000	9795	2874	119

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	10779	3147	131
2002	12177	3586	145
2003	13938	4060	162
2004	15781	4401	184
2005	17479	4757	215
2006	20058	5384	255
2007	23152	5860	306
2008	25956	6088	371
2009	29550	7089	476
2010	32609	7590	619
2011	37815	8314	783
2012	43007	9162	952
2013	48640	10135	1088
2014	54571	11135	1224
2015	60292	12121	1368
2016	67949	13442	1521
2017	76082	14797	1587
2018	84232	16005	—
2019	93411	17127	—

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 2019, the nominal human capital per capita increased from 42.2 thousand Yuan to 2.2 million Yuan, an increase

of more than 50 times; and the real human capital per capita increased from 42.2 thousand Yuan to 0.4 million Yuan, an increase of approximately 8 times.

Figure GX-2.1 illustrates the trends of human capital per capita by gender for Guangxi. The growth pattern of real human capital per capita of male is similar to that of female for Guangxi. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
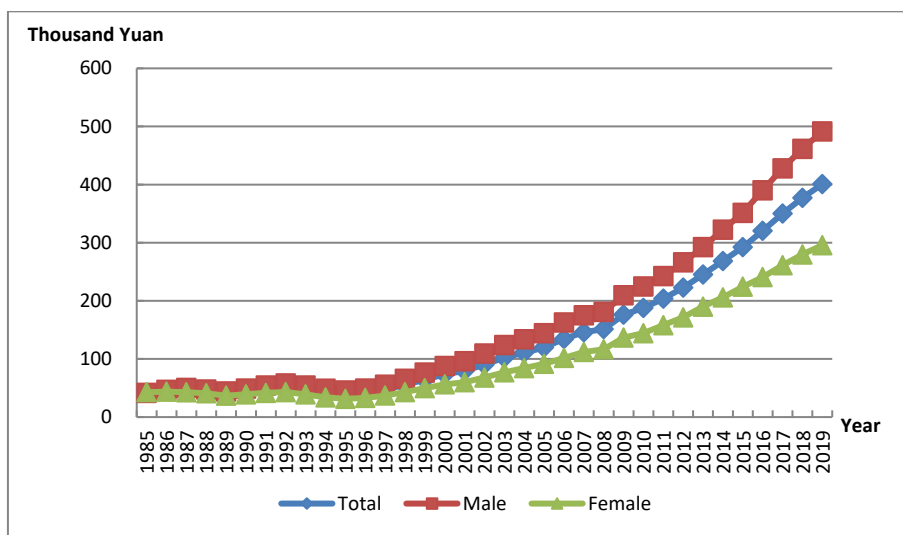
Figure GX-2.1 Human Capital Per Capita by Gender for Guangxi，1985-2019

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	42.21	83.17	35.84	42.21	83.17	35.84
1986	48.23	101.18	39.59	45.42	95.27	37.28
1987	52.94	111.72	42.95	46.54	95.47	38.22

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	60.55	126.54	48.73	44.39	87.69	36.63
1989	67.97	140.27	54.48	40.76	81.21	33.21
1990	75.95	154.45	60.88	44.48	90.96	35.55
1991	85.17	173.24	67.37	48.47	99.35	38.19
1992	94.88	191.43	74.64	50.97	102.60	40.15
1993	106.09	212.49	82.85	47.27	92.37	37.42
1994	118.67	236.01	91.97	41.91	81.81	32.84
1995	131.31	259.63	100.91	39.17	76.27	30.38
1996	148.62	290.25	110.98	41.54	80.82	31.11
1997	169.87	330.77	122.81	47.12	91.46	34.15
1998	193.51	371.25	135.48	55.36	105.72	38.92
1999	219.69	414.16	149.14	64.31	121.34	43.63
2000	250.65	458.25	167.02	73.55	134.25	49.10
2001	272.52	471.11	182.57	79.56	136.25	53.89
2002	306.38	522.05	197.53	90.23	152.66	58.72
2003	350.83	588.58	218.69	102.18	170.58	64.17
2004	397.35	658.15	240.89	110.82	183.23	67.39
2005	439.93	715.01	264.65	119.72	193.26	72.87
2006	500.80	796.48	298.57	134.43	211.87	81.46
2007	576.59	907.65	335.17	145.93	228.63	85.62
2008	645.10	994.24	375.65	151.31	232.76	88.45
2009	734.22	1116.96	425.77	176.13	267.09	102.82
2010	806.88	1199.46	477.98	187.81	278.74	111.63
2011	926.65	1373.53	517.66	203.73	301.98	113.81
2012	1045.25	1530.22	564.36	222.68	326.00	120.23
2013	1176.97	1707.04	618.49	245.25	356.22	128.33
2014	1316.22	1893.64	679.07	268.57	386.65	138.28

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
2015	1454.11	2075.22	750.24	292.33	417.47	150.51
2016	1620.37	2291.88	824.01	320.55	453.79	162.55
2017	1800.49	2514.38	915.46	350.18	488.56	178.62
2018	1984.67	2734.46	1019.36	377.12	518.87	194.61
2019	2186.20	2973.78	1131.38	400.84	545.20	207.49

Figure GX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
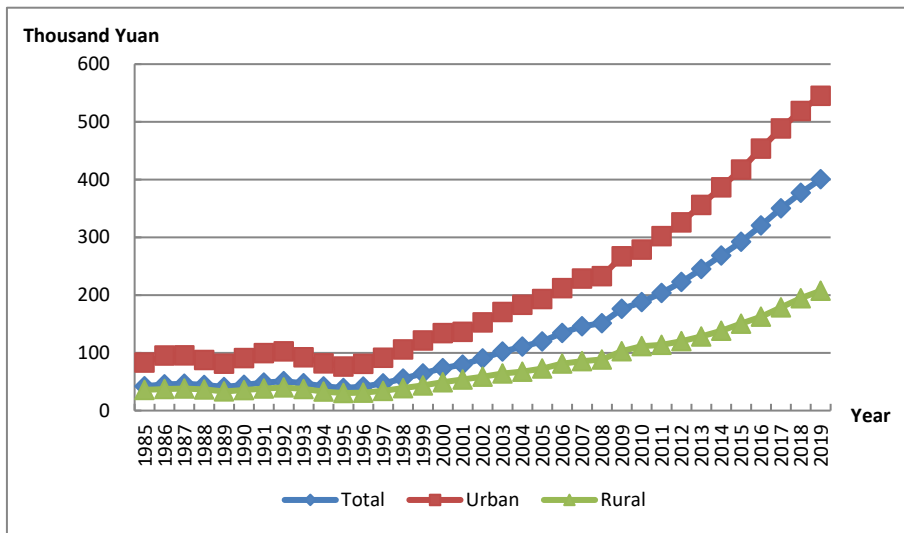
Figure GX-2.2 Real Human Capital Per Capita by Region for Guangxi 1985-2019

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 2019, the nominal labor force human capital increased from 0.6 trillion Yuan to 28.9 trillion Yuan, an increase of more than 48 times; and the real labor force human capital increased from 0.6 trillion Yuan to 5.3 trillion Yuan, an increase of approximately 8 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)
1985	582	582
1986	668	629
1987	769	677
1988	871	639
1989	1000	601
1990	1172	686
1991	1305	742
1992	1441	774
1993	1614	720
1994	1837	650
1995	2099	626
1996	2407	673
1997	2693	747
1998	3063	877
1999	3480	1019

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	3999	1174
2001	4453	1302
2002	4832	1425
2003	5197	1516
2004	5687	1587
2005	6245	1703
2006	7244	1949
2007	8247	2090
2008	9273	2176
2009	10396	2496
2010	11615	2705
2011	13102	2881
2012	14602	3111
2013	16226	3380
2014	17744	3620
2015	19155	3850
2016	21457	4243
2017	23917	4653
2018	26374	5014
2019	28906	5300

27.3.2 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. Tables GX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 29.3 thousand Yuan to 1.1 million Yuan, an increase of more than 35 times; and the real average labor force human capital increased from 29.3 thousand Yuan to 0.2 thousand Yuan, an increase of approximately 6 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	29.34	55.74	24.86	29.34	55.74	24.86
1986	32.79	62.71	27.55	30.88	59.05	25.94
1987	35.59	68.53	29.61	31.30	58.55	26.36
1988	40.85	76.63	34.02	29.99	53.11	25.57
1989	45.64	83.49	38.15	27.40	48.33	23.26
1990	51.38	91.52	43.22	30.08	53.90	25.24
1991	56.91	101.73	47.15	32.38	58.34	26.73
1992	62.44	109.62	51.78	33.55	58.75	27.85
1993	69.16	119.92	57.18	30.84	52.13	25.82
1994	77.03	131.38	63.75	27.23	45.54	22.76
1995	86.05	145.17	70.94	25.69	42.64	21.35
1996	97.67	164.51	78.18	27.31	45.81	21.91
1997	109.01	179.67	86.51	30.24	49.68	24.05
1998	122.65	198.12	95.87	35.10	56.42	27.54
1999	137.43	216.81	106.27	40.23	63.52	31.09
2000	155.03	238.85	118.58	45.50	69.98	34.86
2001	170.12	258.82	129.25	49.73	74.85	38.15
2002	183.79	276.78	138.98	54.20	80.94	41.31
2003	198.23	291.46	151.50	57.82	84.47	44.45
2004	217.43	318.52	162.49	60.67	88.68	45.45
2005	238.22	345.06	176.37	64.95	93.27	48.56
2006	274.86	398.04	198.67	73.95	105.88	54.20
2007	312.64	449.72	223.07	79.23	113.28	56.99
2008	351.85	499.35	250.77	82.57	116.90	59.04

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	395.33	551.63	283.69	94.93	131.91	68.51
2010	441.15	604.46	320.70	102.73	140.47	74.90
2011	494.10	683.30	341.93	108.63	150.23	75.18
2012	549.49	759.24	368.47	117.06	161.75	78.50
2013	608.92	836.95	399.44	126.82	174.65	82.88
2014	663.81	900.99	437.63	135.41	183.97	89.11
2015	715.80	951.94	485.79	143.86	191.50	97.46
2016	795.52	1062.51	526.59	157.32	210.38	103.88
2017	887.45	1185.55	577.23	172.67	230.36	112.63
2018	984.37	1312.30	632.76	187.14	249.01	120.80
2019	1083.04	1438.06	692.24	198.58	263.65	126.95

Chapter 28   Human Capital for Hainan

28.1 Total human capital

Table HaN-1.1 presents the estimates of nominal and real total human capital and real physical capital for Hainan. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Hainan.

Table HaN-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Hainan

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	258	258	6
1986	298	284	8
1987	333	290	9
1988	384	262	10
1989	449	241	12
1990	525	271	14
1991	605	302	17
1992	698	328	21
1993	797	312	25
1994	905	279	30
1995	1000	271	35
1996	1157	301	38
1997	1336	345	41
1998	1596	424	43
1999	1837	496	47
2000	2164	578	50

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	2248	609	53
2002	2600	709	57
2003	3071	839	62
2004	3474	913	67
2005	3844	996	74
2006	4565	1167	82
2007	5151	1255	92
2008	5865	1341	104
2009	6572	1512	118
2010	7314	1607	138
2011	8229	1712	160
2012	9355	1891	191
2013	10640	2096	227
2014	12024	2318	266
2015	13266	2529	297
2016	14916	2768	331
2017	16365	2949	366
2018	17692	3113	—
2019	19036	3244	—

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 2019, the nominal human capital per capita increased from 46.2 thousand Yuan to 2.3 million Yuan, an increase of more

than 49 times; and the real human capital per capita increased from 46.2 thousand Yuan to 0.4 million Yuan, an increase of approximately 8 times.

Figure HaN-2.1 illustrates the trends of human capital per capita by gender for Hainan. The growth pattern of real human capital per capita of male is similar to that of female for Hainan. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
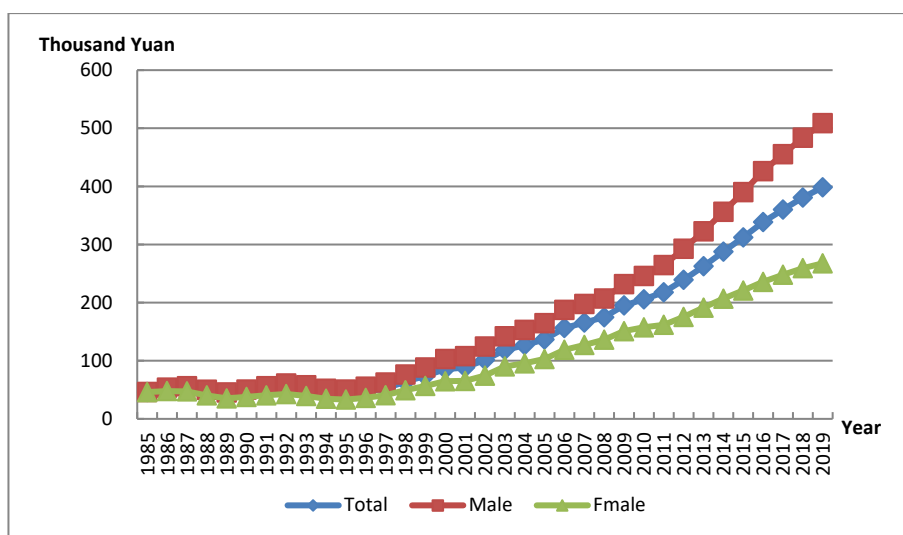
Figure HaN-2.1 Human Capital Per Capita by Gender for Hainan，1985-2019

Table HaN-2.1 Nominal and Real Human Capital Per Capita by Region for Hainan

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1985	46.22	92.90	36.81	46.22	92.90	36.81
1986	53.39	112.17	40.50	51.03	108.19	38.51
1987	59.74	124.16	44.48	52.02	109.03	38.51
1988	66.94	133.41	49.67	45.70	90.63	34.03

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1989	75.90	148.11	55.45	40.79	79.64	29.79
1990	86.51	166.23	61.84	44.68	89.75	30.74
1991	98.41	186.21	68.61	49.07	96.66	32.92
1992	111.99	208.38	76.17	52.65	99.24	35.33
1993	126.46	229.40	84.68	49.48	88.32	33.73
1994	142.05	251.64	93.95	43.81	77.15	29.19
1995	156.28	268.52	102.85	42.41	74.84	26.98
1996	178.36	308.79	113.24	46.45	82.11	28.65
1997	203.63	353.02	124.67	52.55	92.48	31.45
1998	240.54	424.76	137.02	63.92	114.00	35.78
1999	273.61	480.08	150.47	73.86	130.00	40.38
2000	320.09	556.89	167.98	85.50	148.58	44.98
2001	326.26	532.30	181.40	88.36	143.76	49.41
2002	372.10	603.09	194.31	101.40	164.51	52.82
2003	433.26	695.29	212.60	118.32	190.80	57.28
2004	482.97	763.42	231.42	126.87	202.99	58.59
2005	526.94	817.97	251.86	136.57	214.71	62.70
2006	611.37	942.73	280.39	156.32	244.51	68.24
2007	679.67	1032.03	310.64	165.63	255.88	71.12
2008	764.85	1149.85	343.39	174.91	268.69	72.26
2009	847.98	1260.10	381.43	195.15	295.91	81.07
2010	936.42	1381.11	421.76	205.77	310.35	84.72
2011	1046.84	1516.83	443.94	217.79	323.07	82.73
2012	1183.56	1690.95	473.74	239.18	349.01	85.54
2013	1333.08	1883.69	508.18	262.56	378.18	89.35
2014	1492.41	2095.63	553.62	287.67	411.67	94.68
2015	1637.80	2290.77	608.59	312.27	444.68	103.56
2016	1824.22	2536.83	655.41	338.52	478.58	108.81

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2017	1998.22	2753.89	710.53	360.04	503.40	115.77
2018	2163.85	2957.52	768.05	380.80	527.92	122.08
2019	2337.49	3170.08	829.01	398.38	548.33	126.71

Figure HaN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2018, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
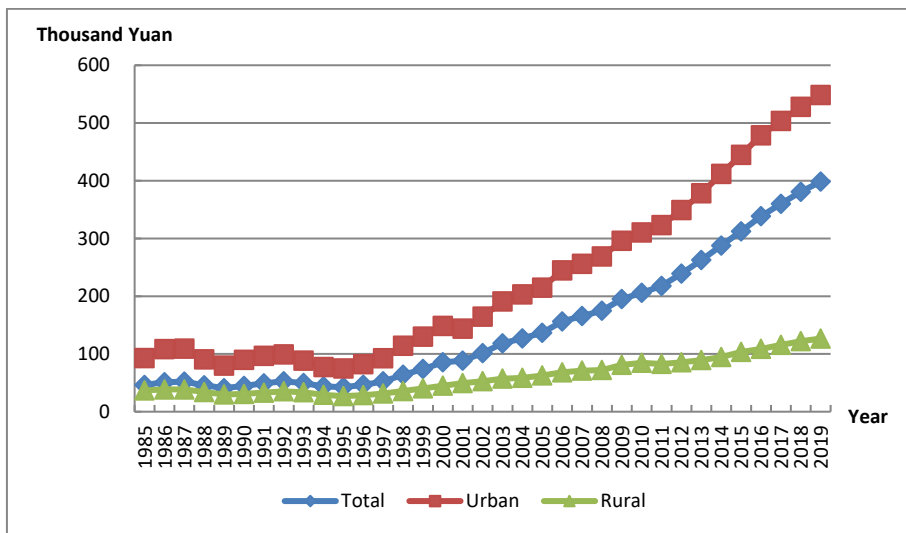
Figure HaN-2.2 Real Human Capital Per Capita by Region for Hainan，1985-2019

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 2019, the nominal labor force human capital increased from 0.1 trillion Yuan to 7.1 trillion Yuan, an increase of more than 70 times; and the real labor force human capital increased from 0.1 trillion Yuan to 1.2 trillion Yuan, an increase of approximately 11 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)
1985	99	99
1986	115	110
1987	134	117
1988	155	106
1989	182	98
1990	217	112
1991	249	124
1992	285	134
1993	325	127
1994	374	115
1995	430	117
1996	486	126
1997	555	143
1998	637	169
1999	728	197

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	833	223
2001	920	249
2002	1022	278
2003	1133	309
2004	1266	331
2005	1413	365
2006	1611	410
2007	1831	443
2008	2077	471
2009	2358	537
2010	2672	581
2011	3042	625
2012	3462	690
2013	3888	755
2014	4342	825
2015	4779	898
2016	5361	982
2017	5961	1062
2018	6539	1139
2019	7121	1201

28.3.2 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. Tables HaN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 33.2 thousand Yuan to 1.3 million Yuan, an increase of more than 37 times; and the real average labor force human capital increased from 33.2 thousand

Yuan to 214.8 thousand Yuan, an increase of approximately 5 times.

Table HaN-3.2 Nominal and Real Average Labor Force Human Capital by Region for Hainan

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	33.24	57.67	27.80	33.24	57.67	27.80
1986	37.35	65.02	30.74	35.68	62.72	29.23
1987	41.98	72.92	34.00	36.53	64.04	29.44
1988	47.24	79.48	37.94	32.26	53.99	25.99
1989	53.62	88.04	42.48	28.82	47.34	22.82
1990	61.23	98.25	47.88	31.55	53.05	23.79
1991	68.87	108.93	52.92	34.27	56.55	25.39
1992	77.41	120.71	58.32	36.37	57.49	27.05
1993	86.98	133.42	64.43	34.06	51.37	25.66
1994	97.69	147.08	71.61	30.14	45.09	22.25
1995	109.80	162.58	79.24	29.78	45.31	20.79
1996	122.14	179.79	86.85	31.78	47.81	21.97
1997	136.98	200.59	95.59	35.32	52.55	24.11
1998	153.33	222.50	105.54	40.70	59.71	27.56
1999	170.41	244.47	116.61	45.98	66.20	31.29
2000	189.77	269.11	128.65	50.70	71.80	34.45
2001	205.64	290.42	139.15	55.72	78.43	37.90
2002	224.01	316.94	148.83	61.03	86.46	40.46
2003	244.11	342.92	161.18	66.55	94.10	43.42
2004	268.41	376.40	172.09	70.21	100.09	43.57
2005	294.30	410.59	185.46	75.96	107.78	46.17
2006	330.39	458.39	206.36	84.01	118.89	50.22
2007	369.47	509.60	229.36	89.43	126.35	52.51

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
2008	411.78	563.96	256.09	93.28	131.78	53.89
2009	459.06	623.87	287.70	104.66	146.51	61.15
2010	510.13	688.54	322.52	110.89	154.72	64.79
2011	573.39	777.15	347.13	117.74	165.53	64.69
2012	643.52	871.99	377.83	128.31	179.98	68.23
2013	714.03	963.95	413.02	138.68	193.53	72.62
2014	788.06	1058.72	452.33	149.68	207.98	77.36
2015	859.14	1145.16	500.40	161.46	222.30	85.15
2016	952.28	1271.91	538.30	174.34	239.95	89.37
2017	1057.25	1412.61	579.62	188.35	258.22	94.44
2018	1163.21	1553.74	618.22	202.59	277.34	98.27
2019	1273.21	1698.20	658.32	214.81	293.74	100.62

Chapter 29   Human Capital for Chongqing

29.1 Total human capital

Table CQ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Chongqing. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Chongqing.

Table CQ-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Chongqing

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	887	887	37
1986	1030	988	39
1987	1161	1014	44
1988	1344	957	48
1989	1559	949	47
1990	1850	1110	47
1991	2172	1218	50
1992	2519	1270	54
1993	2898	1231	60
1994	3382	1108	69
1995	3844	1054	78
1996	4408	1102	87
1997	5079	1229	98
1998	5498	1381	115
1999	6370	1611	132
2000	7600	1987	149

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	8020	2062	171
2002	8814	2275	198
2003	10218	2622	234
2004	11971	2962	278
2005	12393	3042	330
2006	13629	3267	387
2007	16027	3670	451
2008	18459	4002	520
2009	21095	4649	603
2010	23958	5116	700
2011	27407	5558	817
2012	31295	6185	941
2013	34987	6733	1071
2014	38850	7344	1216
2015	42926	8010	1374
2016	46993	8614	1555
2017	51165	9286	1738
2018	55651	9902	—
2019	60362	10459	—

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 2019, the nominal human capital per capita increased from 37.0 thousand Yuan to 2.7 million Yuan, an increase

of more than 71 times; and the real human capital per capita increased from 37.0 thousand Yuan to 0.5 million Yuan, an increase of approximately 11 times.

Figure CQ-2.1 illustrates the trends of human capital per capita by gender for Chongqing. The growth pattern of real human capital per capita of male is similar to that of female for Chongqing. Both of them kept increasing from 1985 to 2019, and the growth 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 since 1997.
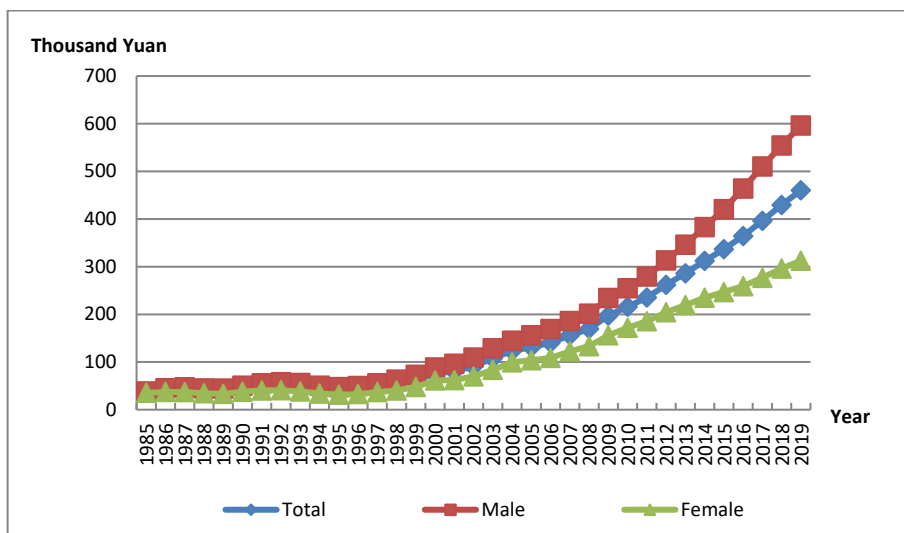
Figure CQ-2.1 Human Capital Per Capita by Gender for Chongqing，1985-2019

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	36.98	77.26	27.09	36.98	77.26	27.09
1986	43.03	92.06	30.29	41.29	88.35	29.07

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1987	48.48	102.35	33.76	42.37	89.46	29.51
1988	56.10	115.50	37.97	39.96	82.28	27.04
1989	64.32	127.50	43.33	39.13	77.56	26.36
1990	74.22	145.19	49.46	44.53	87.10	29.67
1991	86.37	166.34	55.30	48.43	93.26	31.00
1992	99.13	187.31	61.27	49.98	94.44	30.89
1993	112.73	205.62	68.80	47.88	87.34	29.23
1994	130.21	232.88	77.92	42.64	76.27	25.52
1995	145.54	256.76	86.05	39.92	70.43	23.60
1996	166.79	294.80	94.05	41.70	73.71	23.52
1997	192.90	342.18	103.78	46.69	82.82	25.12
1998	208.70	356.64	116.77	52.40	89.55	29.32
1999	242.22	418.97	130.24	61.25	105.94	32.93
2000	290.37	515.49	146.51	75.93	134.79	38.31
2001	312.62	524.13	158.30	80.38	134.76	40.70
2002	352.23	570.96	170.97	90.93	147.39	44.13
2003	418.83	663.02	191.50	107.47	170.14	49.14
2004	498.16	782.96	218.56	123.27	193.75	54.08
2005	533.75	811.96	247.75	131.03	199.33	60.82
2006	585.35	866.21	281.59	140.33	207.66	67.51
2007	680.83	988.97	318.99	155.89	226.45	73.04
2008	780.96	1112.39	358.12	169.34	241.20	77.65
2009	895.58	1259.40	405.31	197.35	277.51	89.31
2010	1010.74	1398.03	451.13	215.82	298.51	96.33
2011	1159.68	1577.02	475.75	235.15	319.78	96.47
2012	1324.21	1773.66	507.18	261.71	350.54	100.24
2013	1486.36	1962.52	542.23	286.04	377.67	104.35
2014	1650.55	2153.82	583.34	312.02	407.15	110.27

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	1803.27	2330.77	636.64	336.51	434.95	118.81
2016	1987.50	2554.92	673.02	364.33	468.35	123.37
2017	2183.13	2789.82	719.26	396.23	506.35	130.54
2018	2413.14	3063.89	770.17	429.39	545.19	137.04
2019	2655.88	3353.21	815.04	460.16	580.98	141.22

Figure CQ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
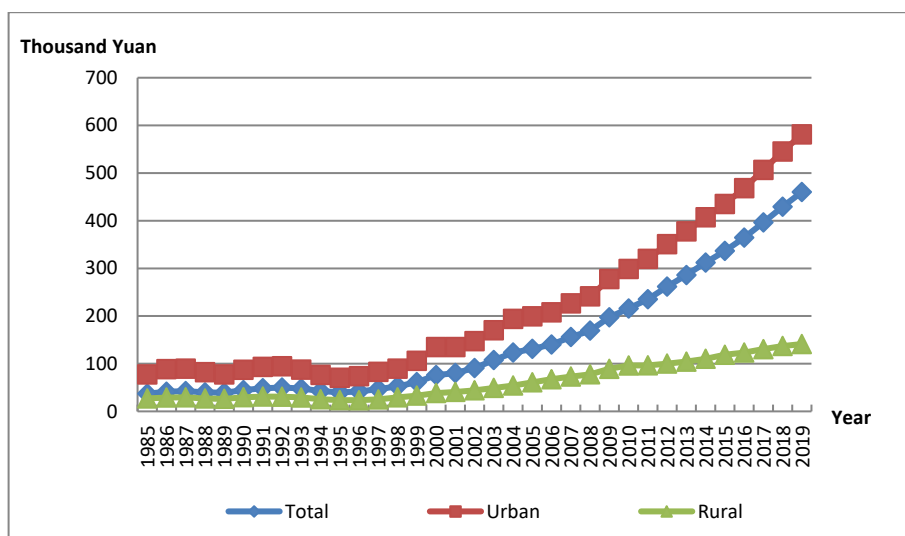
Figure CQ-2.2 Real Human Capital Per Capita by Region for Chongqing，1985-2019

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 2019, the nominal labor force human capital increased from 0.4 trillion Yuan to 31.1 trillion Yuan, an increase of more than 71 times; and the real labor force human capital increased from 0.4 trillion Yuan to 5.4 trillion Yuan, an increase of approximately 12 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)
1985	429	429
1986	506	485
1987	599	523
1988	697	496
1989	823	501
1990	986	592
1991	1117	626
1992	1270	640
1993	1437	611
1994	1616	529
1995	1816	498
1996	2047	512
1997	2326	563
1998	2631	661
1999	2949	746

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	3321	868
2001	3676	945
2002	4102	1059
2003	4548	1167
2004	4950	1225
2005	5339	1311
2006	6401	1535
2007	7652	1752
2008	8971	1945
2009	10356	2282
2010	11970	2556
2011	13743	2787
2012	15550	3073
2013	17319	3333
2014	19094	3610
2015	20811	3884
2016	23073	4230
2017	25524	4633
2018	28104	5001
2019	31133	5394

29.3.2 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. Tables CQ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 27.7 thousand Yuan to 1.9 million Yuan, an increase of more than 68 times; and

the real average labor force human capital increased from 27.7 thousand Yuan to 0.3 million Yuan, an increase of approximately 11 times.

Table CQ-3.2 Nominal and Real Average Labor Force Human Capital by Region for Chongqing

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	27.71	53.93	20.42	27.71	53.93	20.42
1986	28.98	52.46	23.23	27.81	50.35	22.30
1987	31.71	61.30	23.19	30.43	58.82	22.25
1988	36.28	69.40	26.34	31.71	60.66	23.02
1989	41.63	77.09	29.90	29.66	54.91	21.30
1990	47.75	85.34	34.31	29.05	51.91	20.87
1991	54.88	94.41	39.86	32.93	56.64	23.91
1992	61.72	104.21	44.08	34.61	58.43	24.71
1993	78.28	127.21	54.20	33.25	54.03	23.02
1994	87.60	139.82	59.92	28.69	45.79	19.63
1995	98.03	153.95	65.99	26.89	42.23	18.10
1996	110.33	173.99	72.48	27.59	43.50	18.12
1997	125.11	197.61	79.99	30.28	47.83	19.36
1998	141.08	221.98	88.69	35.42	55.74	22.27
1999	157.77	247.29	98.11	39.89	62.53	24.81
2000	177.49	278.18	108.51	46.41	72.74	28.37
2001	202.36	310.34	116.18	52.03	79.79	29.87
2002	233.58	348.85	123.41	60.30	90.05	31.86
2003	268.90	386.76	132.58	69.00	99.25	34.02
2004	306.35	424.32	142.56	75.81	105.00	35.28
2005	344.55	460.01	154.85	84.58	112.93	38.01
2006	410.82	540.35	175.89	98.49	129.54	42.17
2007	485.47	626.74	204.30	111.16	143.51	46.78

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
2008	567.22	717.19	232.39	122.99	155.51	50.39
2009	656.26	814.73	262.89	144.61	179.53	57.93
2010	753.42	920.36	296.79	160.87	196.52	63.37
2011	852.06	1025.96	320.49	172.78	208.04	64.99
2012	956.77	1134.50	348.53	189.09	224.22	68.88
2013	1060.50	1240.83	379.12	204.08	238.79	72.96
2014	1160.06	1343.24	414.56	219.30	253.92	78.37
2015	1255.23	1440.33	457.75	234.24	268.78	85.42
2016	1387.65	1593.74	490.20	254.37	292.15	89.86
2017	1539.88	1766.27	528.38	279.48	320.57	95.90
2018	1716.08	1962.70	571.74	305.36	349.24	101.74
2019	1914.37	2181.31	614.21	331.69	377.94	106.42

Chapter 30   Human Capital for Sichuan

30.1 Total human capital

Table SC-1.1 presents the estimates of nominal and real total human capital and real physical capital for Sichuan. Column 1 contains nominal human capital estimates based on six-education categories. Column 2 presents real human capital estimates based on six-education categories. Column 3 reports the real physical capital of Sichuan.

Table SC-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Sichuan

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	2434	2434	60
1986	2809	2682	67
1987	3161	2820	73
1988	3565	2650	79
1989	4097	2532	83
1990	4781	2848	88
1991	5474	3165	94
1992	6257	3386	100
1993	7110	3288	106
1994	8064	2980	116
1995	9089	2823	129
1996	10345	2930	145
1997	11856	3189	162
1998	13248	3573	185
1999	15184	4145	207

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	17255	4697	233
2001	19201	5102	261
2002	21081	5606	293
2003	23112	6050	330
2004	25305	6309	375
2005	27426	6719	428
2006	32243	7692	495
2007	38001	8527	577
2008	43590	9296	669
2009	49066	10376	778
2010	55198	11296	901
2011	63879	12369	1036
2012	72810	13705	1183
2013	80967	14799	1337
2014	89680	16112	1491
2015	98058	17359	1650
2016	108837	18873	1826
2017	119550	20397	1999
2018	130460	21863	—
2019	142071	23032	—

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 2019, the nominal human capital per capita increased from 35.1 thousand Yuan to 2.2 million yuan, an increase of

approximately 63 times; and the real human capital per capita increased from 35.1 thousand Yuan to 0.3 million Yuan, an increase of approximately 9 times.

Figure SC-2.1 illustrates the trends of human capital per capita by gender for Sichuan. The growth pattern of real human capital per capita of males is similar to that of females for Sichuan. Both of them kept increasing from 1985 to 2019, and the growth of human capital for males and females has both accelerated, with males' growth rate significantly higher than females'. As a result, the gender gap has expanded, especially since 1997.
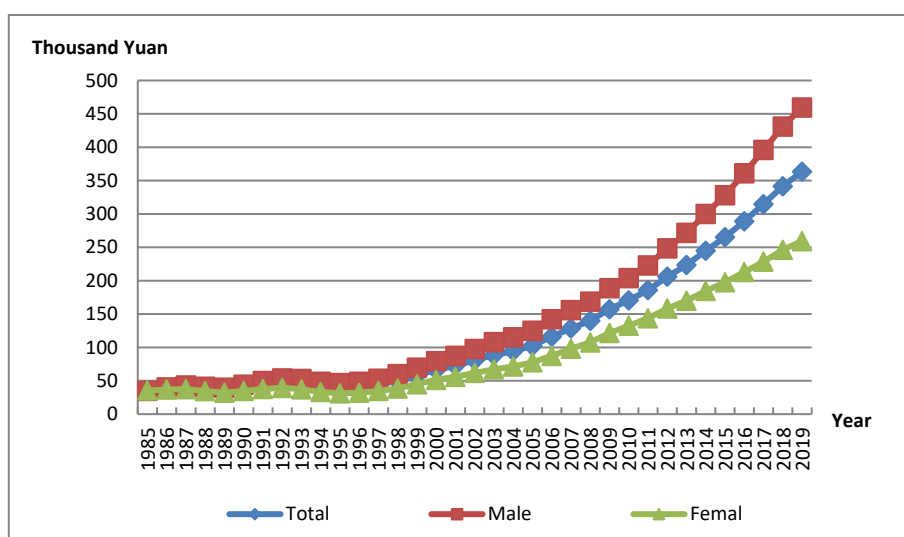
Figure SC-2.1 Human Capital Per Capita by Gender for Sichuan，1985-2019

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	35.09	71.88	28.83	35.09	71.88	28.83
1986	40.41	86.67	32.21	38.58	82.70	30.77
1987	45.33	95.98	35.99	40.43	83.18	32.55

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	51.25	104.97	40.35	38.09	74.02	30.80
1989	58.49	117.23	45.46	36.15	70.18	28.61
1990	67.02	132.61	51.42	39.92	78.21	30.81
1991	76.42	149.77	57.31	44.19	84.69	33.64
1992	87.03	169.66	63.40	47.10	87.37	35.58
1993	98.76	187.87	70.59	45.67	82.76	33.94
1994	112.11	208.75	78.68	41.43	71.90	30.88
1995	126.53	232.08	87.04	39.31	67.18	28.88
1996	144.09	266.19	96.74	40.81	70.17	29.42
1997	165.34	308.62	108.07	44.47	77.41	31.30
1998	185.01	342.71	120.40	49.89	86.13	35.05
1999	212.74	403.22	133.50	58.07	103.30	39.25
2000	243.54	464.35	149.57	66.29	119.32	43.72
2001	273.09	512.45	164.32	72.57	129.35	46.77
2002	303.73	560.67	178.62	80.76	142.24	50.83
2003	338.26	607.49	198.79	88.55	151.24	56.07
2004	378.01	666.26	219.90	94.24	158.58	58.96
2005	417.30	719.10	242.17	102.24	168.29	63.91
2006	486.61	815.91	273.40	116.10	186.47	70.53
2007	572.42	940.41	306.97	128.45	202.95	74.70
2008	655.77	1049.91	344.20	139.85	216.41	79.32
2009	743.18	1166.92	389.56	157.16	238.93	88.92
2010	833.36	1280.65	437.74	170.54	253.74	96.95
2011	959.37	1459.23	467.17	185.76	275.10	97.79
2012	1094.08	1643.46	503.70	205.94	301.39	103.37
2013	1222.64	1813.98	542.91	223.47	323.60	108.38
2014	1363.01	2007.11	588.40	244.87	352.07	115.96

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	1498.29	2189.75	644.26	265.23	378.80	124.97
2016	1667.17	2423.56	689.59	289.10	411.03	131.52
2017	1844.26	2660.88	743.27	314.66	443.73	140.64
2018	2038.23	2915.28	802.94	341.58	478.03	149.39
2019	2241.60	3182.94	860.52	363.40	505.25	155.29

Figure SC-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
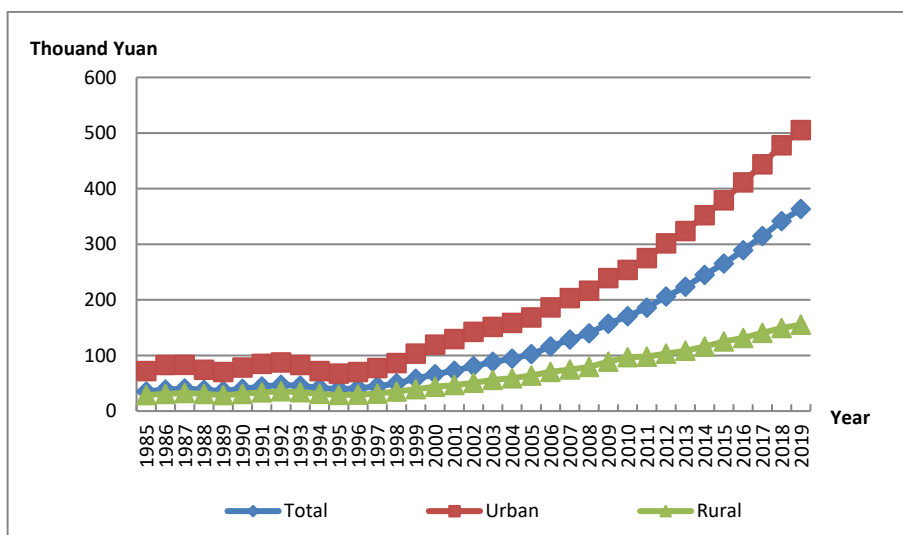

Figure SC-2.2 Real Human Capital Per Capita by Region for Sichuan，1985-2019

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 over 16 years of age, 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 2019, the nominal labor force human capital increased from 1.1 trillion Yuan to 76.8 trillion Yuan, an increase of more than 68 times; and the real labor force human capital increased from 1.1 trillion Yuan to 12.5 trillion Yuan, an increase of approximately 10 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)
1985	1099	1099
1986	1290	1232
1987	1528	1362
1988	1790	1329
1989	2123	1312
1990	2545	1516
1991	2875	1663
1992	3264	1770
1993	3684	1708
1994	4126	1531
1995	4586	1431
1996	5157	1468
1997	5835	1577
1998	6555	1776
1999	7307	2006

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	8189	2241
2001	8961	2391
2002	9874	2631
2003	10868	2845
2004	11908	2964
2005	13076	3193
2006	15930	3789
2007	18909	4238
2008	22064	4703
2009	25138	5315
2010	29201	5973
2011	33535	6496
2012	37899	7142
2013	42241	7732
2014	46632	8395
2015	50942	9038
2016	56828	9879
2017	63002	10779
2018	69436	11669
2019	76755	12478

30.3.2 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. Tables SC-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 26.2 thousand Yuan to 1.7 million Yuan, an increase of more than 62 times; and

the real average labor force human capital increased from 26.2 thousand Yuan to 0.3 million Yuan, an increase of approximately 9 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	26.17	51.09	20.76	26.17	51.09	20.76
1986	29.86	58.18	23.46	28.51	55.51	22.40
1987	34.18	66.27	26.58	30.46	57.43	24.04
1988	39.05	73.61	30.17	28.99	51.91	23.03
1989	44.69	81.80	34.46	27.62	48.97	21.68
1990	51.24	90.91	39.63	30.52	53.62	23.75
1991	57.35	100.22	43.84	33.18	56.67	25.73
1992	64.40	110.76	48.64	34.91	57.04	27.29
1993	72.35	122.71	53.76	33.54	54.06	25.85
1994	80.77	135.05	59.21	29.97	46.52	23.24
1995	89.91	148.55	64.66	28.06	43.00	21.45
1996	101.37	168.75	71.30	28.85	44.49	21.69
1997	114.91	192.61	78.96	31.06	48.31	22.87
1998	129.23	216.42	87.65	35.01	54.39	25.52
1999	144.41	241.40	97.08	39.65	61.84	28.55
2000	162.70	272.52	107.30	44.53	70.03	31.36
2001	181.33	302.96	114.72	48.38	76.47	32.65
2002	204.31	340.51	121.75	54.45	86.38	34.65
2003	230.44	378.16	130.77	60.33	94.15	36.89
2004	260.08	420.56	140.05	64.74	100.10	37.55
2005	293.03	464.96	150.89	71.55	108.81	39.82
2006	353.20	545.25	174.87	84.02	124.61	45.11
2007	417.24	626.01	201.94	93.51	135.10	49.14

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2008	484.76	707.23	231.33	103.32	145.78	53.31
2009	554.54	789.70	265.86	117.25	161.70	60.69
2010	636.29	883.95	303.70	130.16	175.14	67.26
2011	724.45	995.25	325.91	140.34	187.63	68.22
2012	817.26	1107.77	353.20	154.01	203.15	72.48
2013	910.44	1219.34	383.62	166.66	217.52	76.58
2014	1004.19	1333.47	418.78	180.77	233.90	82.53
2015	1094.35	1438.76	461.04	194.16	248.89	89.43
2016	1212.32	1597.02	495.95	210.75	270.85	94.59
2017	1343.27	1769.40	537.13	229.81	295.07	101.63
2018	1493.86	1960.54	583.63	251.04	321.48	108.58
2019	1659.22	2167.84	630.25	269.74	344.11	113.73

Chapter 31   Human Capital for Guizhou

31.1 Total human capital

Table GZ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Guizhou. Column 1 contains nominal human capital based on six-education categories. Column 2 presents real human capital based on six-education categories. Column 3 reports the real physical capital of Guizhou.

Table GZ-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Guizhou

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	986	986	23
1986	1135	1077	25
1987	1247	1102	27
1988	1387	1030	29
1989	1563	979	30
1990	1787	1096	32
1991	2061	1207	34
1992	2338	1270	35
1993	2681	1253	37
1994	3068	1167	39
1995	3441	1073	42
1996	3941	1124	45
1997	4507	1242	49
1998	5046	1389	55
1999	5687	1576	62

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	6496	1807	70
2001	7553	2060	80
2002	8197	2257	92
2003	9108	2475	105
2004	10340	2698	120
2005	11513	2971	136
2006	13169	3341	155
2007	14931	3563	178
2008	16894	3752	204
2009	19293	4343	234
2010	21428	4685	274
2011	25343	5273	316
2012	29298	5938	371
2013	33475	6623	433
2014	38110	7366	498
2015	42476	8057	571
2016	47929	8967	662
2017	53796	9966	755
2018	59793	10849	—
2019	66204	11745	—

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 2019, the nominal human capital per

capita increased from 34.2 thousand Yuan to 2.1 million Yuan, an increase of more than 60 times; and the real human capital per capita increased from 34.2 thousand Yuan to 0.4 million Yuan, an increase of approximately 10 times.

Figure GZ-2.1 illustrates the trends of human capital per capita by gender for Guizhou. The growth pattern of real human capital per capita of males is similar to that of females for Guizhou. Both of them kept increasing from 1985 to 2019, and the growth of human capital for males and females both accelerated, with males' growth rate significantly higher than females'. As a result, the gender gap has expanded, especially from 1997 onward.
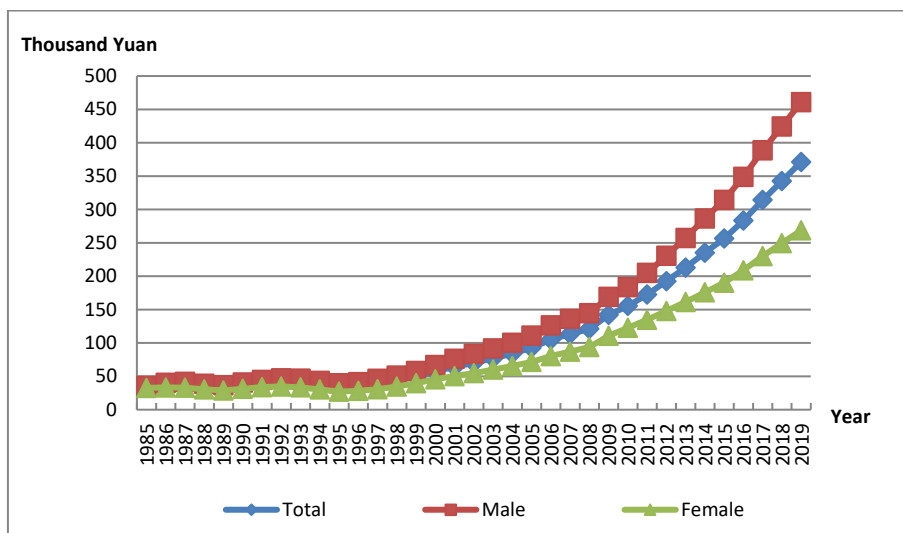

Figure GZ-2.1 Human Capital Per Capita by Gender for Guizhou，1985-2019

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	34.21	78.17	24.91	34.21	78.17	24.91
1986	38.97	94.87	27.21	36.99	89.16	26.01

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	42.66	103.97	29.68	37.69	89.08	26.82
1988	47.07	113.81	32.75	34.97	80.25	25.25
1989	52.74	128.31	36.10	33.05	76.74	23.43
1990	59.21	144.15	39.89	36.32	85.28	25.19
1991	67.75	167.00	43.84	39.68	95.09	26.33
1992	76.28	185.28	48.23	41.42	97.05	27.10
1993	86.52	208.39	53.20	40.44	94.26	25.72
1994	97.76	233.71	58.66	37.18	86.65	22.95
1995	108.15	251.41	64.50	33.73	78.00	20.24
1996	123.31	294.11	71.03	35.16	82.50	20.67
1997	141.31	346.55	78.20	38.95	94.02	22.01
1998	158.05	390.16	86.25	43.50	105.32	24.38
1999	178.61	445.91	94.99	49.51	121.71	26.92
2000	205.09	515.57	105.08	57.05	141.86	29.72
2001	235.62	588.17	115.41	64.27	158.05	32.29
2002	254.89	614.48	125.91	70.19	166.95	35.48
2003	283.25	656.40	140.06	76.98	176.75	38.69
2004	322.19	728.65	154.33	84.06	189.57	40.49
2005	359.00	784.92	169.24	92.65	202.99	43.49
2006	413.74	869.57	190.94	104.98	221.34	48.10
2007	475.33	963.58	215.17	113.44	231.61	50.47
2008	545.04	1066.68	242.58	121.05	239.61	52.30
2009	631.00	1201.90	276.55	142.04	273.82	60.22
2010	711.22	1314.63	313.81	155.51	290.50	66.61
2011	829.41	1489.81	346.25	172.59	312.64	70.13
2012	949.93	1651.84	384.85	192.54	337.53	75.82
2013	1076.16	1813.52	427.64	212.91	361.53	82.19

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2014	1217.03	2000.93	477.80	235.21	389.54	89.68
2015	1352.27	2175.42	537.12	256.50	415.21	99.33
2016	1514.20	2386.39	598.84	283.29	449.16	109.22
2017	1696.53	2614.26	671.27	314.30	486.70	121.70
2018	1888.36	2845.87	753.59	342.63	516.93	136.06
2019	2092.27	3090.43	845.97	371.20	549.26	148.87

Figure GZ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remained larger than that in the rural areas. Since 1997, the growth has accelerated for both rural and urban human capital, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural human capital expanded rapidly.
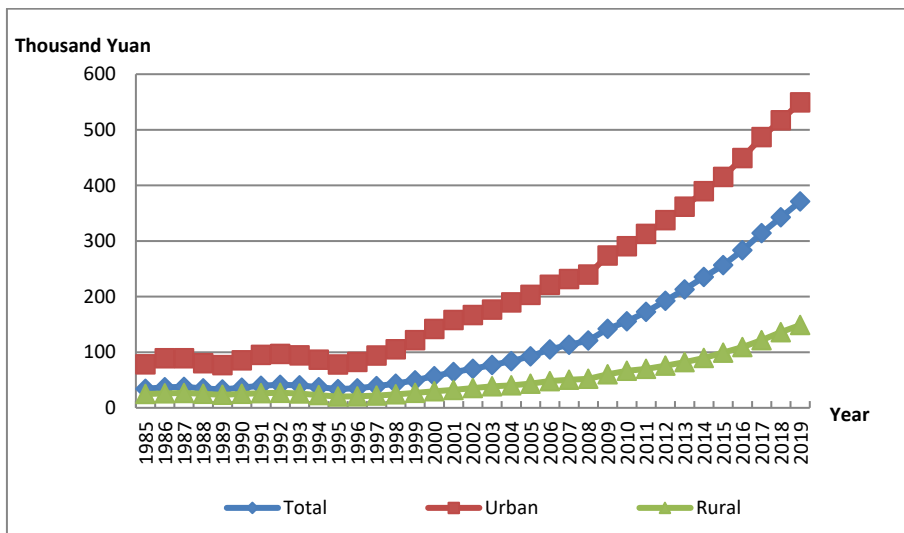

Figure GZ-2.2 Real Human Capital Per Capita by Region for Guizhou，1985-2019

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 over 16 years of age, 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 2019, the nominal labor force human capital increased from 0.4 trillion Yuan to 24 trillion Yuan, an increase of more than 66 times; and the real labor force human capital increased from 0.4 trillion Yuan to 4.3 trillion Yuan, an increase of approximately 11 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)
1985	361	361
1986	414	393
1987	480	425
1988	546	406
1989	633	397
1990	749	460
1991	846	497
1992	958	522
1993	1091	511
1994	1251	477
1995	1429	446
1996	1573	449
1997	1712	473
1998	1883	520

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	2073	577
2000	2297	641
2001	2530	693
2002	2737	756
2003	2934	800
2004	3199	836
2005	3548	915
2006	4147	1051
2007	4752	1131
2008	5353	1184
2009	6008	1346
2010	6701	1459
2011	7922	1643
2012	9150	1848
2013	10429	2056
2014	11743	2261
2015	13133	2481
2016	15438	2878
2017	18043	3332
2018	20855	3781
2019	24010	4255

31.3.2 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. Tables GZ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 23.9 thousand Yuan to 1.1 million Yuan, an increase of more than 47 times; and

the real average labor force human capital increased from 23.9 thousand Yuan to 0.2 million Yuan, an increase of approximately 7 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	23.92	49.09	17.79	23.92	49.09	17.79
1986	26.56	55.36	19.59	25.21	52.03	18.73
1987	29.60	62.72	21.67	26.18	53.73	19.58
1988	32.93	69.27	23.94	24.48	48.85	18.46
1989	36.94	77.14	26.66	23.18	46.13	17.30
1990	41.74	86.20	30.04	25.64	50.99	18.97
1991	46.37	94.85	32.83	27.20	54.01	19.72
1992	51.62	104.55	35.99	28.10	54.76	20.22
1993	57.62	115.45	39.69	27.01	52.22	19.19
1994	64.32	127.20	44.09	24.53	47.16	17.25
1995	71.98	141.13	48.46	22.46	43.79	15.20
1996	79.52	157.44	52.74	22.72	44.17	15.35
1997	87.17	173.00	57.72	24.09	46.94	16.25
1998	96.13	190.84	63.43	26.55	51.52	17.92
1999	105.56	209.01	69.86	29.36	57.05	19.80
2000	116.76	230.74	76.93	32.57	63.49	21.76
2001	128.09	252.01	83.00	35.10	67.72	23.23
2002	139.02	272.60	88.87	38.42	74.06	25.04
2003	149.80	288.68	96.64	40.82	77.73	26.70
2004	163.69	312.16	104.75	42.75	81.21	27.48
2005	180.69	341.91	113.86	46.60	88.42	29.26
2006	212.25	398.17	129.15	53.79	101.35	32.53
2007	246.22	454.70	145.74	58.61	109.29	34.18

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
2008	281.49	507.73	164.17	62.25	114.06	35.39
2009	321.12	563.52	186.20	71.96	128.38	40.55
2010	362.84	618.80	211.28	79.02	136.74	44.84
2011	420.80	707.29	234.29	87.27	148.43	47.45
2012	480.38	790.94	262.19	97.03	161.62	51.65
2013	541.09	869.98	295.02	106.66	173.43	56.70
2014	601.81	943.50	335.62	115.84	183.68	63.00
2015	663.49	1008.71	386.91	125.36	192.53	71.55
2016	762.13	1152.53	437.08	142.05	216.93	79.72
2017	877.71	1316.09	497.18	162.11	245.02	90.14
2018	1004.84	1490.15	564.94	182.20	270.67	102.00
2019	1143.01	1673.67	643.06	202.57	297.46	113.16

Chapter 32   Human Capital for Yunnan

32.1 Total human capital

Table YN-1.1 presents the estimates of nominal and real total human capital and real physical capital for Yunnan. Column 1 contains nominal human capital estimated based on six-education categories. Column 2 contains real human capital estimated based on six-education categories. Column 3 contains the real physical capital of Yunnan.

Table YN-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital Stocks for Yunnan

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
1985	1110	1110	57
1986	1284	1213	59
1987	1469	1299	61
1988	1642	1213	63
1989	1844	1149	66
1990	2103	1277	69
1991	2393	1408	76
1992	2766	1486	84
1993	3205	1422	92
1994	3740	1401	100
1995	4278	1326	109
1996	4913	1403	120
1997	5610	1538	132
1998	6900	1861	148
1999	8062	2188	163

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	8352	2312	177
2001	9525	2669	192
2002	10801	3042	208
2003	12146	3382	230
2004	13442	3531	256
2005	14969	3878	284
2006	17097	4353	317
2007	19354	4658	352
2008	21809	4977	387
2009	24138	5486	451
2010	26837	5881	550
2011	31009	6499	671
2012	34758	7093	811
2013	38415	7599	969
2014	42727	8255	1151
2015	46494	8806	1348
2016	51446	9606	1558
2017	56753	10502	1768
2018	61771	11253	—
2019	66861	11880	—

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 2019, the nominal human capital per capita

increased from 34.8 thousand Yuan to 1.7 million Yuan, an increase of more than 46 times; and the real human capital per capita increased from 34.8 thousand Yuan to 0.3 million Yuan, an increase of approximately 8 times.

Figure YN-2.1 illustrates the trends of human capital per capita by gender for Yunnan. The growth pattern of real human capital per capita of males is similar to that of females for Yunnan. Both of them kept increasing from 1985 to 2019, and the growth of human capital for both males and females accelerated, with males' growth rate significantly higher than females'. As a result, the gender gap has expanded, especially from 1997 onward.
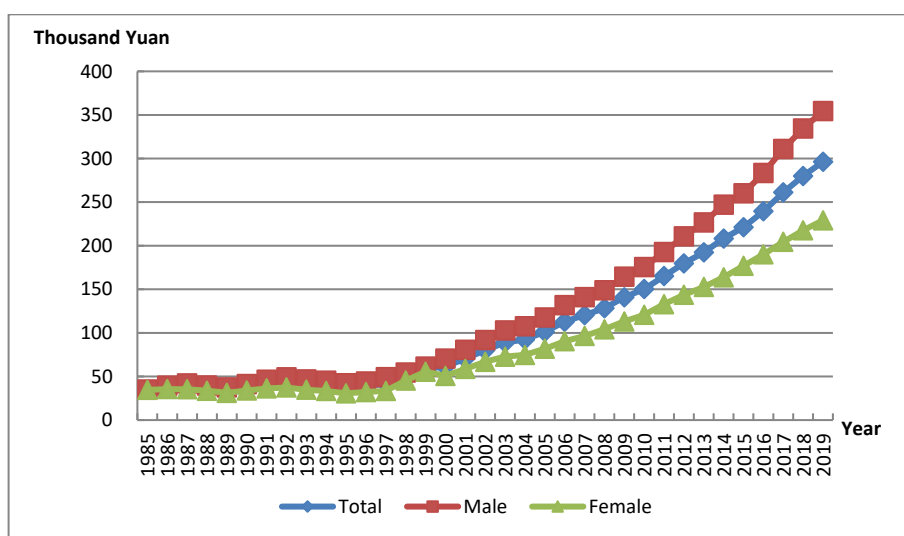

Figure YN-2.1 Real Human Capital Per Capita by Gender for Yunnan，1985-2019

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	34.81	88.28	26.35	34.81	88.28	26.35
1986	39.79	106.33	28.93	37.61	101.46	27.19
1987	43.83	118.61	31.27	38.76	105.38	27.57

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	49.79	133.95	35.09	36.78	98.27	26.04
1989	55.49	148.15	38.80	34.58	92.19	24.20
1990	62.31	167.47	42.96	37.83	102.57	25.91
1991	70.81	187.60	47.19	41.68	110.69	27.71
1992	81.15	213.88	52.00	43.60	114.31	28.07
1993	92.82	242.54	57.50	41.20	109.11	25.17
1994	105.86	276.66	63.80	39.66	106.11	23.30
1995	118.99	306.79	70.31	36.87	97.81	21.08
1996	135.26	347.57	77.22	38.63	102.13	21.27
1997	153.18	391.20	85.07	41.99	109.89	22.56
1998	186.41	496.68	93.75	50.27	136.25	24.59
1999	216.11	575.31	102.97	58.66	159.74	26.82
2000	221.63	545.89	114.14	61.35	155.30	30.21
2001	251.51	600.70	125.21	70.47	174.20	32.95
2002	284.80	666.82	136.61	80.20	194.74	35.77
2003	319.13	723.79	152.47	88.86	208.67	39.53
2004	351.69	773.52	169.18	92.38	210.18	41.41
2005	390.49	837.06	185.89	101.17	223.65	45.05
2006	442.76	923.26	207.57	112.73	242.08	49.42
2007	500.47	1014.28	230.86	120.46	251.13	51.90
2008	561.90	1105.27	256.82	128.24	259.63	54.47
2009	619.72	1174.50	288.21	140.84	274.48	60.99
2010	685.73	1257.32	322.24	150.27	283.07	65.82
2011	787.88	1416.10	349.70	165.12	304.22	68.09
2012	880.64	1541.99	382.41	179.70	321.62	72.79
2013	972.29	1660.40	418.98	192.32	334.93	77.65
2014	1077.61	1796.78	461.36	208.20	353.25	83.91

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	1167.25	1890.28	513.22	221.09	363.63	92.15
2016	1282.82	2041.08	567.91	239.52	387.22	100.26
2017	1411.37	2204.99	634.10	261.17	415.00	110.51
2018	1536.94	2359.09	709.46	279.98	437.01	121.94
2019	1667.47	2515.09	793.72	296.28	454.85	132.81

Figure YN-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remained larger than that in the rural areas. Since 1995, the growth of human capital for rural and urban has both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions human capital expanded rapidly.
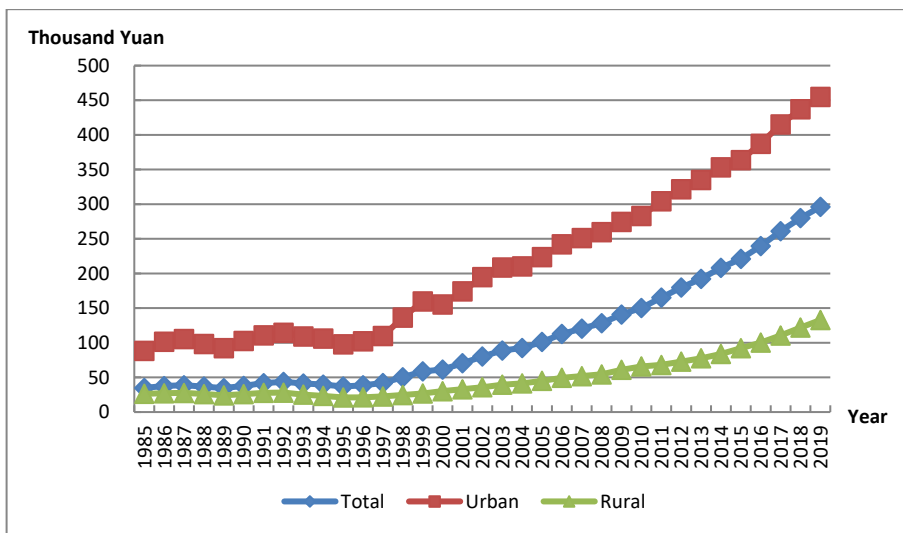

Figure YN-2.2 Real Human Capital Per Capita by Region for Yunnan，1985-2019

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 over 16 years of age, 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 2019, the nominal labor force human capital increased from 0.4 trillion Yuan to 27.6 trillion Yuan, an increase of more than 62 times. The real labor force human capital increased from 0.4 trillion Yuan to 4.9 trillion Yuan, an increase of approximately 10 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)
1985	433	433
1986	500	472
1987	583	515
1988	668	493
1989	774	482
1990	908	551
1991	1043	614
1992	1201	645
1993	1378	610
1994	1612	602
1995	1861	574
1996	2123	603
1997	2404	656
1998	2717	729
1999	3052	821

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2000	3430	942
2001	3810	1055
2002	4161	1155
2003	4632	1272
2004	5187	1346
2005	5781	1482
2006	6520	1642
2007	7272	1731
2008	8108	1829
2009	9082	2042
2010	10183	2210
2011	11540	2395
2012	13002	2631
2013	14522	2851
2014	16024	3074
2015	17609	3314
2016	19846	3682
2017	22382	4116
2018	24988	4526
2019	27565	4871

32.3.2 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. Tables YN-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 24.7 thousand Yuan to 1.0 million Yuan, an increase of more than 38 times. The real average labor force human capital increased from 24.7 thousand Yuan to 0.2 million Yuan, an increase of approximately 6 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	24.72	56.64	19.04	24.72	56.64	19.04
1986	27.69	64.03	21.08	26.16	61.10	19.81
1987	30.08	69.98	22.67	26.59	62.18	19.98
1988	34.78	80.13	26.03	25.70	58.79	19.32
1989	39.03	88.98	29.11	24.32	55.37	18.15
1990	43.88	98.61	32.83	26.62	60.39	19.80
1991	49.52	111.59	36.11	29.14	65.84	21.21
1992	55.82	125.32	39.90	30.01	66.98	21.54
1993	62.70	139.54	44.18	27.78	62.78	19.34
1994	70.72	155.72	49.46	26.40	59.72	18.06
1995	79.38	173.19	54.80	24.48	55.21	16.43
1996	88.68	191.12	60.44	25.19	56.16	16.65
1997	98.82	210.05	66.69	26.95	59.01	17.68
1998	109.63	228.20	73.65	29.40	62.60	19.32
1999	121.02	246.47	80.82	32.55	68.43	21.05
2000	133.68	266.42	88.82	36.72	75.80	23.51
2001	147.91	290.22	97.16	40.97	84.16	25.57
2002	161.64	312.78	105.68	44.88	91.34	27.67
2003	179.08	339.41	116.67	49.19	97.85	30.25
2004	199.54	373.08	127.89	51.78	101.37	31.31
2005	221.13	408.14	139.51	56.67	109.05	33.81
2006	247.67	449.30	154.79	62.38	117.80	36.85
2007	275.83	491.41	171.29	65.67	121.67	38.51
2008	306.59	534.88	189.60	69.16	125.65	40.21
2009	342.62	584.67	211.32	77.04	136.63	44.72

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
2010	382.30	638.78	234.98	82.95	143.82	48.00
2011	429.40	710.11	253.60	89.11	152.55	49.38
2012	480.82	783.40	275.93	97.29	163.40	52.52
2013	533.23	852.89	302.01	104.69	172.04	55.97
2014	584.01	911.97	333.27	112.04	179.30	60.62
2015	637.34	966.88	372.93	119.95	186.00	66.96
2016	710.37	1071.04	412.56	131.79	203.19	72.84
2017	797.65	1194.49	459.79	146.67	224.81	80.13
2018	889.38	1321.25	511.33	161.11	244.75	87.89
2019	981.12	1440.88	569.41	173.37	260.58	95.28

Chapter 33　　Human Capital for Tibet

33.1 Total human capital

Table XZ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Tibet. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Tibet.

Table XZ-1.1 Real Physical Wealth Capital Stocks, 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)
1985	64	64	6
1986	79	74	7
1987	92	81	7
1988	104	78	8
1989	114	74	8
1990	124	77	8
1991	143	81	8
1992	168	87	9
1993	193	88	10
1994	218	78	11
1995	248	74	12
1996	290	80	13
1997	347	91	14
1998	379	99	14
1999	454	118	15
2000	489	127	16

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	580	151	17
2002	684	176	19
2003	759	194	22
2004	859	214	27
2005	1041	256	33
2006	1269	305	40
2007	1330	310	47
2008	1521	335	55
2009	1622	353	66
2010	1813	386	81
2011	2086	422	93
2012	2253	441	109
2013	2575	486	130
2014	2939	537	154
2015	3342	598	176
2016	3582	625	201
2017	3981	683	229
2018	4409	745	—
2019	4859	802	—

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 2019, the nominal human capital per capita increased from 36.0 thousand Yuan to 1.7 million Yuan, an increase of approximately 46 times; and the real human capital per capita increased

331

from 36.0 thousand Yuan to 278.7 thousand Yuan, an increase of approximately 7 times.

Figure XZ-2.1 illustrates the trends of human capital per capita by gender for Tibet. The growth pattern of real human capital per capita of male is similar to that of female for Tibet. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
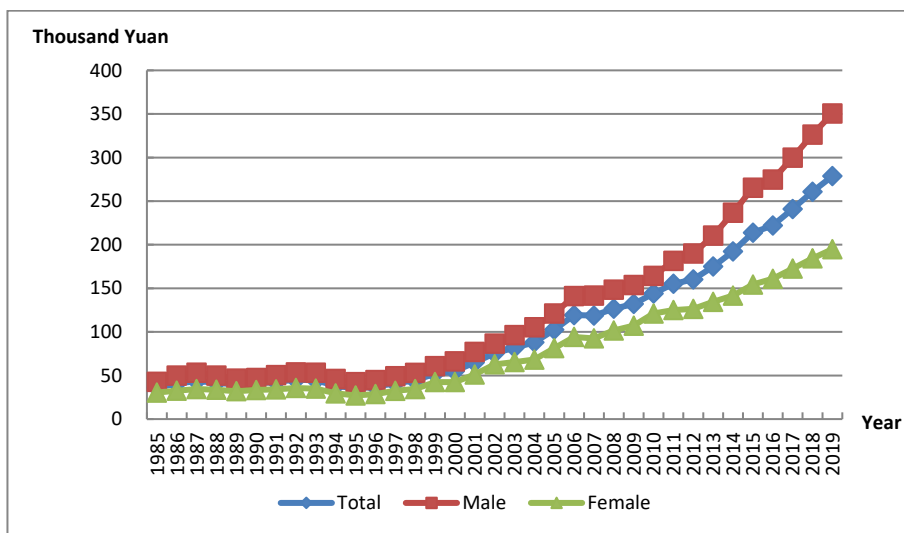

Figure XZ-2.1 Human Capital Per Capita by Gender for Tibet，1985-2018

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	36.04	123.67	21.41	36.04	123.67	21.41
1986	43.45	155.58	23.54	40.74	145.40	22.16
1987	49.64	172.96	25.99	43.58	149.19	23.33

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	55.26	190.76	28.86	41.81	139.68	22.75
1989	60.82	206.99	32.26	39.38	130.77	21.52
1990	65.78	226.60	35.49	40.60	136.08	22.61
1991	75.70	250.35	39.67	42.74	137.43	23.21
1992	87.05	281.77	44.13	45.13	141.90	23.80
1993	97.59	305.09	49.44	44.51	133.37	23.89
1994	106.94	324.53	55.39	38.22	113.05	20.49
1995	117.38	350.38	61.77	35.09	100.62	19.45
1996	134.16	397.09	68.22	37.06	104.14	20.25
1997	157.27	466.63	75.93	41.20	116.77	21.34
1998	169.44	478.74	83.89	44.20	120.04	23.23
1999	200.07	573.60	93.11	52.15	144.70	25.65
2000	211.39	574.01	102.63	55.07	144.22	28.33
2001	249.66	663.87	111.48	64.93	168.15	30.50
2002	292.71	761.22	120.26	75.43	190.89	32.93
2003	320.21	793.07	133.37	81.83	197.30	36.20
2004	352.89	850.72	147.92	88.02	207.50	38.82
2005	417.27	1004.58	161.87	102.51	241.40	42.11
2006	495.98	1193.93	181.53	119.24	281.55	46.11
2007	509.24	1171.64	202.57	118.73	268.51	49.39
2008	573.97	1319.50	225.97	126.58	286.09	52.12
2009	606.66	1368.66	252.86	132.06	292.42	57.60
2010	676.46	1540.92	281.45	144.09	322.14	62.73
2011	766.27	1741.74	303.26	155.19	346.12	64.56
2012	819.31	1820.66	326.34	160.23	349.23	67.19
2013	927.41	2049.10	351.12	174.99	379.76	69.78
2014	1052.55	2292.65	376.42	192.36	411.33	72.98

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	1195.10	2570.04	405.60	213.80	451.61	77.25
2016	1273.14	2654.58	440.28	222.04	454.64	81.81
2017	1404.88	2868.09	481.26	240.99	483.48	87.93
2018	1543.35	3085.68	526.34	260.75	513.48	94.09
2019	1688.98	3316.31	577.23	278.67	538.92	100.87

Figure XZ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
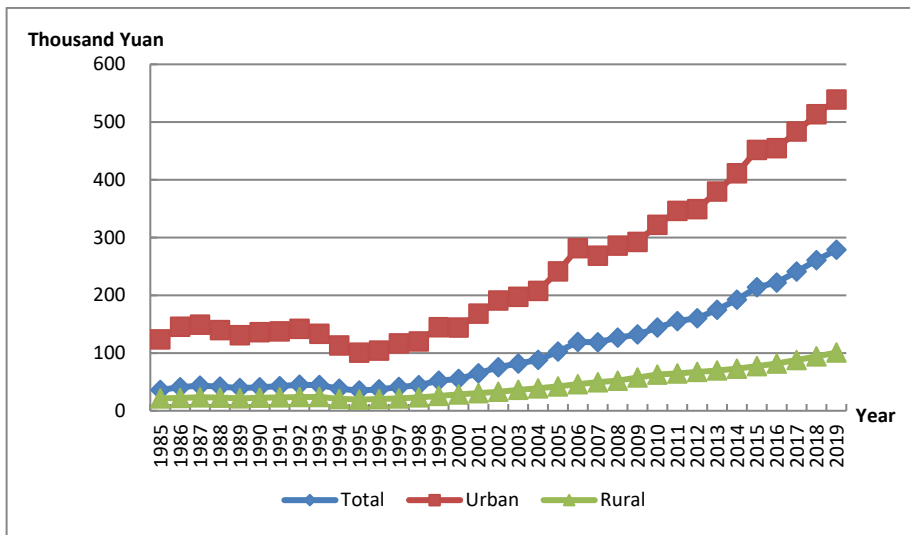
Figure XZ-2.2 Real Human Capital Per Capita by Region for Tibet，1985-2019

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 2019, the nominal labor force human capital increased from 25 billion Yuan[38] to 2.1 trillion Yuan, an increase of more than 83 times; and the real labor force human capital increased from 0.03 trillion Yuan to 0.3 trillion Yuan, an increase of approximately 13 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)
1985	25	25
1986	29	27
1987	33	29
1988	38	29
1989	44	28
1990	51	31
1991	57	33
1992	65	34
1993	73	34
1994	83	30
1995	93	28
1996	108	30

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[38] In 1985, both the nominal and actual labor force human capital stocks of the Tibet were 0.02527 trillion yuan, which are 0.03 trillion yuan and 0.025 trillion yuan after rounding.

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1997	127	34
1998	147	39
1999	170	45
2000	197	52
2001	218	57
2002	242	63
2003	274	71
2004	317	80
2005	369	92
2006	437	106
2007	504	118
2008	562	125
2009	614	135
2010	671	144
2011	803	164
2012	943	185
2013	1092	207
2014	1220	224
2015	1370	246
2016	1534	268
2017	1724	296
2018	1911	323
2019	2102	347

33.3.2 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. Tables XZ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 24.6

thousand Yuan to 1068.3 thousand Yuan, an increase of more than 42 times; and the real average labor force human capital increased from 24.6 thousand Yuan to 176.5 thousand Yuan, an increase of more than 6 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	24.55	76.86	17.10	24.55	76.86	17.10
1986	27.27	85.74	18.67	25.59	80.13	17.57
1987	30.16	94.66	20.37	26.64	81.65	18.28
1988	34.13	106.69	22.62	26.08	78.12	17.83
1989	38.49	119.61	25.09	25.07	75.57	16.74
1990	43.64	134.38	27.99	27.08	80.70	17.83
1991	48.79	144.51	30.80	27.72	79.33	18.02
1992	54.61	155.88	33.96	28.50	78.51	18.31
1993	60.48	166.52	37.29	27.85	72.80	18.02
1994	67.29	178.36	41.57	24.17	62.13	15.38
1995	74.00	189.17	46.23	22.28	54.33	14.55
1996	83.66	210.29	51.19	23.35	55.15	15.19
1997	94.94	234.34	57.08	25.14	58.64	16.04
1998	106.86	258.08	63.47	28.08	64.71	17.57
1999	118.98	280.08	71.31	31.29	70.65	19.64
2000	132.11	303.21	80.32	34.72	76.18	22.17
2001	146.04	333.37	87.03	38.33	84.44	23.81
2002	161.06	366.84	94.17	42.03	91.99	25.79
2003	180.67	407.39	103.93	46.70	101.35	28.21
2004	203.57	454.69	116.11	51.25	110.90	30.48
2005	230.30	512.79	127.64	57.20	123.22	33.20

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	263.88	583.33	143.45	64.13	137.56	36.44
2007	296.66	650.13	160.21	69.68	148.99	39.06
2008	325.13	704.39	178.59	72.28	152.72	41.19
2009	351.71	754.18	199.40	77.19	161.14	45.42
2010	380.23	803.24	222.04	81.72	167.92	49.49
2011	440.88	939.05	237.02	89.99	186.61	50.46
2012	505.05	1074.30	252.26	99.34	206.07	51.94
2013	573.40	1212.15	267.50	108.69	224.65	53.16
2014	636.08	1337.03	281.31	116.82	239.88	54.54
2015	708.61	1472.47	299.29	127.39	258.74	57.00
2016	787.39	1612.04	319.94	137.82	276.09	59.45
2017	879.30	1770.84	341.52	151.23	298.51	62.40
2018	971.73	1926.23	363.86	164.45	320.54	65.05
2019	1068.25	2085.13	389.85	176.46	338.85	68.13

Chapter 34   Human Capital for Shaanxi

34.1 Total human capital

Table SaX-1.1 presents the estimates of nominal and real total human capital and real physical capital for Shaanxi. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Shaanxi.

Table SaX-1.1 Real Physical Wealth Capital Stocks, 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)
1985	925	925	33
1986	1088	1028	39
1987	1259	1104	44
1988	1463	1084	49
1989	1686	1046	54
1990	1933	1171	57
1991	2280	1298	61
1992	2674	1389	65
1993	3077	1406	69
1994	3507	1262	74
1995	3960	1198	79
1996	4658	1276	85
1997	5472	1426	91
1998	6008	1592	99
1999	6931	1877	108

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2000	8064	2182	120
2001	9354	2501	132
2002	10026	2711	146
2003	10960	2918	163
2004	12004	3100	184
2005	12882	3289	211
2006	14866	3736	245
2007	17189	4106	292
2008	19867	4460	349
2009	22792	5091	420
2010	25751	5532	507
2011	29276	5949	600
2012	33647	6654	707
2013	38365	7369	819
2014	42983	8123	939
2015	47223	8842	1049
2016	56823	10504	1169
2017	63020	11453	1173
2018	69178	12321	—
2019	75656	13095	—

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 2019, the nominal human capital per capita increased from 33.0 thousand Yuan to 2.6 million Yuan, an increase

340

of approximately 77 times; and the real human capital per capita increased from 33.0 thousand Yuan to 444.8 thousand Yuan, an increase of more than 12 times.

Figure SaX-2.1 illustrates the trends of human capital per capita by gender for Shaanxi. The growth pattern of real human capital per capita of male is similar to that of female for Shaanxi. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
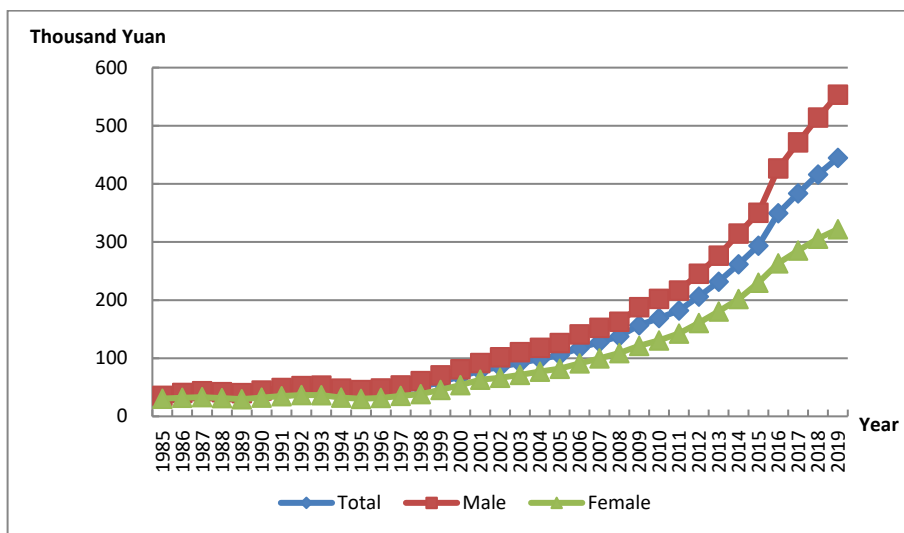
Figure SaX-2.1 Human Capital Per Capita by Gender for Shaanxi，1985-2019

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	33.01	69.25	23.32	33.01	69.25	23.32

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1986	38.53	84.95	26.14	36.39	79.69	24.83
1987	43.89	97.46	29.33	38.49	83.72	26.21
1988	49.82	108.13	32.97	36.90	77.34	25.22
1989	56.75	120.54	37.40	35.20	73.32	23.64
1990	63.79	132.45	42.26	38.66	78.52	26.16
1991	74.40	153.75	47.21	42.35	84.94	27.76
1992	86.39	176.21	52.97	44.90	87.55	29.02
1993	98.92	199.03	59.44	45.21	86.74	28.83
1994	112.25	221.90	66.63	40.39	75.44	25.81
1995	125.97	244.89	74.27	38.10	70.55	23.99
1996	147.05	284.57	82.23	40.28	74.33	24.24
1997	172.10	331.79	91.27	44.86	82.38	25.87
1998	189.18	354.12	101.17	50.14	89.99	28.87
1999	217.57	404.53	111.79	58.93	105.77	32.42
2000	252.83	469.63	123.79	68.41	122.42	36.27
2001	292.89	543.46	136.61	78.32	141.52	38.89
2002	314.92	568.36	149.01	85.17	150.72	42.26
2003	345.74	610.36	166.10	92.04	160.57	45.51
2004	381.37	664.79	184.23	98.50	169.80	48.91
2005	411.84	705.82	203.19	105.16	178.67	52.99
2006	467.45	789.02	232.61	117.49	195.62	60.42
2007	534.12	884.96	262.23	127.57	208.56	64.81
2008	612.76	1001.13	295.96	137.57	222.17	68.56
2009	702.30	1134.83	333.57	156.87	251.84	75.90
2010	787.06	1241.60	372.35	169.08	265.70	80.92
2011	896.49	1380.07	399.05	182.16	279.41	82.13
2012	1041.31	1570.13	426.77	205.93	309.83	85.19

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2013	1206.49	1783.91	457.06	231.73	342.43	88.07
2014	1384.91	2018.69	495.06	261.72	381.39	93.70
2015	1568.38	2256.81	541.62	293.67	422.58	101.40
2016	1891.22	2721.41	581.20	349.61	503.03	107.52
2017	2111.05	3003.40	632.65	383.65	545.34	115.76
2018	2336.67	3288.16	690.00	416.18	585.34	123.42
2019	2569.58	3573.22	748.79	444.75	618.15	130.16

Figure SaX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural regions expanded rapidly.
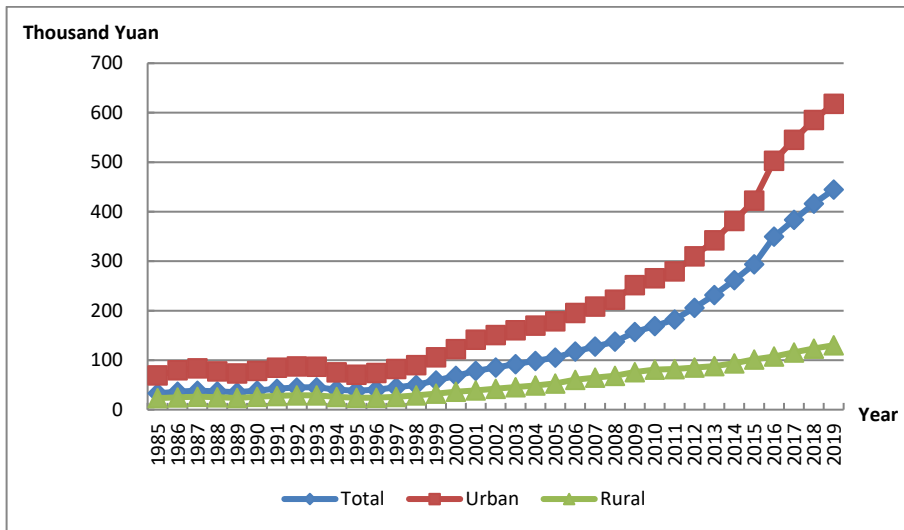
Figure SaX-2.2 Real Human Capital Per Capita by Region for Shaanxi，1985-2019

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 2019, the nominal labor force human capital increased from 0.4 trillion Yuan to 26.9 trillion Yuan, an increase of approximately 69 times; and the real labor force human capital increased from 0.4 trillion Yuan to 4.7 trillion Yuan, an increase of approximately 11 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)
1985	385	385
1986	430	406
1987	492	433
1988	594	443
1989	711	442
1990	844	513
1991	964	551
1992	1086	569
1993	1209	558
1994	1355	494
1995	1518	464
1996	1731	481
1997	1972	522

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1998	2192	589
1999	2486	682
2000	2844	783
2001	3118	845
2002	3400	928
2003	3717	994
2004	4017	1042
2005	4407	1129
2006	5455	1377
2007	6562	1574
2008	7634	1720
2009	8672	1941
2010	10201	2194
2011	11599	2360
2012	12938	2562
2013	14316	2751
2014	15830	2992
2015	17321	3243
2016	19764	3654
2017	22088	4017
2018	24440	4355
2019	26887	4656

34.3.2 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. Tables SaX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 23.2 thousand Yuan to 1283.0 thousand Yuan, an increase of approximately 55

times; and the real average labor force human capital increased from 23.2 thousand Yuan to 222.2 Thousand Yuan, an increase of more than 8 times.

Table SaX-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 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1985	23.18	45.98	17.28	23.18	45.98	17.28
1986	25.54	50.16	19.37	24.14	47.05	18.39
1987	28.54	56.03	21.78	25.11	48.13	19.46
1988	33.17	64.42	24.74	24.69	46.08	18.92
1989	38.16	72.69	28.11	23.73	44.21	17.77
1990	43.55	80.95	31.99	26.46	47.99	19.81
1991	49.05	89.39	35.64	28.05	49.39	20.96
1992	54.95	98.42	39.44	28.79	48.90	21.61
1993	60.92	106.59	43.84	28.12	46.46	21.26
1994	67.74	116.19	48.85	24.69	39.50	18.92
1995	75.33	127.18	54.19	23.05	36.64	17.51
1996	85.40	144.88	59.80	23.71	37.84	17.63
1997	96.67	164.13	66.14	25.60	40.75	18.74
1998	107.28	180.49	73.41	28.83	45.87	20.95
1999	120.06	199.94	81.58	32.96	52.28	23.66
2000	134.98	222.23	91.15	37.14	57.93	26.70
2001	148.03	239.78	98.88	40.11	62.44	28.15
2002	161.70	259.12	106.25	44.13	68.71	30.13
2003	176.81	277.87	115.82	47.30	73.10	31.73
2004	191.67	295.17	126.42	49.74	75.39	33.56
2005	209.33	316.22	138.71	53.63	80.05	36.18
2006	252.02	382.86	160.20	63.60	94.92	41.61
2007	296.34	448.18	184.71	71.06	105.62	45.65

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of Yuan)		
	Total	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
2008	339.88	509.11	210.39	76.58	112.98	48.74
2009	383.75	567.03	239.62	85.92	125.83	54.52
2010	442.30	646.92	269.89	95.14	138.44	58.66
2011	504.04	737.09	295.85	102.57	149.23	60.89
2012	569.06	827.51	324.39	112.67	163.29	64.75
2013	639.77	924.37	354.52	122.93	177.44	68.31
2014	724.64	1041.94	382.74	136.97	196.85	72.44
2015	814.46	1158.00	417.28	152.50	216.83	78.12
2016	923.61	1313.27	451.39	170.75	242.75	83.50
2017	1037.25	1468.71	492.54	188.64	266.68	90.13
2018	1158.00	1631.32	536.65	206.34	290.40	95.99
2019	1283.13	1796.47	583.01	222.18	310.78	101.34

Chapter 35　Human Capital for Gansu

35.1 Total human capital

Table GS-1.1 presents the estimates of nominal and real total human capital and real physical capital for Gansu. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Gansu.

Table GS-1.1 Real Physical Wealth Capital Stocks, 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)
1985	573	573	27
1986	667	627	30
1987	759	664	33
1988	871	645	35
1989	1000	627	38
1990	1153	700	40
1991	1302	752	42
1992	1470	794	44
1993	1654	773	46
1994	1852	698	47
1995	2082	656	49
1996	2362	676	52
1997	2684	746	56
1998	3013	846	60
1999	3429	986	65
2000	3814	1101	72

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	4342	1204	81
2002	4897	1358	91
2003	5581	1531	103
2004	6228	1669	117
2005	6917	1820	133
2006	8044	2092	150
2007	9150	2257	170
2008	10309	2351	193
2009	11437	2575	221
2010	12744	2755	254
2011	14503	2966	292
2012	16152	3221	336
2013	17867	3459	385
2014	19494	3696	439
2015	21012	3926	497
2016	23214	4285	560
2017	25452	4636	589
2018	27617	4933	—
2019	30033	5247	—

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 2019, the nominal human capital per capita increased from 29.3 thousand Yuan to 1.4 million Yuan, an increase of

approximately 46 times; and the real human capital per capita increased from 29.3 thousand Yuan to 239.6 thousand Yuan, an increase of approximately 7 times.

Figure GS-2.1 illustrates the trends of human capital per capita by gender for Gansu. The growth pattern of real human capital per capita of male is similar to that of female for Gansu. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
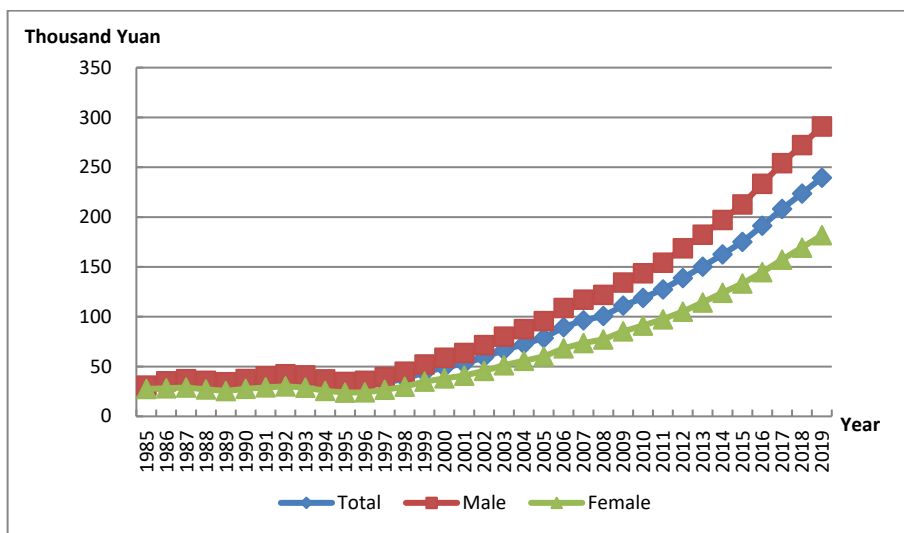
Figure GS-2.1 Human Capital Per Capita by Gender for Gansu，1985-2019

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	29.30	68.70	20.52	29.30	68.70	20.52
1986	33.90	81.27	22.67	31.85	75.97	21.39
1987	38.12	90.63	25.02	33.36	78.17	22.17

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	42.78	99.03	27.83	31.67	70.83	21.26
1989	48.11	108.87	31.13	30.19	65.88	20.22
1990	54.16	120.72	34.78	32.88	71.67	21.58
1991	60.65	135.13	38.52	35.02	75.90	22.87
1992	67.90	151.11	42.70	36.68	79.10	23.83
1993	75.81	167.94	47.42	35.44	76.32	22.85
1994	84.37	186.07	52.53	31.79	67.87	20.50
1995	93.97	207.04	58.07	29.60	63.51	18.84
1996	106.05	235.68	64.26	30.35	65.55	19.00
1997	120.47	271.96	71.25	33.49	73.58	20.47
1998	134.83	305.07	78.92	37.87	83.36	22.93
1999	153.28	351.75	87.17	44.06	98.90	25.79
2000	170.24	386.17	96.96	49.13	109.46	28.66
2001	191.14	419.29	107.05	52.98	115.37	29.99
2002	213.90	454.91	117.31	59.31	126.05	32.57
2003	242.33	499.34	130.91	66.47	137.12	35.85
2004	270.56	544.38	145.19	72.49	147.56	38.12
2005	298.93	580.13	160.06	78.68	155.38	40.79
2006	344.18	651.15	181.10	89.52	172.35	45.52
2007	391.07	720.34	203.49	96.46	181.23	48.17
2008	441.72	793.83	228.40	100.74	184.93	49.73
2009	493.90	870.40	257.96	111.20	200.95	54.96
2010	549.73	942.28	290.55	118.86	208.38	59.75
2011	623.34	1049.26	316.65	127.46	218.91	61.60
2012	696.15	1147.44	345.73	138.81	233.56	65.23
2013	776.45	1260.31	377.17	150.31	249.06	68.82
2014	857.33	1371.57	412.83	162.54	265.23	73.79

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	937.45	1477.12	455.81	175.14	281.71	80.03
2016	1036.29	1609.64	502.11	191.27	303.36	86.85
2017	1143.27	1746.24	557.48	208.23	324.59	95.18
2018	1252.41	1881.68	617.22	223.69	343.24	103.02
2019	1371.10	2026.38	683.02	239.56	361.68	111.33

Figure GS-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
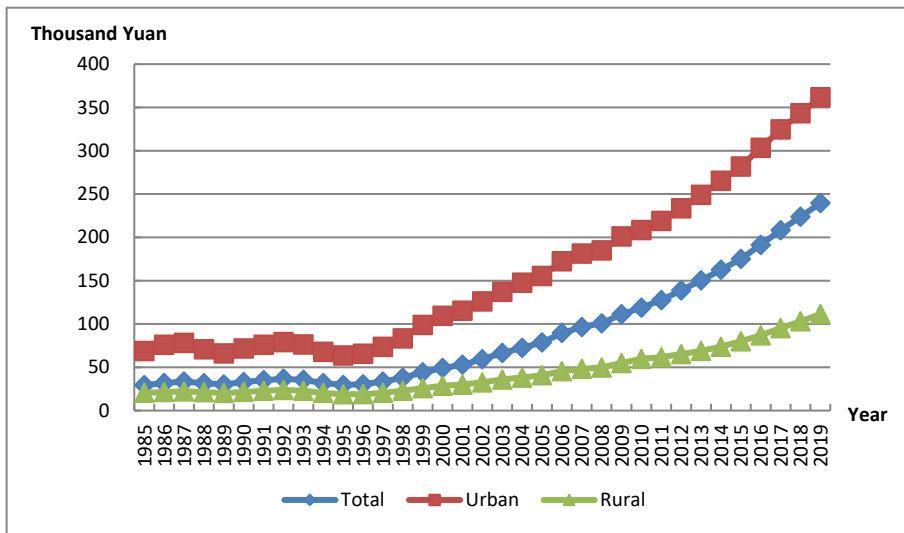
Figure GS-2.2 Real Human Capital Per Capita by Region for Gansu，1985-2019

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 2019, the nominal labor force human capital increased from 250.0 billion Yuan to 14.1 trillion Yuan, an increase of more than 55 times; and the real labor force human capital increased from 250.0 billion Yuan to 2.4 trillion Yuan, an increase of approximately 9 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)
1985	250	250
1986	293	276
1987	347	304
1988	405	300
1989	475	298
1990	556	338
1991	629	364
1992	704	381
1993	781	366
1994	867	327
1995	960	303
1996	1072	307
1997	1185	330
1998	1314	370

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	1452	419
2000	1615	467
2001	1782	495
2002	1949	541
2003	2146	589
2004	2310	617
2005	2598	680
2006	3065	793
2007	3551	871
2008	4061	920
2009	4546	1015
2010	5278	1133
2011	6068	1233
2012	6853	1357
2013	7619	1464
2014	8354	1573
2015	9037	1675
2016	10220	1872
2017	11462	2072
2018	12727	2256
2019	14052	2436

35.3.2 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. Tables GS-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 22.1 thousand Yuan to 873.3 thousand Yuan, an increase of approximately 39 times; and the real average labor force human capital increased from 22.1

354

thousand Yuan to 151.4 thousand Yuan, an increase of approximately 6 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	22.08	50.96	15.38	22.08	50.96	15.38
1986	25.00	56.90	17.16	23.49	53.18	16.19
1987	28.36	63.65	19.17	24.83	54.90	16.99
1988	31.90	69.32	21.53	23.64	49.58	16.45
1989	35.94	75.72	24.23	22.58	45.82	15.74
1990	40.41	82.60	27.30	24.55	49.04	16.94
1991	44.95	91.51	30.09	25.98	51.40	17.86
1992	49.67	100.58	33.07	26.87	52.65	18.46
1993	54.71	110.16	36.31	25.61	50.06	17.49
1994	60.18	120.37	39.98	22.71	43.91	15.60
1995	66.24	131.90	43.80	20.89	40.46	14.21
1996	73.54	146.95	48.40	21.09	40.87	14.31
1997	81.23	162.13	53.53	22.65	43.86	15.38
1998	89.66	178.00	59.30	25.26	48.64	17.23
1999	98.51	194.00	65.59	28.41	54.54	19.41
2000	108.65	212.08	72.90	31.45	60.11	21.55
2001	119.53	227.98	79.31	33.18	62.73	22.22
2002	130.54	243.95	85.82	36.20	67.59	23.83
2003	142.99	259.42	94.40	39.21	71.24	25.85
2004	154.00	270.79	103.96	41.12	73.40	27.29
2005	170.83	293.32	114.91	44.73	78.56	29.29
2006	199.67	342.57	130.52	51.68	90.67	32.81
2007	229.87	390.93	147.99	56.37	98.36	35.03

Year	Nominal Average Labor Force Human Capital (Thousands of Yuan)			Real Average Labor Force Human Capital (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2008	261.51	438.12	167.57	59.26	102.06	36.49
2009	292.54	479.95	191.54	65.32	110.80	40.81
2010	335.36	541.47	217.28	72.02	119.75	44.68
2011	380.85	612.08	237.90	77.39	127.70	46.28
2012	427.55	680.28	261.28	84.68	138.47	49.30
2013	474.31	745.66	286.56	91.17	147.35	52.29
2014	521.05	807.50	314.22	98.09	156.15	56.16
2015	567.26	861.29	347.66	105.17	164.26	61.04
2016	634.37	956.15	385.53	116.19	180.20	66.68
2017	710.37	1060.31	430.93	128.42	197.09	73.58
2018	789.99	1167.03	480.69	140.01	212.88	80.23
2019	873.27	1274.50	535.31	151.36	227.48	87.25

Chapter 36   Human Capital for Qinghai

36.1 Total human capital

Table QH-1.1 presents the estimates of nominal and real total human capital and real physical capital for Qinghai. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Qinghai.

Table QH-1.1 Real Physical Wealth Capital Stocks, 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)
1985	124	124	11
1986	144	136	12
1987	163	144	13
1988	186	140	14
1989	211	135	15
1990	238	144	16
1991	274	154	16
1992	314	164	17
1993	358	166	19
1994	412	156	20
1995	468	150	21
1996	526	153	24
1997	599	167	27
1998	674	186	30
1999	759	210	34
2000	850	236	39

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	966	262	46
2002	1076	284	53
2003	1196	309	62
2004	1324	331	71
2005	1462	362	81
2006	1662	405	92
2007	1869	427	104
2008	2088	433	117
2009	2371	478	137
2010	2651	507	162
2011	3031	545	194
2012	3391	590	239
2013	3772	630	298
2014	4155	674	366
2015	4548	718	441
2016	4991	773	519
2017	5456	831	596
2018	5946	883	—
2019	6480	939	—

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 2019, the nominal human capital per capita increased from 30.9 thousand Yuan to 1.3 million Yuan, an increase

of approximately 40 times; and the real human capital per capita increased from 30.9 thousand Yuan to 182.3 thousand Yuan, an increase of approximately 5 times.

Figure QH-2.1 illustrates the trends of human capital per capita by gender for Qinghai. The growth pattern of real human capital per capita of male is similar to that of female for Qinghai. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
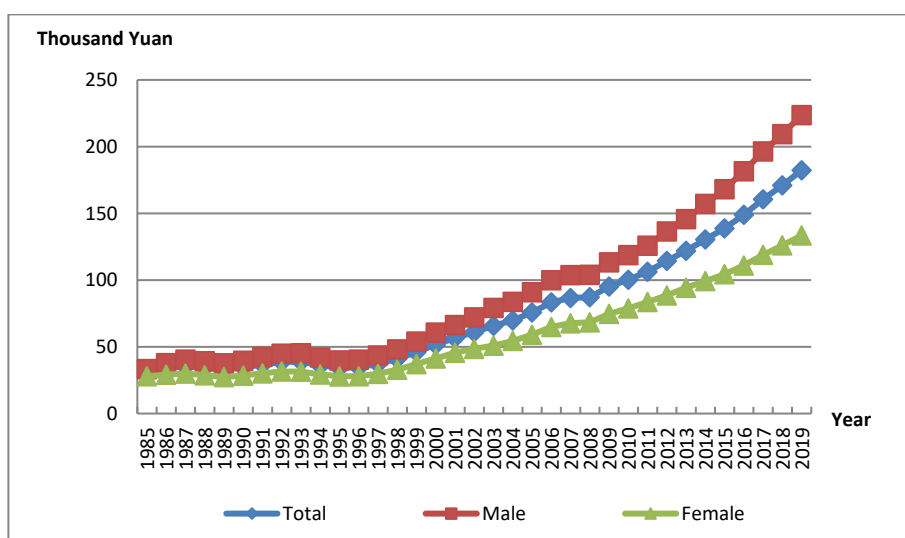
Figure QH-2.1 Human Capital Per Capita by Gender for Qinghai，1985-2019

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	30.85	59.72	21.11	30.85	59.72	21.11
1986	35.81	70.64	23.64	33.77	66.39	22.37
1987	40.30	78.03	26.40	35.66	68.03	23.74

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	45.74	86.55	29.44	34.44	63.62	22.78
1989	51.43	95.53	33.08	32.91	59.87	21.70
1990	57.14	104.60	37.06	34.49	62.61	22.59
1991	65.34	118.19	41.47	36.80	65.08	24.03
1992	74.15	132.60	46.27	38.74	67.23	25.15
1993	83.73	148.11	51.63	38.86	65.88	25.40
1994	95.14	168.27	57.77	36.12	60.75	23.54
1995	106.72	187.41	64.60	34.34	56.52	22.75
1996	118.84	207.13	71.80	34.66	56.08	23.24
1997	133.58	232.07	80.13	37.17	59.78	24.90
1998	148.62	256.34	88.92	41.01	65.64	27.35
1999	166.64	286.53	98.35	46.11	73.74	30.38
2000	185.56	315.29	109.93	51.58	81.47	34.16
2001	209.00	354.10	120.72	56.65	88.83	37.07
2002	230.91	387.72	131.53	60.98	95.26	39.25
2003	254.43	420.10	145.87	65.79	101.39	42.46
2004	279.32	455.17	160.52	69.82	107.60	44.29
2005	306.10	493.76	176.52	75.77	117.07	47.24
2006	342.02	539.71	198.13	83.31	125.71	52.45
2007	379.67	586.56	221.53	86.65	128.52	54.65
2008	420.84	639.49	245.44	87.19	128.67	53.92
2009	472.19	706.34	274.35	95.19	137.71	59.26
2010	524.45	769.63	304.36	100.28	142.77	62.14
2011	591.81	864.52	323.78	106.33	151.29	62.13
2012	657.37	950.27	344.38	114.36	161.41	64.09
2013	730.35	1048.27	366.07	121.98	171.09	65.70
2014	804.56	1147.84	389.03	130.49	182.06	68.05

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	879.32	1244.70	418.08	138.79	192.05	71.56
2016	961.64	1355.97	445.15	148.95	205.52	74.85
2017	1054.26	1479.51	477.52	160.62	220.49	79.42
2018	1151.29	1609.20	512.22	171.00	233.97	83.11
2019	1258.42	1751.96	547.42	182.34	248.76	86.66

Figure QH-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
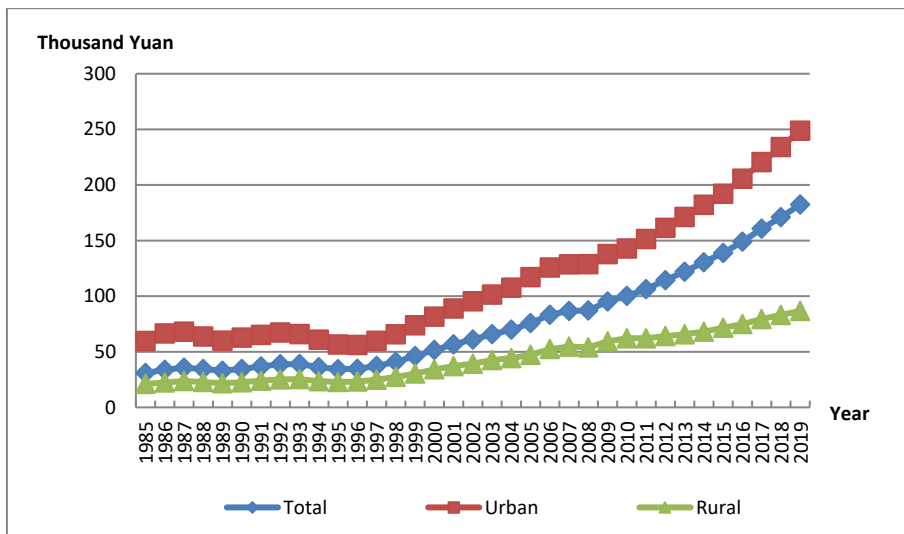
Figure QH-2.2 Real Human Capital Per Capita by Region for Qinghai，1985-2019

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 2019, the nominal labor force human capital increased from 53.0 billion Yuan to 3.1 trillion Yuan, an increase of approximately 57 times; and the real labor force human capital increased from 53.0 billion Yuan to 447.0 billion Yuan, an increase of more than 7 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)
1985	53	53
1986	60	57
1987	70	62
1988	83	63
1989	99	63
1990	116	70
1991	135	76
1992	156	82
1993	180	84
1994	205	78
1995	232	75
1996	261	77
1997	293	82
1998	328	91

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	365	102
2000	406	114
2001	446	122
2002	487	130
2003	536	140
2004	591	149
2005	648	162
2006	744	182
2007	846	194
2008	953	198
2009	1093	221
2010	1258	242
2011	1421	256
2012	1586	277
2013	1736	291
2014	1888	308
2015	2069	328
2016	2296	358
2017	2531	388
2018	2786	416
2019	3072	447

36.3.2 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. Tables QH-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 23.9 thousand Yuan to 835.4 thousand Yuan, an increase of approximately 34 times; and the real average labor force human capital increased from 23.9

thousand Yuan to 121.6 thousand Yuan, an increase of approximately 4 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	23.89	46.01	16.62	23.89	46.01	16.62
1986	26.55	49.87	18.64	25.04	46.87	17.64
1987	30.28	56.04	20.92	26.82	48.86	18.81
1988	34.53	62.76	23.61	26.04	46.13	18.27
1989	39.22	70.01	26.68	25.13	43.88	17.50
1990	44.13	77.22	30.30	26.65	46.22	18.47
1991	50.10	86.90	33.83	28.26	47.85	19.60
1992	56.47	96.98	37.75	29.58	49.17	20.52
1993	63.56	108.02	42.18	29.61	48.05	20.75
1994	71.09	119.40	47.26	27.14	43.11	19.26
1995	79.20	131.74	52.65	25.66	39.73	18.54
1996	87.69	143.99	58.40	25.78	38.98	18.91
1997	97.09	157.35	64.87	27.25	40.53	20.16
1998	107.02	170.78	72.10	29.81	43.73	22.18
1999	117.20	184.21	79.58	32.79	47.41	24.58
2000	128.62	199.41	87.85	36.15	51.52	27.30
2001	141.12	218.17	95.41	38.77	54.73	29.29
2002	154.10	237.96	103.04	41.24	58.47	30.75
2003	168.52	257.45	113.11	44.14	62.14	32.93
2004	184.14	278.73	124.00	46.53	65.89	34.21
2005	200.04	299.64	135.48	49.94	71.05	36.26
2006	227.11	336.94	150.67	55.72	78.48	39.89

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
2007	255.87	375.39	167.10	58.71	82.25	41.23
2008	285.19	412.69	186.11	59.32	83.03	40.89
2009	320.80	458.21	209.30	64.98	89.33	45.21
2010	360.82	509.46	233.62	69.28	94.51	47.70
2011	401.19	567.50	246.82	72.37	99.31	47.36
2012	443.15	625.81	261.85	77.41	106.30	48.73
2013	482.74	679.12	278.11	81.01	110.84	49.92
2014	523.52	733.76	295.37	85.35	116.38	51.67
2015	569.07	790.67	317.07	90.31	121.99	54.27
2016	625.57	871.83	338.01	97.40	132.14	56.83
2017	688.78	961.69	361.94	105.50	143.32	60.20
2018	758.19	1061.27	386.25	113.16	154.31	62.67
2019	835.44	1171.60	411.30	121.59	166.35	65.11

Chapter 37   Human Capital for Ningxia

37.1 Total human capital

Table NX-1.1 presents the estimates of nominal and real total human capital and real physical capital for Ningxia. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Ningxia.

Table NX-1.1 Real Physical Wealth Capital Stocks, 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)
1985	165	165	11
1986	193	182	12
1987	221	195	13
1988	253	191	14
1989	292	187	14
1990	338	202	15
1991	386	218	16
1992	442	231	16
1993	501	229	17
1994	567	210	18
1995	638	202	19
1996	732	217	20
1997	855	244	21
1998	978	279	23
1999	1121	324	25
2000	1276	370	27

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2001	1492	424	30
2002	1694	484	34
2003	1923	539	40
2004	2159	583	46
2005	2452	652	54
2006	2884	751	64
2007	3326	820	75
2008	3793	861	90
2009	4347	980	109
2010	4886	1059	133
2011	5601	1143	154
2012	6360	1270	181
2013	7164	1383	210
2014	7992	1513	252
2015	8799	1647	301
2016	9876	1819	355
2017	10838	1964	477
2018	11810	2092	—
2019	12904	2240	—

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 2019, the nominal human capital per capita increased from 40.4 thousand Yuan to 2.1 million Yuan, an increase

of approximately 52 times; and the real human capital per capita increased from 40.4 thousand Yuan to 371.6 thousand Yuan, an increase of approximately 8 times.

Figure NX-2.1 illustrates the trends of human capital per capita by gender for Ningxia. The growth pattern of real human capital per capita of male is similar to that of female for Ningxia. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 2000.
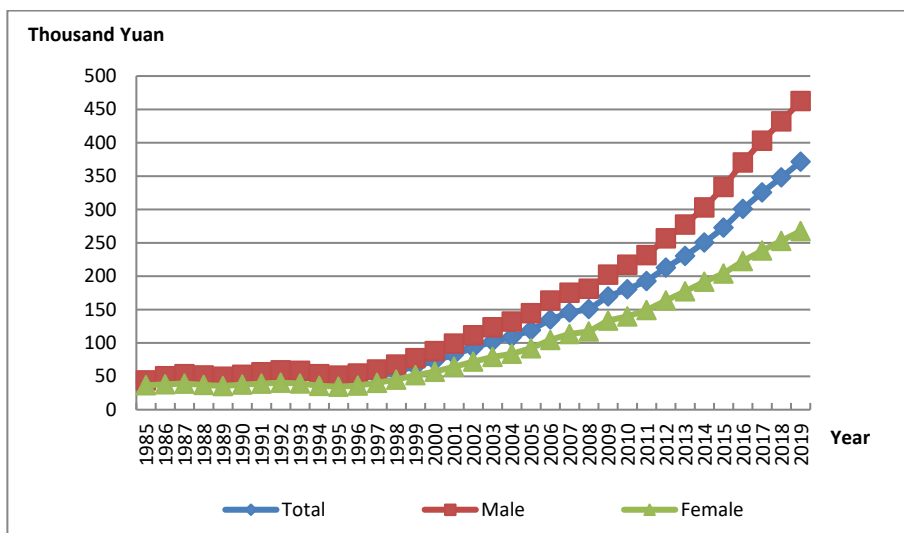
Figure NX-2.1 Human Capital Per Capita by Gender for Ningxia，1985-2019

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	40.36	79.00	27.78	40.36	79.00	27.78
1986	46.78	93.71	31.12	44.32	88.40	29.61
1987	52.74	103.51	34.93	46.43	88.85	31.55

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
1988	59.01	113.38	39.35	44.54	82.70	30.74
1989	66.77	127.01	44.40	42.93	79.73	29.27
1990	75.67	142.58	50.13	45.37	84.82	30.31
1991	85.15	158.07	56.45	48.10	87.96	32.40
1992	96.03	175.23	63.53	50.24	89.22	34.25
1993	108.03	195.59	71.56	49.35	86.43	33.90
1994	121.38	217.81	80.24	44.98	77.13	31.26
1995	135.92	243.75	89.46	43.09	73.60	29.94
1996	153.70	275.72	99.23	45.58	78.08	31.07
1997	177.54	321.95	110.69	50.67	87.77	33.49
1998	199.61	359.12	123.23	56.96	97.91	37.35
1999	225.29	403.77	136.77	65.08	111.08	42.27
2000	251.84	442.20	154.08	73.02	122.02	47.85
2001	290.07	502.20	171.34	82.46	136.77	52.06
2002	324.47	550.32	188.58	92.60	150.77	57.60
2003	364.10	600.32	211.65	102.08	162.07	63.37
2004	403.33	644.09	235.13	108.88	168.30	67.37
2005	448.18	700.90	259.34	119.12	180.27	73.42
2006	519.56	797.92	291.35	135.22	201.80	80.64
2007	590.74	890.83	323.96	145.73	214.40	84.67
2008	663.92	983.78	358.54	150.78	219.40	85.27
2009	752.95	1102.20	401.64	169.82	245.10	94.10
2010	832.97	1195.40	446.64	180.59	256.19	100.01
2011	944.84	1334.02	480.48	192.75	270.26	100.27
2012	1065.80	1485.57	518.14	212.82	294.46	106.31
2013	1193.13	1644.60	560.30	230.31	315.60	110.75
2014	1323.82	1809.29	609.92	250.62	340.35	118.66

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2015	1457.72	1979.03	665.74	272.78	367.92	128.25
2016	1633.53	2209.34	719.97	300.91	404.20	137.03
2017	1797.25	2413.15	781.70	325.67	434.10	146.88
2018	1965.39	2622.05	846.93	348.13	461.55	154.95
2019	2140.29	2843.30	925.73	371.59	490.65	165.90

Figure NX-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
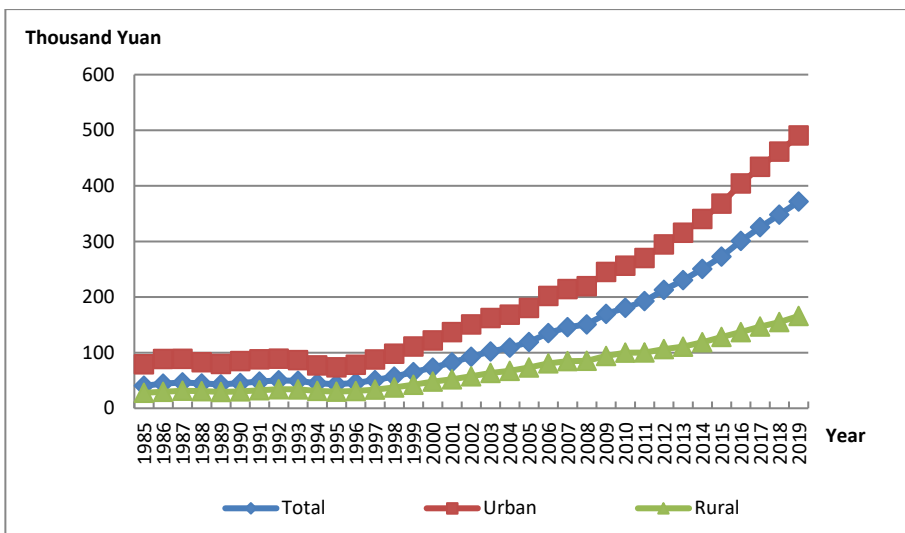
Figure NX-2.2 Real Human Capital Per Capita by Region for Ningxia，1985-2019

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 2019, the nominal labor force human capital increased from 60.0 billion Yuan to 5.1 trillion Yuan, an increase of approximately 84 times; and the real labor force human capital increased from 60.0 billion Yuan to 887.0 billion Yuan, an increase of approximately 14 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)
1985	60	60
1986	67	64
1987	79	70
1988	95	72
1989	113	73
1990	135	81
1991	157	89
1992	182	95
1993	204	93
1994	231	86
1995	260	83
1996	303	90
1997	349	100
1998	399	114

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
1999	453	132
2000	513	150
2001	578	165
2002	639	184
2003	708	200
2004	792	215
2005	894	239
2006	1049	275
2007	1223	304
2008	1409	322
2009	1598	362
2010	1857	404
2011	2111	432
2012	2375	476
2013	2661	515
2014	2998	569
2015	3308	621
2016	3710	686
2017	4159	756
2018	4604	818
2019	5096	887

37.3.2 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. Tables NX-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 28.0 thousand Yuan to 1214.5 thousand Yuan, an increase of more than 42 times; and the real average labor force human capital increased from 28.0 thousand

Yuan to 211.5 thousand Yuan, an increase of approximately 7 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	28.01	51.59	20.04	28.01	51.59	20.04
1986	30.65	54.60	22.47	29.05	51.51	21.38
1987	34.72	60.92	25.23	30.63	52.29	22.80
1988	39.85	69.40	28.47	30.13	50.62	22.24
1989	45.64	78.72	32.25	29.37	49.42	21.26
1990	52.06	88.63	36.76	31.22	52.73	22.23
1991	58.67	98.91	41.22	33.15	55.04	23.66
1992	66.12	110.24	46.22	34.62	56.13	24.91
1993	73.07	119.81	51.76	33.42	52.94	24.52
1994	81.31	131.31	58.00	30.19	46.50	22.60
1995	90.23	143.92	64.63	28.68	43.46	21.63
1996	101.84	162.21	72.20	30.29	45.94	22.61
1997	114.72	181.88	80.67	32.88	49.59	24.41
1998	128.06	200.90	90.23	36.72	54.77	27.35
1999	142.03	219.87	100.51	41.30	60.49	31.06
2000	157.65	240.94	111.86	46.00	66.48	34.74
2001	175.10	263.93	122.30	50.10	71.88	37.16
2002	192.24	286.18	132.63	55.22	78.40	40.51
2003	210.69	306.48	146.47	59.46	82.74	43.85
2004	232.00	330.79	161.95	63.01	86.44	46.40
2005	255.44	357.40	179.25	68.36	91.92	50.75
2006	294.31	409.96	201.81	77.11	103.68	55.86
2007	335.50	464.22	226.52	83.28	111.73	59.21

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
2008	378.03	517.38	254.92	86.31	115.38	60.62
2009	422.27	569.74	288.77	95.71	126.69	67.66
2010	477.67	638.84	323.18	103.96	136.91	72.37
2011	536.89	717.88	347.30	109.80	145.44	72.47
2012	598.58	797.35	375.20	119.88	158.05	76.98
2013	664.46	880.36	406.77	128.58	168.94	80.40
2014	737.09	970.07	448.82	139.95	182.48	87.32
2015	804.97	1048.05	492.82	151.10	194.84	94.94
2016	895.18	1167.12	532.55	165.46	213.52	101.36
2017	999.04	1304.51	577.97	181.66	234.67	108.60
2018	1105.66	1445.61	624.56	196.42	254.46	114.26
2019	1214.51	1584.22	690.63	211.48	273.38	123.77

Chapter 38   Human Capital for Xinjiang

38.1 Total human capital

Table XJ-1.1 presents the estimates of nominal and real total human capital and real physical capital for Xinjiang. Column 1 is nominal human capital in six-education categories. Column 2 is real human capital in six-education categories. Column 3 is the real physical capital of Xinjiang.

Table XJ-1.1 Real Physical Wealth Capital Stocks, 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)
1985	514	514	26
1986	615	574	29
1987	714	622	32
1988	818	622	35
1989	930	608	38
1990	1062	661	43
1991	1221	699	48
1992	1421	748	55
1993	1630	763	64
1994	1889	697	75
1995	2161	664	86
1996	2509	697	96
1997	2919	781	105
1998	3312	884	117
1999	3784	1037	128
2000	4313	1191	141
2001	4873	1293	155

Year	Nominal Human Capital (Billions of Yuan)	Real Human Capital (Billions of 1985 Yuan)	Real Physical Capital (Billions of 1985 Yuan)
2002	5276	1406	173
2003	5787	1536	195
2004	6367	1642	220
2005	6960	1780	246
2006	8199	2069	275
2007	9467	2265	310
2008	10931	2422	347
2009	12410	2731	387
2010	14031	2962	441
2011	15807	3154	503
2012	17716	3409	597
2013	19871	3681	716
2014	22103	4011	855
2015	24546	4433	1000
2016	27245	4854	1120
2017	30099	5243	1258
2018	33128	5660	—
2019	36769	6156	—

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 2019, the nominal human capital per capita increased from 37.8 thousand Yuan to 1655.5 thousand Yuan, an increase of approximately 43 times; and the real human capital per capita

increased from 37.8 thousand Yuan to 277.2 thousand Yuan, an increase of more than 6 times.

Figure XJ-2.1 illustrates the trends of human capital per capita by gender for Xinjiang. The growth pattern of real human capital per capita of male is similar to that of female for Xinjiang. Both of them kept increasing from 1985 to 2019, and the growth of human capital for male and female has both accelerated, with male's growth rate significantly higher than female's. As a result, the gender gap has been expanding, especially since 1997.
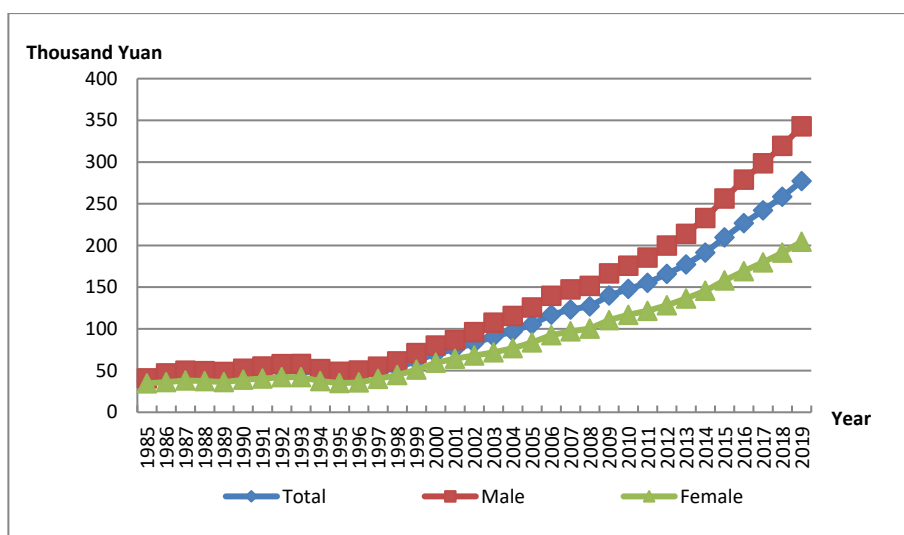
Figure XJ-2.1 Human Capital Per Capita by Gender for Xinjiang，1985-2019

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	37.82	67.03	25.44	37.82	67.03	25.44
1986	44.59	81.49	28.38	41.57	75.74	26.57
1987	50.71	92.51	31.77	44.21	78.95	28.47
1988	57.42	104.74	35.45	43.66	76.40	28.46

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	65.03	118.16	39.68	42.55	75.27	26.93
1990	73.89	133.43	44.76	45.99	81.34	28.68
1991	83.89	152.15	49.79	47.99	84.86	29.57
1992	95.77	174.48	55.74	50.41	89.03	30.77
1993	107.87	197.42	62.36	50.48	88.68	31.07
1994	122.18	226.37	69.86	45.07	79.63	27.71
1995	137.14	253.92	78.17	42.13	75.44	25.31
1996	156.20	293.76	86.42	43.39	79.05	25.30
1997	178.66	341.01	95.54	47.83	88.67	26.92
1998	199.64	382.57	105.57	53.30	99.57	29.51
1999	224.99	432.95	116.61	61.65	115.33	33.67
2000	254.30	488.88	129.61	70.19	130.10	38.35
2001	286.20	544.98	143.15	75.92	139.45	40.80
2002	310.63	580.38	157.12	82.75	150.17	44.39
2003	340.75	620.94	175.92	90.44	159.86	49.60
2004	375.68	671.93	195.03	96.87	169.43	52.62
2005	411.79	721.41	216.08	105.33	180.82	57.61
2006	463.51	795.05	242.06	116.95	197.31	63.27
2007	514.78	863.77	269.99	123.18	204.93	65.83
2008	573.32	945.29	300.65	127.04	209.02	66.94
2009	636.19	1034.44	335.08	139.98	228.36	73.15
2010	700.41	1117.62	371.57	147.85	238.15	76.67
2011	778.09	1240.37	400.24	155.23	250.53	77.33
2012	862.10	1373.27	432.27	165.90	268.32	79.77
2013	956.75	1523.16	467.92	177.21	286.44	82.95
2014	1055.22	1678.71	507.48	191.51	308.81	88.45
2015	1160.95	1839.69	552.88	209.65	336.74	95.79
2016	1272.38	2002.78	606.99	226.67	361.53	103.82

Year	Nominal Human Capital Per Capita (Thousands of Yuan)			Real Human Capital Per Capita (Thousands of 1985 Yuan)		
	Total	Urban	Rural	Total	Urban	Rural
2017	1389.44	2171.16	670.95	242.04	382.74	112.73
2018	1512.86	2345.51	743.01	258.47	406.17	121.91
2019	1655.53	2545.73	824.35	277.16	431.81	132.77

Figure XJ-2.2 shows the trend of real human capital per capita by region. From 1985 to 2019, the real human capital per capita in the urban areas remains larger than that in the rural areas. Since 1997, the growths of human capital for rural and urban both accelerated, and the growth rate is significantly higher in the urban areas than in the rural areas. Therefore, the gap between urban and rural expanded rapidly.
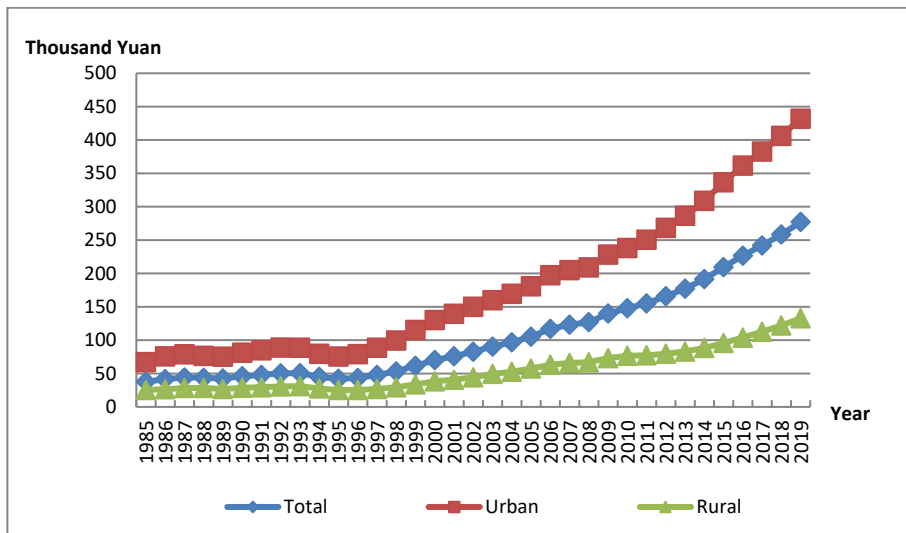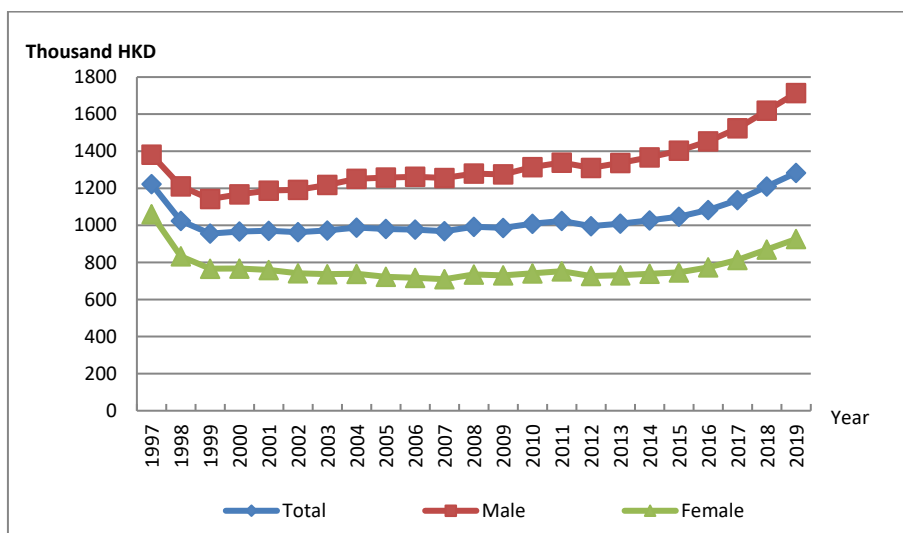

Figure XJ-2.2 Real Human Capital Per Capita by Region for Xinjiang 1985-2019

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 2019, the nominal labor force human capital increased from 198.0 billion Yuan to 15.2 trillion Yuan, an increase of approximately 76 times; and the real labor force human capital increased from 198.0 billion Yuan to 2.5 trillion Yuan, an increase of approximately 12 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)
1985	198	198
1986	233	218
1987	278	243
1988	326	248
1989	383	251
1990	449	279
1991	526	301
1992	613	323
1993	697	327
1994	802	297
1995	919	283
1996	1052	293
1997	1196	322
1998	1354	363
1999	1523	420
2000	1713	477

Year	Nominal Labor Force Human Capital (Billions of Yuan)	Real Labor Force Human Capital (Billions of 1985 Yuan)
2001	1897	508
2002	2058	553
2003	2274	609
2004	2507	651
2005	2762	711
2006	3373	855
2007	4003	960
2008	4699	1042
2009	5357	1178
2010	6198	1305
2011	6950	1381
2012	7739	1482
2013	8601	1585
2014	9493	1715
2015	10442	1878
2016	11495	2040
2017	12657	2198
2018	13883	2365
2019	15240	2545

38.3.2 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. Tables XJ-3.2 reports the nominal and real average labor force human capital by region. From 1985 to 2019, the nominal average labor force human capital increased from 28.0 thousand Yuan to 1021.5 thousand Yuan, an increase of more than 35 times; and the real average labor force human capital increased from 28.0 thousand Yuan to 170.6 thousand Yuan, an increase of more than 5 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	27.96	45.71	19.15	27.96	45.71	19.15
1986	31.71	51.84	21.30	29.56	48.18	19.94
1987	36.46	59.36	23.94	31.77	50.66	21.45
1988	41.33	66.93	27.02	31.42	48.82	21.69
1989	47.04	75.78	30.47	30.77	48.28	20.68
1990	53.73	85.55	34.71	33.43	52.15	22.25
1991	60.66	97.08	38.80	34.71	54.15	23.04
1992	68.61	110.65	43.23	36.13	56.46	23.86
1993	76.05	122.96	48.38	35.65	55.23	24.10
1994	84.70	137.67	54.48	31.35	48.42	21.61
1995	94.78	154.26	61.20	29.20	45.83	19.82
1996	105.26	172.07	67.94	29.36	46.30	19.89
1997	116.86	191.39	75.36	31.44	49.76	21.23
1998	128.98	210.77	83.57	34.60	54.86	23.36
1999	141.90	230.92	92.26	39.13	61.52	26.64
2000	156.69	252.92	102.55	43.65	67.31	30.34
2001	172.93	277.21	112.91	46.34	70.94	32.19
2002	188.40	300.28	123.81	50.61	77.69	34.98
2003	207.38	325.95	138.10	55.52	83.92	38.94
2004	227.69	353.40	153.32	59.11	89.11	41.37
2005	250.39	381.74	170.51	64.45	95.68	45.46
2006	288.10	437.35	192.01	73.04	108.54	50.19
2007	325.03	488.50	214.84	77.96	115.90	52.38
2008	363.79	540.13	239.63	80.66	119.43	53.36
2009	401.49	587.48	266.86	88.25	129.69	58.26

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**
2010	446.95	645.74	294.96	94.11	137.60	60.86
2011	491.81	715.69	318.04	97.76	144.56	61.45
2012	539.79	790.41	343.33	103.38	154.44	63.36
2013	592.71	873.04	370.77	109.23	164.18	65.73
2014	649.52	962.12	397.26	117.36	176.99	69.24
2015	711.08	1056.25	426.84	127.87	193.34	73.95
2016	777.09	1153.30	460.42	137.91	208.19	78.75
2017	852.07	1263.20	498.82	147.99	222.68	83.81
2018	933.10	1381.15	540.87	158.96	239.17	88.74
2019	1021.47	1507.13	587.95	170.61	255.64	94.70

Chapter 39   Human Capital for Hong Kong

39.1 Total human capital

Table HK-1.1 presents the estimates of nominal and real total human capital and real physical capital for Hongkong. Column 1 is nominal human capital in five-education category[40]. Column 2 is real human capital in five-education category.

Table HK-1.1 Real Physical Wealth Capital Stocks, Nominal and Real Human Capital for Hong Kong

Year	Nominal Human Capital (Billions of HKD)	Real Human Capital (Billions of 1985 HKD)
1997	17011	7095
1998	15281	6022
1999	14788	5666
2000	14505	5790
2001	14188	5881
2002	13946	5878
2003	13736	5972
2004	13616	6072
2005	13481	6039
2006	13556	6018
2007	13855	6024
2008	14579	6217
2009	15169	6204
2010	15594	6339
2011	16092	6392
2012	16797	6338
2013	17840	6470
2014	18986	6598
2015	20223	6730
2016	21463	6937

[40] Hong Kong's census data does not have population data with undergraduate education, so only five types of education can be calculated for human capital. The actual value is obtained by dividing the nominal value by the CPI calculated based on 1985.

Year	Nominal Human Capital (Billions of HKD)	Real Human Capital (Billions of 1985 HKD)
2017	23049	7276
2018	24864	7734
2019	26982	8197

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.

Figure HK-2.1 illustrates the trends of human capital per capita by gender for Hongkong. Overall，the growth pattern of real human capital per capita of male is more than that of female for Hongkong. Both trends are similar, downward sloping from 1997 to 1999 and slowly increasing thereafter, with male's growth rate higher than female's in recent years.

Figure HK-2.1 Human Capital Per Capita by Gender for Hong Kong, 1997-2019

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 15 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 1997 to 2019, the nominal labor force human capital increased from10.5 trillion HKD to17.7 trillion HKD; and the real labor force human capital increased from 4.4 trillion HKD to 5.4 trillion HKD.

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)
1997	10506	4382
1998	9461	3729
1999	9225	3534
2000	8957	3575
2001	8800	3648
2002	8678	3658
2003	8632	3753
2004	8552	3813
2005	8469	3794
2006	8561	3801
2007	8794	3824
2008	9068	3867
2009	9375	3834
2010	9709	3947
2011	10166	4038
2012	10615	4005
2013	11341	4113
2014	12119	4212
2015	12945	4308
2016	13885	4488
2017	14936	4715

Year	Nominal Labor Force Human Capital (Billions of HKD)	Real Labor Force Human Capital (Billions of 1985 HKD)
2018	16215	5044
2019	17718	5382

39.3.2 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 1997 to 2019, the nominal average labor force human capital increased from 2.6 million HKD to 3.8 million HKD, the real per capita labor force human capital stock increased from 1.1 million HKD to 1.2 million HKD between 1997 and 2019.

Chapter 40   Human Capital for Taiwan

40.1 Total human capital

Table TW-1.1 presents the estimates of nominal and real total human capital and real physical capital for Taiwan. Column 1 is nominal human capital in five-education categories. Column 2 is real human capital in five-education categories.

Table TW-1.1 Real Physical Capital Stocks Nominal and Real Human Capital for Taiwan

Year	Nominal Human Capital (Billions of NTD)	Real Human Capital (Billions of 1985 NTD)
1997	147812	106034
1998	150260	105996
1999	154459	108774
2000	154293	107319
2001	146974	102229
2002	141179	98389
2003	145808	101907
2004	147780	101644
2005	148567	99891
2006	149235	99743
2007	149819	98358
2008	140380	89029
2009	138873	88839
2010	138545	87786
2011	136125	85041
2012	136122	83434
2013	136262	82864

Year	Nominal Human Capital (Billions of NTD)	Real Human Capital (Billions of 1985 NTD)
2014	139047	82736
2015	141014	84157
2016	138364	81443
2017	135892	79497
2018	136979	79064
2019	136156	78152

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. From 1997 to 2019, the nominal human capital per capita stays at 7.3 million NTD, an increase of 0.01 times; and the real human capital per capita decreased from 5.2 million NTD to 4.2 million NTD, a a 20% reduction.

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 in Taiwan. Both of them kept increasing from 1997 to 2000, and the growths of human capital for male and female both accelerated. But from 2000 to 2019, the real human capital per capita of male and female tend to be flat or even declining.
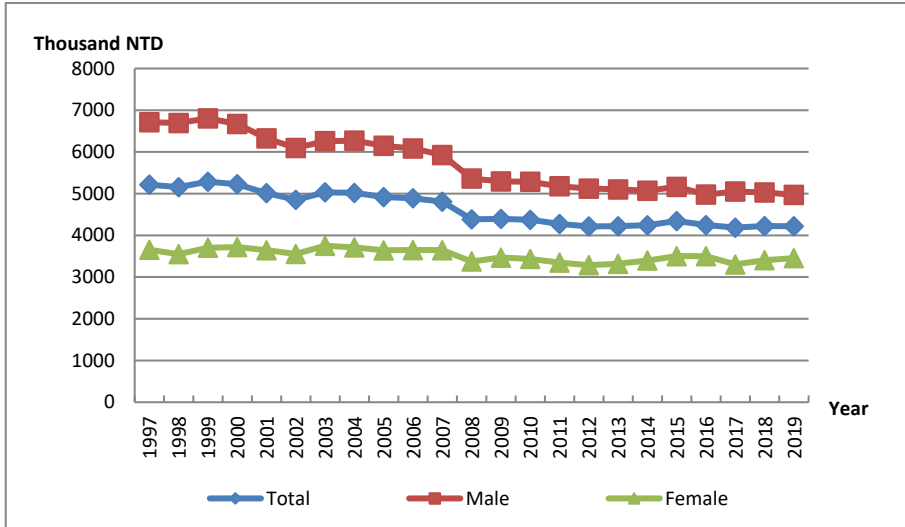
Figure TW-2.1 Human Capital Per Capita by Gender for Taiwan, 1997-2019

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 15 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 1997 to 2019, the nominal labor force human capital increased from 85.4 trillion NTD to 92.3 trillion NTD, an 8% increase; and the real labor force human capital increased from 61.3 trillion NTD to 53.0 trillion NTD, a 14% reduction.

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)
1997	85431	61285
1998	87856	61975
1999	90819	63957
2000	90990	63289
2001	86304	60029
2002	83729	58352
2003	88634	61947
2004	91354	62834
2005	92365	62103
2006	93296	62356
2007	93497	61382
2008	88978	56430
2009	88326	56503
2010	89206	56524
2011	88329	55182
2012	88733	54388
2013	89239	54268
2014	91377	54371
2015	92715	55332
2016	91357	53774
2017	91582	53576
2018	92059	53137
2019	92271	52962

40.3.2 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 1997 to 2019, the nominal average labor force human capital increased from 6.6 million NTD

to 6.8 million NTD, a 3% increase; and the real average labor force human capital decreased from 4.7 million NTD to 3.9 million NTD, a -17% decrease.

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, 2010,2015	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/renkoupu cha /2000pucha/pucha.htm 2005, http://www.stats.gov.cn/tjsj/ndsj/renkou/2	

Data	Sources	Notes
	005 /renkou.htm • 2010, *China 2010 Census* • 2015, *China 2015 1% Demographic Sampling* Survey edited by Department of Demographic Statistics of National Bureau of Statistics	
National, urban and rural population aged 0-5 years, by age and sex: 1982,1987, 1990,1995, 2000,2005, 2010,2015	• 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/2 005 /renkou.htm • 2010, *China 2010 Census and China Demographic Statistics Yearbook* 2012 • 2015, *China 2015 1% Demographic*	We assume that the population aged 0-6years receive no schooling

Data	Sources	Notes
	Sampling Survey edited by Department of Demographic Statistics of National Bureau of Statistics	
National, urban and rural population by age and sex: 1982-2015	• *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 • *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, 1994-2019	• *China Demographic Statistics Yearbook：1988-2020*	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	• *Educational Statistics yearbook of China.1987* edited by the Plan and	*Part of Educational Statistics Yearbook of*

Data	Sources	Notes
level: 1980-2019	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 Educational Committee • *Educational Statistics yearbook of China 1997,* edited by the Plan and Development Department of National Educational Ministry • *Educational Statistics yearbook of China. 1998-2019*edited by the Plan and Development Department of National Educational Ministry	*China.* are downloaded fromhttp://www.cnki.net/.
National, urban and rural population and birth rate for each year	• *China Statistics Yearbook 2019.* • *Statistics Summary for 56 years in China.* China Statistics Press	
Students by age, grade of primary and junior school: 2003-2018	• *Educational Statistics yearbook of China.2003-2019,* 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 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 • 2016, Hong Kong 2016 Population Census Thematic Report • 1985-2019 Census and Statistics Department of Hong Kong	
Total population	• 1980-2019, Hong Kong *Statistics Yearbook*	It is the resident population.
Enrollment by education level	• 1985-2019, Hong Kong Education Bureau	
Mortality rate by age and sex	• Hong Kong Mortality Table	
Birth by sex	• 1985-2019, Hong Kong *Statistics Yearbook*	
Employment rate by age, sex and education level	• 1985-2019, Hong Kong Census and Statistics Department	
Consumer Price Index (CPI)	• 1981-2019, Hong Kong *Statistics Yearbook*	

Data	Sources	Notes
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*	
Average discount rate （based on the basic loan interest of Central Bank）	• Monetary Policy Bureau of PBC • http://www.pbc.gov.cn/publish/zhengce huobisi/631/2012/20120706181352694 274852/20120706181352694274852_.h tml	The data is not available for some years.
10-year treasury bond rate	• *China Financial Statistics Yearbook* • *China Financial Statistics Yearbook(English Version)*	The data is not available for 2009, 2005 and 1994.

Table TW.A.2.1 Data Sources of Taiwan

Data	Sources	Notes
Population age, sex and education level	• Department of Household Registration, M.O.I • Taiwan Population *Statistics Yearbook*	
Population aged 6 years and over, by age and sex gender	• Department of Household Registration, M.O.I	

Data	Sources	Notes
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
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)";

Data	Sources	Notes
		In 1999-2000, based on "standard industrial classification (the seventh edition)"; In 2001-2011, based on "Standard industrial Classification (the eighth edition)"; In 2012-2019, 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.[41] 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.

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[41] 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 2019, the female enrollment data for university and college is available in the statistic yearbooks.

2.2.3 New enrollment data of urban and rural areas

The new enrollments by gender in urban and rural areas in each educational level are not available. We assume that the proportions of female enrollment in urban and rural areas equal the corresponding proportions at the national level.

The new enrollments of specialized middle school are not separated by urban and rural. So we assume that the ratio of urban to rural new enrollments in specialized middle school is the same as that of regular senior middle school.

From 2003 to 2019, 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

A simplified method was used to estimate the age distribution ratio λ. We assume that the enrollment age of primary school, junior high school, senior high school, junior college and above are 7, 13, 16 and 19 respectively:

Table A1.3.2 Enrollment age distribution ratio λ

Age	Primary school	Junior middle school	senior middle school	university
5				
6				
7	1			
8				
9				
10				
11				
12				
13		1		
14				

15			
16		1	
17			
18			
19			1

3.3 Method of imputing population data: 1985-2019

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: 1985-2019

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 2018, birth rate for each year from 1983 to 2019, national, rural and urban population by age and gender from the population sampling surveys for 1987 and each year from 1989 to 2019.

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 region.

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)

(6) China Labor-force Dynamics Survey (CLDS)

1.2 Components of income

(1) Main job and Secondary job salaries;

(2) Other cash income from work;

(3) Pension;

(4) The estimated market value of received items;

(5) Various subsidies;

(6) The income of rural population includes working income and individual's share of household income according to working-hour share.

1.3 Work experience

$Exp = \text{Age} - 16$, if $Sch < 10$

$Exp = \text{Age} - Sch - 6$, if $Sch > 9$

$Exp = 0$, if $Exp < 0$

1.4 Selection of sample

(1) 16-60 years old for males, and 16-55 years old for females;

(2) Must have information on income and educational attainment;

(3) Students, retirees, people who are unemployed but looking for a job, the disabled, people who are waiting to enter school and housekeepers are excluded.

1.5 Imputation method

(1) To make all parameters comparable, we first use UHS, CHIP, CHNS, CHFS, CFPS, and CLDS 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, 2007 and 2013, and urban parameters for 1999.

(4) [42]We use CHNS to obtain urban parameters for 2000, 2004, 2006, 2009, 2011 and 2015, and rural parameters for 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011 and 2015.

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[42] We have urban datasets of UHS for 1989, 1991, 1993 and 1997, so we do not use the CHNS datasets of those years for urban parameter estimation.

(5) We use CHFS to obtain urban and rural parameters for 2010, 2012, 2014 and 2016.

(6) We use CFPS to obtain urban and rural parameters for 2010, 2012, 2014, 2016 and 2018.

(7) We use CLDS to obtain urban and rural parameters for 2014.

As an example, for the intercept term, we can obtain the urban intercept α^u88 (UHS), assuming the sample size is n^u88 (UHS).

We estimate the urban intercept α^u88 (UHS) using UHS 1988, with the sample size of n^u88 (UHS). We also could obtain the urban and rural intercepts α^u88 (CHIP), α^r88 (CHIP), with the sample size of n^u88(CHIP), n^r88(CHIP) respectively. The annual urban and rural intercepts are:

$$\alpha^u88 = \frac{\alpha^u88(UHS) \times n^u88(UHS)}{n^u88(UHS) + n^u88(CHIP)} + \frac{\alpha^u88(CHIP) \times n^u88(CHIP)}{n^u88(UHS) + n^u88(CHIP)}$$

$$\alpha^r88 = \alpha^r88(CHIP)$$

The same principle is applied to estimate other parameters for urban and rural areas.

1.6 Parameter α

$$\ln(inc) = \alpha + \beta \cdot Sch + \gamma \cdot Exp + \delta \cdot Exp^2$$

$\hat{y} = \alpha \times e^{\widehat{\ln y}}$, where α is an adjustment factor. We estimate it as follows:

(1) Obtain $\widehat{\ln y}$ from the regression of $\ln(y_i)$ on all right-hand-side variables.

(2) Obtain $\hat{m}_i = e^{\widehat{\ln y}}$.

(3) Regress y_i on $\hat{m}_i$ without the intercept: $\hat{y} = \alpha \times \hat{m}_i$ and keep α.

(4) For the given values *Sch*, *Exp*, *Exp^2*, obtain $\hat{\ln y}$.

(5) $\hat{y} = \alpha \times e^{\hat{\ln y}}$.

2. Data

We use six well-known household surveys in China. UHS, CFPS, CHNS, CHIP, CHFS, CLDS.

Table B.1 shows the distribution of the six 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) Other employment income;

5) Other working income;

6) Household avocation production income.

3.1.2 Years of schooling

(1)1986-1991

LEVEL	Sch
College	16
Professional school	11

LEVEL	Sch
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 a 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 income of urban residents in 1999 includes eight parts: wages of employees (excluding living expenses for laid-off workers), income of individual employed persons, income of retired and re-employed persons, income of other employees, income of other workers, price subsidies, net income from family sideline production, and The currency (converted) amount of real income.

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-agricultural income and agricultural income.

In 2013, the income of rural households includes family non-wage income distributed according to working hours and personal wage 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;

(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) and INDSUB (Individual 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, the average number of pieces completed/work, 1989

I19, the value of bonuses received last year (job level), 1989-2011

I101, other cash income (job level), 2006-2011

I103, the 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 the household that the individual participates in.

Source:

The 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:

The 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 the sale of the 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 the government (crop level), 1991-1997

E15, government price for the crop (crop level), 1991-1997

E16, kg of crop sold to the free market (crop level), 1991-1997

E17, the free-market price for the crop (crop level), 1991-1997

E12, expenses to raise all crops (household level), 1991-2011

E14A, receipts from the sale of all crops (household level), 1991-2011

E16A, the value of all crops consumed (household level), 1991-2011

e) Fishing Income

Variable: INDFISH - Individual income from fishing.

Source:

The 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, the market value of fish received in-kind from the collective (individual)

G11, revenue from fish sales (household)

G13, the value of fish consumed at home (household)

G15, the value of fish given as a gift (household)

G16, expenses of fishing business (household)

f) Gardening Income

Variable: INDGARD - Total individual net income from gardening

Source:

The 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 the sale of home garden produce, 1989 - 2011
>
> D6, the 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:

The 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 the collective (individual)
>
> F14, expenses to raise livestock (livestock level)
>
> F15, expenses from using home-grown feed (livestock level)
>
> F17, revenue from the sale of livestock products (livestock level)
>
> F19, the value of livestock products consumed at home (livestock level)
>
> F21, the value of livestock products given as gifts (livestock level)

3.3.1.2 Subsidies

The subsidies include INDSUB (Individual subsidies). Since the family subsidies in this database are transfer payments, they are not included in income.

INDSUB=(I9+I11+I12+I13+I13A+I14+I14A+I14B)*12

Source:

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 subsidies, 1989 - 1997

I14A, the average monthly subsidy from job 1, 2000 - 2011

I14B, the 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 are students, unemployed persons, persons with disabilities, scholars to be promoted, or housewives;

(3) Discard individuals whose value of year of schooling, age and sex is missing;

(4) Drop individual whose wage is negative or zero;

(5) First Occupation: We delete samples who's nature of the work is self-employed, unpaid family workers, and in the urban sample, we discard individuals, who are private business owner;

(6) Income range: Keep individuals who's income are between 1/5 and 15 times the average income.

3.4 CHFS

3.4.1 Definition of income

(1) The income divides into urban income and rural incomes. Urban income mainly refers to wage income; rural income mainly includes wage income and household income from agriculture.

(2) Wage income mainly includes three components: wages, bonuses，and allowances.

3.4.2 Personal income distribution of agricultural production

In rural income, wage income is 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 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

Level	Sch
No school	0
Primary school	6
Junior middle school	9
Senior middle school	12
Middle professional degree	11

Level	Sch
Post-secondary professional degree	15
College	16
Master's degree	18
PhD degree	22

3.4.4 Selection of samples

(1) Include male individuals from 16 to 60 years old and female individuals from 16 to 55 years old.

(2) Discard individuals whose value of year of schooling is missing, individuals who did not report education level information.

(3) Keep individuals whose current status is working or employed.

(4) First Occupation:

In the urban samples of 2010, we discard individuals who are self-employed, work for private companies or other samples (volunteers), and we delete samples without income data. In the rural sample of 2010, we also discard individuals who are self-employed, work for private companies or other samples (volunteers), and we delete samples without income data.

In the urban sample of 2012, we discard individuals, who work for private companies; self-employed individuals at home and other samples (volunteers); and seasonal jobs, and we delete samples without income data sample. In the rural sample of 2012, we delete the samples without income data.

In the urban and rural sample of 2014, we discard individuals, who work for private companies; self-employed individuals at home and other samples (volunteers); and open online shops, and we delete samples without income data. At the same time, in the urban sample of 2014, we delete the samples whose jobs are of agricultural nature.

In the urban and rural sample of 2016, we discard individuals, who

work for private companies; self-employed individuals at home and other samples (volunteers); and open online shops. At the same time, in the urban sample of 2016, we delete the samples whose jobs are of agricultural nature.

(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.

Attention: Some units of income are ten thousand Yuan.

(7) Family agricultural production and management: Urban sample households engaged in agricultural production were deleted in samples.

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; rural income mainly includes wage income and household income from agriculture.

(2) Wage income mainly includes six components: wages, bonuses, subsidies, cash in kind, income from a second occupation and other labor income.

(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 is 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 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, discard individuals whose current status is retired.

(4) First Occupation: For the urban sample, those who were self-employed and farmed at home were deleted and those whose income data were missing were deleted. For the rural sample, the sample without

income data was deleted.

(5) Second Occupation: Urban and rural sample without income data were deleted.

(6) Family agricultural production and management: In the rural sample, the sample engaged in household agriculture but whose income data were missing was deleted.

(7) Income range: 1/20 to 15 times of the mean income.

3.6 CLDS

3.6.1 Definition of income

(1) The income divides into urban income and rural incomes. Urban income mainly includes wage income; rural income mainly includes agriculture income and agricultural government subsidies.

(2) Wage income mainly includes three components: wages, bonuses and allowances.

(3) Agriculture income refers to the net income from farming, gardening, livestock, fishing and side-line occupation.

3.6.2 Personal income distribution of agricultural production

In rural income, agriculture income and agricultural government subsidies are 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: Calculation of the whole hours for farm work of each family members according to the days of agricultural production in this year for the individual, the average number of hours a day to do farm work in the busy

season, and the number of hours a day to do farm work in slack season.

Step 2: Calculation of the ratio of each family practitioner farm work hours to the whole farm work hours for the family. We could obtain personal rural income by calculating family rural income times each person's ratio of farm work.

3.6.3 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

3.6.4 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) Drop individuals whose current status is farming, employers, or self-employed in the urban area.

(4) Drop students.

(5) Drop individual whose wage is zero.

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, and CFPS.

4.1.2 General idea about imputation

We use UHS, CHIP, CHNS, CHFS, CFPS and CLDS 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 1985-2017. 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 2018.

Tables and figures of appendix B

Table B.1 Micro Datasets

Year	UHS	CHIP	CHNS	CHFS	CFPS	CLDS
1985	U					
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						

Year	UHS	CHIP	CHNS	CHFS	CFPS	CLDS
2006			U/R			
2007		U/R				
2008						
2009			U/R			
2010				U/R	U/R	
2011			U/R			
2012				U/R	U/R	
2013		U/R				
2014				U/R	U/R	U/R
2015			U/R			
2016				U/R	U/R	
2017						
2018					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

CLDS: China Labor-force Dynamic Survey

Table B.1.1 Summary Statistics: UHS Samples

Year	Variables	Male		Female	
		Mean	S.D.	Mean	S.D.
1986	inc	1486.53	548.38	1243.42	446.76
	Sch	10.48	2.92	9.76	2.79
	Exp	20.48	11.06	17.80	9.50
1987	inc	1543.90	611.65	1293.86	495.03
	Sch	10.61	2.91	9.84	2.71
	Exp	21.04	10.89	18.43	9.46

Year					
1988	inc	1978.88	850.60	1641.86	714.41
	Sch	10.77	2.93	9.94	2.77
	Exp	20.67	10.90	17.99	9.37
1989	inc	2265.28	1012.23	1896.05	867.08
	Sch	10.93	2.97	10.11	2.69
	Exp	20.84	10.94	18.32	9.33
1990	inc	2492.83	1088.00	2095.22	926.88
	Sch	11.10	2.93	10.29	2.70
	Exp	21.20	10.80	18.54	9.30
1991	inc	2739.45	1165.52	2329.82	1008.19
	Sch	11.27	2.95	10.50	2.65
	Exp	20.72	10.52	18.25	9.02
1992	inc	3191.15	1515.73	2686.69	1308.76
	Sch	11.41	2.76	10.72	2.55
	Exp	21.03	10.56	18.65	9.02
1993	inc	4250.97	2785.98	3573.59	2308.58
	Sch	11.39	2.72	10.75	2.54
	Exp	21.37	10.57	19.06	9.09
1994	inc	5877.56	4047.05	4866.42	3408.63
	Sch	11.51	2.77	10.93	2.49
	Exp	21.23	10.55	18.92	9.09
1995	inc	7117.74	4711.64	5936.32	4048.36
	Sch	11.61	2.71	10.97	2.49
	Exp	21.45	10.28	19.19	8.95
1996	inc	7895.53	5463.26	6580.43	4906.46
	Sch	11.64	2.69	11.07	2.42
	Exp	21.78	10.30	19.52	8.98
1997	inc	8467.47	6045.86	6984.53	5324.53
	Sch	11.64	2.68	11.11	2.42
	Exp	21.96	10.13	19.74	8.96

Table B.1.2 Summary Statistics: CHNS samples

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1989	inc					1407.28	1225.66	1218.06	1082.48
	Sch					6.28	4.07	4.53	4.36
	Exp					18.03	11.54	16.50	10.40
1991	inc					1508.19	1325.64	1292.31	1151.76
	Sch					6.72	3.92	4.87	4.32
	Exp					18.42	11.51	17.07	10.46
1993	inc					2162.33	1947.11	1795.33	1520.63
	Sch					7.10	3.73	5.25	4.28
	Exp					19.31	11.55	17.99	10.33
1997	inc					4531.68	3824.43	3598.58	2980.80
	Sch					7.37	3.51	5.51	4.19
	Exp					20.55	11.53	19.36	10.56
2000	inc	10431.51	11295.57	8406.36	8501.73	5399.53	4645.36	4198.55	3413.75
	Sch	11.41	2.96	11.28	2.88	8.00	3.23	6.42	4.11
	Exp	20.83	10.21	18.25	9.16	21.28	11.59	20.43	10.48
2004	inc	14944.66	11100.05	13467.29	10708.73	7459.41	6875.53	5901.10	5361.25
	Sch	11.50	2.82	11.53	2.57	8.29	3.18	6.70	4.08
	Exp	22.94	9.89	20.35	8.72	25.07	10.91	23.14	9.73
2006	inc	19597.95	21241.13	16264.91	15889.06	10322.04	8644.57	7535.19	7020.46
	Sch	11.93	2.82	12.09	2.87	8.42	3.57	6.76	4.36
	Exp	24.48	9.41	20.57	8.61	25.63	10.79	23.58	9.51
2009	inc	26626.04	27659.50	21118.24	20367.51	14558.39	11650.17	11975.35	9575.14
	Sch	11.71	2.87	12.02	2.85	8.32	3.33	7.31	4.08
	Exp	25.43	9.94	20.80	9.17	26.27	10.89	23.89	9.68
2011	inc	39711.42	38699.95	37016.48	37292.52	21741.93	17298.92	16871.88	12837.88
	Sch	12.75	3.16	13.36	3.14	8.74	3.50	7.64	4.14
	Exp	23.80	11.02	18.10	9.36	26.97	10.74	24.51	9.43

		60013.75	79007.63	56634.08	93066.55	34129.49	24040.15	28654.46	21872.66
	inc	60013.75	79007.63	56634.08	93066.55	34129.49	24040.15	28654.46	21872.66
2015	Sch	13.37	3.14	13.75	3.12	9.69	3.39	9.38	3.99
	Exp	24.12	10.78	19.68	9.27	25.22	11.56	22.10	10.54

Table B.1.3 Summary Statistics: CHIP samples

		Urban				Rural			
		Male		Female		Male		Female	
Year	Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
	inc	1933.25	947.00	1632.07	834.47	952.83	878.32	852.82	761.74
1988	Sch	10.70	2.92	10.00	2.75	7.16	3.28	5.02	3.88
	Exp	20.96	10.97	18.25	9.43	18.29	12.37	15.41	10.87
	inc	6704.47	3792.46	5549.35	3115.62	4353.95	3431.38	4198.00	3057.44
1995	Sch	11.70	2.78	11.07	2.60	7.70	2.99	5.80	3.60
	Exp	21.43	10.22	19.14	8.89	19.99	11.97	18.03	10.84
	inc	9308.80	5415.55	7781.78	4684.49				
1999	Sch	12.12	2.70	11.92	2.52				
	Exp	22.08	9.79	19.54	8.75				
	inc	12747.63	7930.79	10479.88	7364.85	5179.86	4951.56	3844.38	3969.00
2002	Sch	12.29	2.78	12.15	2.58	8.49	2.78	6.85	3.68
	Exp	23.18	9.83	20.15	8.87	21.74	12.18	19.79	11.12
	inc	31773.40	29415.76	23730.85	18092.49	13407.57	9938.65	9877.10	7648.87
2007	Sch	12.88	2.85	13.00	2.74	8.20	2.38	7.55	2.52
	Exp	21.26	10.98	16.86	9.28	22.46	12.81	20.11	11.50
	inc	45698.17	23508.40	37740.35	20414.28	27897.79	17462.60	24073.46	16586.34
2013	Sch	12.76	3.05	13.09	3.00	8.82	2.64	7.93	3.09
	Exp	21.05	10.84	17.38	9.46	24.82	13.15	24.28	11.86

432

Table B.1.4 Summary Statistics: CFPS samples

		Urban				Rural			
		Male		Female		Male		Female	
Year	Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2010	inc	31308.87	31832.70	23235.87	20193.65	11777.46	12438.71	7283.85	7965.20
	Sch	11.15	3.76	11.39	3.95	6.81	4.14	5.01	4.43
	Exp	21.52	11.36	17.75	10.00	25.54	11.14	23.57	9.60
2012	Inc	32187.62	32540.11	23125.30	23111.38	19066.41	16710.56	11358.85	11945.27
	Sch	10.48	3.73	10.70	3.99	8.17	3.68	6.46	4.45
	Exp	22.20	11.64	19.22	10.34	23.62	12.05	22.23	10.47
2014	Inc	39034.93	30139.73	29815.95	33024.89	22861.82	21973.53	13393.63	14833.32
	Sch	10.47	4.02	10.66	4.33	7.08	4.17	5.59	4.63
	Exp	21.34	11.86	18.68	10.42	24.63	11.93	23.52	10.35
2016	Inc	41604.41	57636.23	29038.57	30753.27	34066.23	273794.00	18510.40	22234.10
	Sch	10.17	4.21	10.04	4.64	7.85	4.14	7.37	4.81
	Exp	20.16	11.51	18.74	10.18	21.62	12.07	19.39	10.85
2018	Inc	53453.21	42932.65	39877.62	33824.64	25297.48	24340.54	14242.46	19268.52
	Sch	8.36	4.56	8.86	4.76	4.95	3.94	3.79	4.18
	Exp	22.08	11.74	19.93	10.38	30.05	10.65	28.67	10.10

Table B.1.5 Summary Statistics: CHFS samples

		Urban				Rural			
		Male		Female		Male		Female	
Year	Variables	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2010	inc	38350.09	50580.68	30434.63	31834.97	9948.47	12102.50	6570.94	9484.97
	Sch	11.85	3.50	11.96	3.57	8.00	3.03	6.66	3.55
	Exp	21.70	10.26	18.50	8.91	28.05	10.34	25.07	9.46
2012	inc	45633.43	50026.94	36180.74	37652.14	17607.20	16560.41	12352.97	12564.70
	Sch	12.40	3.39	12.64	3.50	8.60	3.10	7.59	3.72
	Exp	19.54	11.33	16.04	10.06	22.70	12.39	20.81	11.25

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2014	inc	55841.15	48518.42	47623.14	39760.84	25457.99	19237.05	20699.56	15452.09
	Sch	12.44	3.49	12.92	3.52	9.14	3.00	8.57	3.63
	Exp	20.11	11.17	16.54	9.84	21.88	12.44	19.80	3.63
2016	inc	63628.29	59194.53	54341.57	48039.43	27733.75	21726.69	21966.49	18571.83
	Sch	12.22	3.45	12.72	3.60	8.93	3.00	8.21	3.77
	Exp	21.17	11.34	17.80	10.03	23.42	12.28	22.12	11.49

Table B.1.6 Summary Statistics: CLDS samples

Year	Variables	Urban				Rural			
		Male		Female		Male		Female	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2014	inc	49140.2	46818.3	39476.19	41543.86	26174.77	33250.29	18752.97	31854.30
	Sch	13.04	2.93	13.35	2.94	8.98	2.46	8.56	2.58
	Exp	21.87	11.30	17.72	9.88	24.78	11.85	21.70	10.48

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

$y = 0.0003x^2 - 0.9441x + 838.03$

urban male intercept

$y = -0.0001x^2 + 0.5778x - 579.77$

urban male return to education

$$y = 0.0007x^2 - 2.5343x + 2426.1$$

urban female intercept

$$y = -0.0002x^2 + 0.6836x - 685.19$$

urban female return to education

436
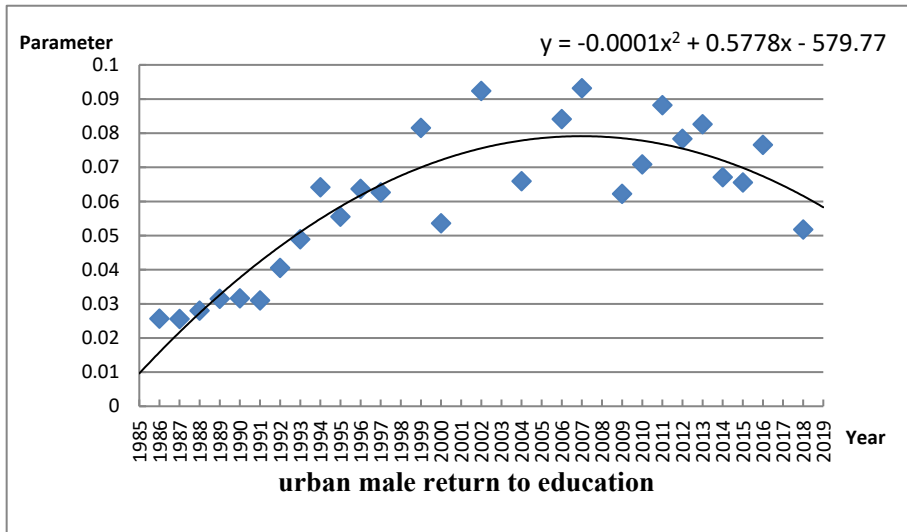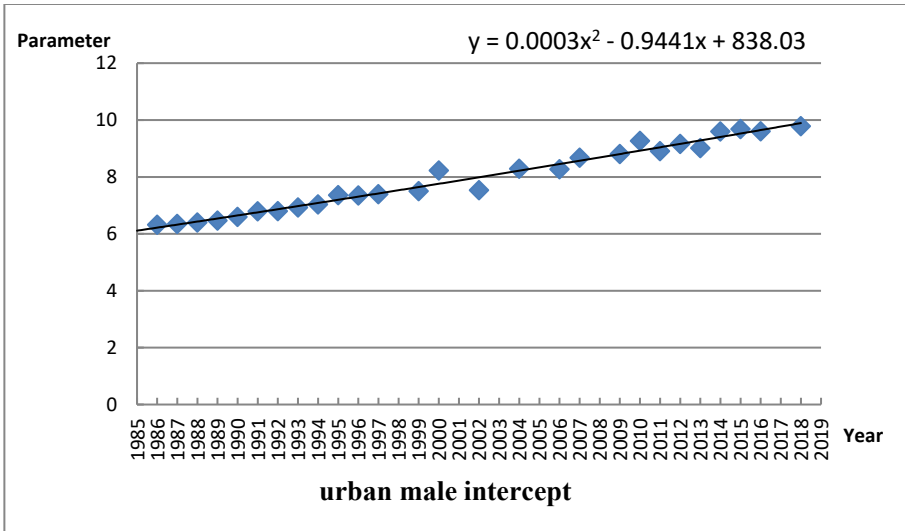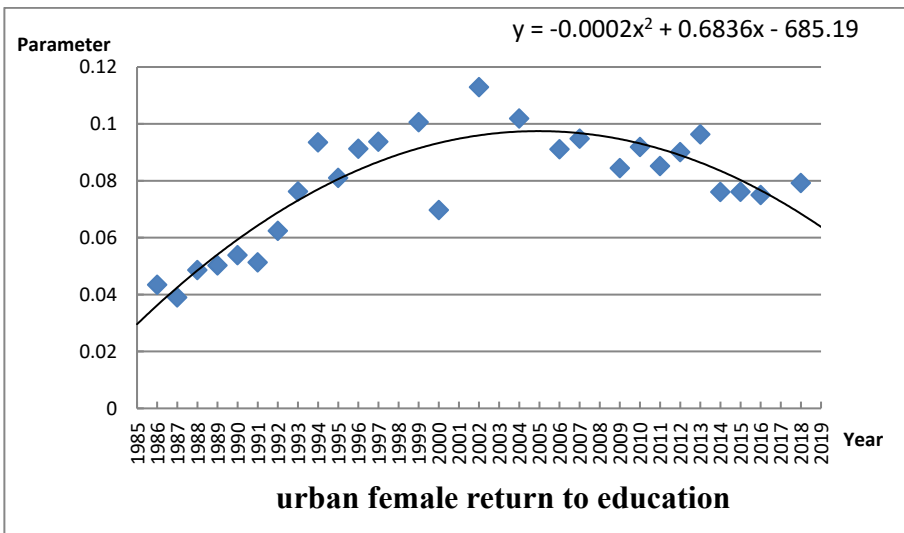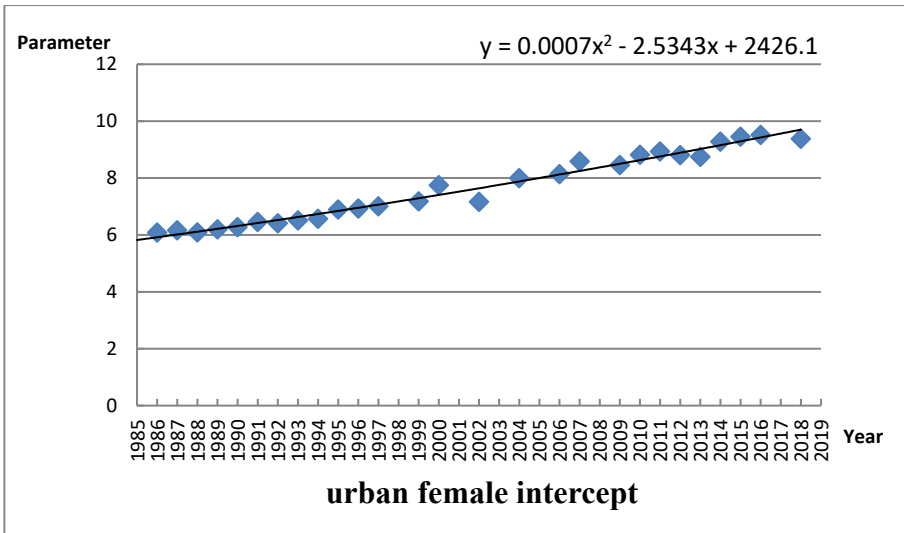
Figures B.5-B.8 Parameter Estimates Against Time: Rural Samples

$y = 0.0006x^2 - 2.3226x + 2207$

rural male intercept

$y = -7E-05x^2 + 0.2815x - 282.47$

rural male return to education

$$y = -0.0002x^2 + 0.7225x - 837.57$$

rural female intercept

$$y = -3E-05x^2 + 0.1281x - 129.04$$

rural female teturn to education
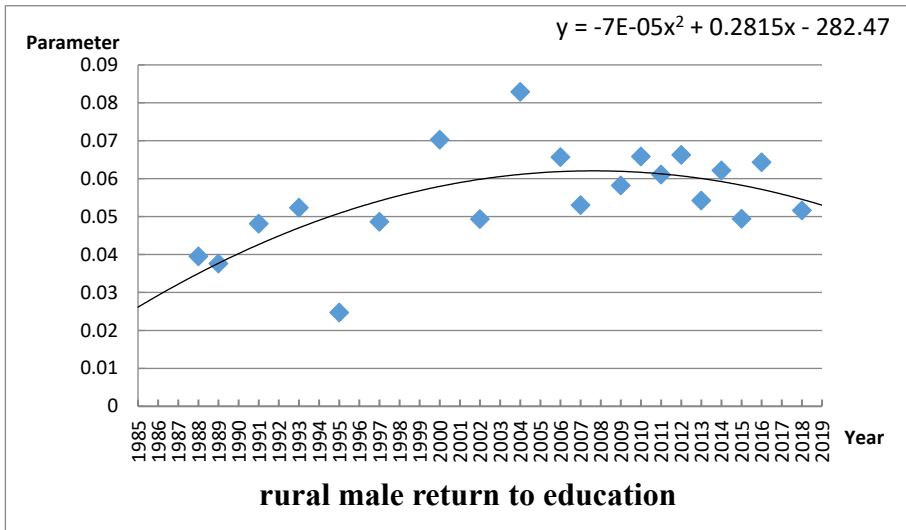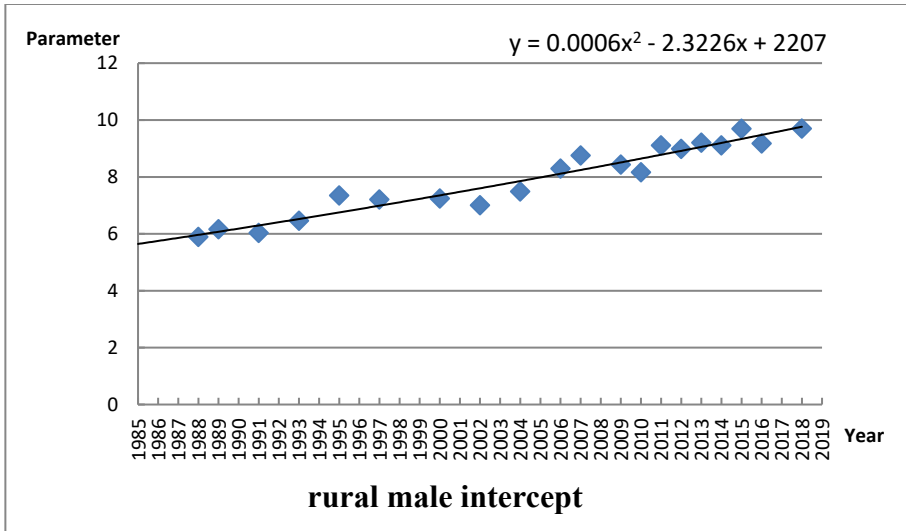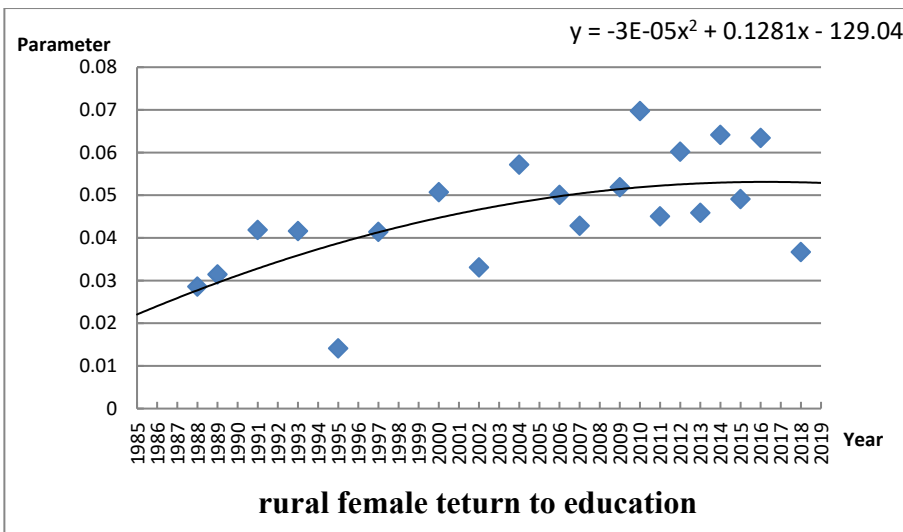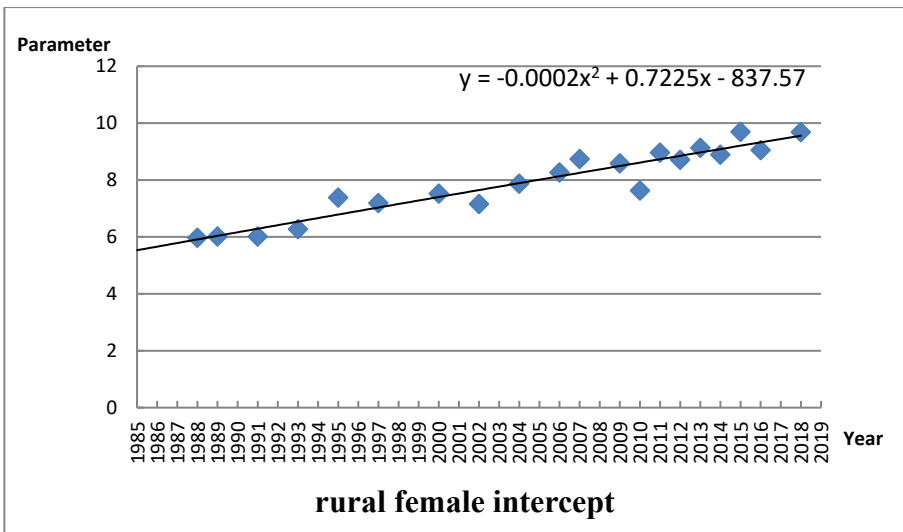
Appendix C Human Capital Stock Calculation

This section summarizes the basic methods and procedures for estimating China's human capital stock from 1985 to 2019 based on the J-F approach. In particular, it explains estimations on some of the variables necessary for the J-F approach based on China's data. We use the following notations:

y indicates calendar years from 1980 to 2019. 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 as five categories for the years 1985-2000 including no schooling (ns), primary school (pri), junior middle school (jm), senior middle school (sm), and college (col). For the years 2000-2019, the levels of education (e) are classified as 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;

where e-n represents students in grade n+1 of education level e

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	0-6
school only	7-15
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, or harmful conditions, the legal retirement age is 55 for males

and 45 for females. For people who become disabled due to illnesses approved by the Labor Ability Appraisal Committee, 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 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 *sch*, work experience *exp* and work experience squared *exp²* by OLS.

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

We use the fitted value of ln yinc from the equation above to obtain $m_i = e^{\ln yinc}$. We regress the annual income observed in the survey data on m_i using the OLS (without the intercept) to obtain the coefficient on m_i, α.[43] Finally, we estimate the annual income of the employed as yinc=$\alpha \times e^{\ln yinc}$.

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

Note that the annual income used for estimating the Mincer equation is in real terms with 1985 as the base 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	-
2000-2019	0	6	9	12	15	16

(2) Coding of work experience:

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

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

For people older than age 16, if s≥10, work experience is *exp=age-sch*-6

2.2 Estimation of annual market income

After estimating the annual income of the employed using the Mincer equation, we obtain $\text{yinc}_{y,s,a,e} = \text{whrs}_{y,s,a,e} \times \text{com}_{y,s,a,e}$.

Given that

$$\text{mhrs}_{y,s,a,e} = \text{whrs}_{y,s,a,e} \times \text{empr}_{y,s,a,e} \quad , \quad \text{ymi}_{y,s,a,e} = \text{whrs}_{y,s,a,e} \times \text{empr}_{y,s,a,e} \times \text{com}_{y,s,a,e}$$

the annual market income is given by:

$$\text{ymi}_{y,s,a,e} = \text{yinc}_{y,s,a,e} \times \text{empr}_{y,s,a,e}.$$

2.2.1 Calculation of employment rate empr(y,s,a,e)

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

Population by age, sex and education in 2010	"China Population Census 2010"
The employed by age group, sex and education in 2010	"China Population and Employment Statistics Yearbook 2011"
The employed by age group, sex in 2015	"China Population and Employment Statistics Yearbook 2015"
The employed by age group, sex and education in 2015	"China Population and Employment Statistics Yearbook 2015"
Population by age, sex and education in 2015	"China Population Census 2015"
The employed by age group, sex and education in 2015	"China Population and Employment Statistics Yearbook 2016"

Note: The 1% sample population in 1995 is converted to the total population by the actual sampling percentage of 1.03%.

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 in 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 assigned to be 0.

3.2 In-school population of each education level and each grade

The in-school population of age a, sex s, education level e, and grade $n+1$ in year y is the enrolled population of age a-n, sex s, and education level e in year y-n:

$$\text{pop\_inschool}(y,s,a,e-n) = \text{NewEnroll}(y-n,s,a-n,e)$$

3.3 Enrollment rate of each education level and each grade

The probability of advancing to the next higher level of education is estimated as 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 of the enrollment rate from no schooling to primary school is:

446

$$senr(y,s,a,pri\text{-}ns) = Newenroll(y+1,s, pri)/ pop(y,s,ns)$$

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.

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:

$$senr(y,s,a,jm\text{-}pri) = newEnroll (y+6, s, jm)/ newEnroll (y, s, pri)$$

(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:

$$senr(y,s,a,jm\text{-}pri\text{-}1) = newEnroll (y+5,s,jm)/ newEnroll (y-1,s,pri)$$

(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:

$$senr(y,s,a,jm\text{-}pri\text{-}2) = newEnroll (y+4,s,jm)/ newEnroll (y-2,s,pri)$$

(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 are worth noting:

(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 suspends 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 periods 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 the 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 periods divided by urban real wage in T-1 period. Results show that, for the 32-year period, 1985-2019, annual growth rates on average are 6.19% and 8.17% 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 final educational attainment is junior middle school. We discount that income by 6 years to reflect the fact that it takes 6 years for him to reach junior middle school: senr(y,s,a,jm-pri)*mi(y,s,a+6,jm)*R^6

(2) If an individual in the second grade of primary school can advance to the next higher level of education, his human capital is calculated as: senr(y,s,a,jm-pri-1)*mi(y,s,a+5,jm)*R^5，discounted by 5 years as it takes him 5 years to reach junior middle school.

(3) Similarly, we can calculate the human capital of the group in each grade of primary school.

6.1.2 Human capital of the group in junior middle school and above by age and sex

Take junior middle school as an example.

(1) If an individual in the first grade of junior middle school can advance to the next higher level of education, he could get human capital equal to that of someone who is currently three years older and whose final

educational attainment is senior middle school. We discount that income by 3 years as it takes 3 years for him to reach senior middle school: senr(y,s,a,sm-jm)*mi(y,s,a+3,sm)*R^3

(2) If an individual in the second grade of junior middle school can advance to the next higher level of education, his human capital is calculated as:

senr(y,s,a,sm-jm-1)*mi(y,s,a+2,sm)*R^2, discounted by 2 years as it takes 2 years for him to reach senior middle school.

(3) Similarly, we can calculate the human capital of the group in each grade of junior middle school.

For the years that we do not observe separate enrollments for university and college (there are five categories for education level, and the last level is college and above), we get the human capital of the group in the first grade of senior middle school as:

senr(y,s,a,col-sm)*mi(y,s,a+3,col)*R^3

For grade 2 and 3 students, the human capital is given by:

senr(y,s,a,col-sm-1)*mi(y,s,a+2,col)*R^2

and

senr(y,s,a,col-sm-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-sm)*mi(y,s,a+3,col)*R^3+senr(y,s,a,uni-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-sm-1)*mi(y,s, a+2,col)*R^2+senr(y,s,a,uni-sm-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:

$$\text{pop\_noschool(y,s,a,e)} = \text{pop}(y, s, a,e) - \text{pop\_inschool(y,s,a,e)}$$

Note that following adjustment is made for negative values in the out-of-school population.

(1) Rewrite the negative numbers of the out-of-school population for certain gender, age and education level as 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 only 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: 1985-2019

The income estimated by the Mincer equation is the real yearly income (using 1985 as the base). We use CPI and real income to obtain the nominal yearly income.

Tables C.1- C.2 report the real human capital in China with 1985 as the baseline year. Tables C.3-C.4 show the labor force human capital.

In all these tables, we report the results based on six education categories from 1985-2019. Due to data limits, initially when we do the imputation, we do not differentiate college and university before 2000; 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 record the population of university by age, sex and region. It is 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.

Tables and figures of appendix C

Table C.1 Real Human Capital by Region and Gender, 1985-2019

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	11734	5947	12245	12538
1986	14182	6550	13514	12656
1987	15038	7133	14806	12946
1988	14707	7140	14770	12137
1989	14879	7387	14429	11245
1990	17161	8899	16124	12004
1991	19032	10207	18201	12769
1992	20283	11202	19868	13211
1993	20130	11345	19804	12558
1994	18331	10572	18082	11033
1995	17676	10338	17071	10175
1996	19796	11555	17405	9955
1997	23174	13625	18804	10319
1998	27762	16421	21005	11113
1999	33307	20204	23422	11964
2000	38346	23739	25991	12618
2001	43821	27614	27818	13287
2002	50873	31459	29401	14021
2003	57184	34915	31222	14530
2004	62340	38434	31714	14701
2005	68334	42266	32849	15299
2006	79703	48200	36212	16780
2007	89081	53496	37640	17647
2008	97174	57847	38467	18471
2009	113030	66540	42338	20613
2010	125029	72919	44222	22044

Year	Urban Male	Urban Female	Rural Male	Rural Female
2011	141490	81311	42555	21546
2012	160673	90963	42341	21721
2013	186091	103015	41888	21815
2014	206906	110725	42333	22384
2015	225864	115686	43453	23466
2016	247744	124205	43364	24546
2017	271781	132062	43741	26012
2018	295262	138091	43496	27349
2019	316553	142398	42465	28384

Note: The results are based on six education categories.

Table C.2 Per Capita Real Human Capital by Region and Gender, 1985-2019

Unit: Thousand Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	98.33	58.81	31.01	35.20
1986	113.18	62.43	34.23	35.78
1987	114.88	65.60	37.54	36.50
1988	106.31	62.15	37.15	34.34
1989	102.56	61.05	36.14	31.89
1990	113.52	70.02	40.11	33.84
1991	122.19	77.09	45.20	35.94
1992	126.63	81.22	49.52	37.26
1993	122.54	79.14	49.68	35.54
1994	109.54	71.29	45.73	31.29
1995	103.67	67.33	43.45	28.85
1996	108.53	70.82	45.19	28.92
1997	119.46	78.74	49.84	30.69
1998	135.24	89.72	56.62	33.71

Year	Urban Male	Urban Female	Rural Male	Rural Female
1999	154.17	104.98	64.22	37.08
2000	169.83	118.02	72.88	40.14
2001	185.72	130.37	80.07	43.17
2002	206.50	141.27	87.49	46.89
2003	223.27	149.74	96.24	50.17
2004	235.19	158.32	101.25	52.41
2005	249.30	167.33	108.39	56.20
2006	278.41	184.75	120.11	62.47
2007	300.22	199.81	126.36	67.11
2008	318.38	211.65	130.76	71.74
2009	358.07	236.75	145.68	81.73
2010	383.78	252.49	154.14	89.24
2011	414.33	269.28	154.06	90.89
2012	453.01	290.58	159.75	95.72
2013	514.64	320.74	164.94	100.28
2014	562.10	340.58	173.11	106.32
2015	607.88	351.52	183.23	114.53
2016	658.66	370.89	188.45	122.56
2017	716.32	391.40	195.67	133.87
2018	770.31	409.26	199.76	146.05
2019	820.22	421.70	199.78	157.12

Note: The results are based on six education categories.

Table C.3 Real Labor Force Human Capital by Region and Gender, 1985-2019

Unit: Billion Yuan

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	5419	2160	5149	5444
1986	5951	2437	5803	5688
1987	6437	2717	6518	5958

Year	Urban Male	Urban Female	Rural Male	Rural Female
1988	6200	2686	6592	5610
1989	6214	2765	6574	5267
1990	7150	3257	7522	5715
1991	7705	3601	8516	6064
1992	7921	3829	9321	6281
1993	7541	3779	9325	5986
1994	6629	3446	8604	5296
1995	6311	3388	8239	4913
1996	7046	3696	8541	4827
1997	8273	4288	9292	5016
1998	9945	5110	10480	5423
1999	11795	6059	11828	5899
2000	13683	6999	13090	6346
2001	15251	7885	13899	6666
2002	17364	8972	14662	7003
2003	19293	10020	15340	7259
2004	21092	10970	15300	7249
2005	23539	12297	15728	7531
2006	28232	14429	17590	8338
2007	31699	16017	18661	8903
2008	34542	17280	19369	9366
2009	41070	20220	21491	10505
2010	46756	22698	22653	11316
2011	52308	25039	22108	11261
2012	59173	27672	22363	11545
2013	66277	30842	22466	11832
2014	73517	32274	22876	12282
2015	80908	34259	23662	12970
2016	89204	37106	23954	13756
2017	98413	39918	24338	14679

Year	Urban Male	Urban Female	Rural Male	Rural Female
2018	109145	42794	24309	15511
2019	118643	45315	23952	16249

Note: The results are based on six education categories.

Table C.4 Per Capita Real Labor Force Human Capital by Region and Gender, 1985-2019

Unit: **Thousand Yuan**

Year	Urban Male	Urban Female	Rural Male	Rural Female
1985	70.75	33.54	22.26	25.86
1986	73.67	35.85	24.71	26.40
1987	75.21	37.71	27.30	26.99
1988	68.50	35.15	27.12	25.39
1989	64.87	34.04	26.50	23.65
1990	70.63	37.75	29.62	25.27
1991	74.05	40.16	33.21	26.57
1992	74.69	41.21	36.17	27.30
1993	70.29	39.41	36.16	25.85
1994	61.28	34.90	33.24	22.62
1995	57.51	33.15	31.83	20.81
1996	59.62	34.11	33.28	20.80
1997	65.08	37.14	36.59	21.97
1998	72.92	41.38	41.64	24.07
1999	81.06	46.11	47.29	26.55
2000	88.47	50.13	52.86	28.98
2001	95.10	53.87	57.48	30.95
2002	104.53	58.61	62.36	33.20
2003	111.99	62.59	67.23	35.22
2004	117.97	65.66	69.49	36.21

Year	Urban Male	Urban Female	Rural Male	Rural Female
2005	126.50	70.38	73.74	38.57
2006	144.61	80.22	82.37	43.17
2007	156.65	87.56	87.51	46.80
2008	165.62	93.11	91.24	50.05
2009	189.15	105.89	101.91	57.16
2010	206.67	114.99	108.19	62.65
2011	222.78	122.67	108.22	64.18
2012	244.71	132.20	112.63	67.90
2013	270.65	144.47	116.54	71.61
2014	294.39	149.79	122.30	76.11
2015	319.59	156.35	129.86	82.13
2016	349.11	166.78	133.74	87.88
2017	382.73	178.91	138.67	95.98
2018	419.06	192.40	141.00	104.83
2019	450.89	203.44	140.77	113.13

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 in this report for the purpose of comparing the value of physical capital with that of human capital.

(2) Productive capital stock: measures the volume (or productive capacity) of physical capital. To be used, for example, in productivity analysis.

Note that when geometric depreciation is adopted, the wealth capital and productive capital stocks are identical.

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 geometric depreciation.

(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 depreciation and with the 1985 value set equal to one.

(5) An index of real growth in capital services, based on hyperbolic depreciation using parameters adopted by the U.S. Bureau of Labor Statistics and the Australian Bureau of Statistics and with the 1985 value set equal to one.

The first four variations of capital stock (and services) measures are derived using a modified version 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 the 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 the 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). We use the data of 2003-2017 to calculate the proportion of "construction and installation engineering, equipment and appliances purchase, others" in the total investment in fixed assets of the whole society in each year, and split the total fixed capital formation in 2003-2017 according to the proportion of each year.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 to all three types of assets (structures, equipment, "others"). In the case of provinces (or years) with missing nominal GFCF values and/or missing GFCF real growth rates, the deflator of industry value-added is used as proxy (with values from *Sixty Years*).

CPI data are obtained from the NBS website.

Income accounts data are obtained in two steps in order to address statistical breaks and to ensure that income accounts data and aggregate expenditure data (including GFCF) are consistent. First, the share of each income component in aggregate income is calculated. The underlying income data for the years since 1993 are from the NBS website and for the years 1978 through 1992 from *GDP 1952-1995*. Shares for the years 1950-1977 are set equal to the average 1978-1982 shares. In a second step, absolute values are obtained by multiplying the share values by aggregate expenditures (using data from the same sources as reported above for GFCF, one of the components of aggregate expenditures).

Missing data are addressed through appropriate approximations. For example, (early) Chongqing GFCF data are constructed as

$$\text{Chongqing GFCF} = \frac{Sichuan\ GFCF}{\text{Sichuan GCF}} * Chongqing\ GCF \tag{1}$$

With the data taken from *Sixty Years* (and GCF denoting gross capital formation, i.e., GFCF plus inventory investment). A very occasional unreasonably extreme data point may be replaced by the mean of the previous and following years' values. A list of all special adjustments has been compiled.

3. Initial capital stock

The initial year of our capital stock series is 1952. The (province-specific) capital stock value W_{1952} is obtained equally for all our measures of capital as

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

$GFCF_{1953}$ is GFCF of the year 1953, θ is the asset-specific average annual (geometric) real growth rate of GFCF between 1953 and 1957, and δ is the asset-specific depreciation rate (using the double-declining balance method). For some but not all provinces, GFCF value would have been available for 1950-1952, and a judgment was made that the first somewhat reliable (non-erratic) post-war GFCF value is probably the 1953 value.

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 all "others."

The procedure comprises two stages. First, constant-price GFCF of a particular type of asset is subjected to a survival function and age-efficiency profile to obtain productive capital stock, or to a survival function and age-price profile to obtain wealth capital stock.

Second, to obtain the growth rate of aggregate capital services, the growth rates of different types of productive capital stock (structures, equipment, "others") are combined using a Tornqvist index with user costs as weights. Aggregate (nominal or constant-price) wealth capital stock is

obtained by summing the asset-specific wealth capital stock, while the real growth rate of the aggregate wealth capital stock is obtained by combining the real growth rates of asset-specific wealth capital using a Tornqvist index, with current-price wealth capital values used in constructing the weights.

4.1 Geometric age-efficiency profile, single type of asset

We follow common practice in the case of a geometric age-efficiency profile, of not separately including a survival function in deriving asset-specific productive or wealth capital stock. With a geometric age-efficiency profile, age-efficiency and age-price profile are identical, and thereby asset-specific productive capital stock and wealth capital stock are identical. The formula for geometric age-efficiency is

$$g_n = (1 - \delta)^n \tag{3}$$

where n denotes age and δ denotes the rate of efficiency decline or the depreciation rate. The rate of efficiency decline (depreciation rate) is obtained using the double-declining balance method, as 2 divided by the average service life. Starting at twice the average service life, efficiency (as well as the price) is set equal to zero.

4.2 Hyperbolic age-efficiency profile, single type of asset

The survival function is 1 minus the asset-specific cumulative normal distribution, with asset-specific average service lives given above, and a standard deviation equal to one-quarter of the average service life.

The age-efficiency profile is described by the hyperbolic function

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

In this report, parameters for the hyperbolic function are set to those used by the U.S. Bureau of Labor Statistics and the Australian Bureau of Statistics. Specifically, 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 U.S. Bureau of Labor Statistics and by the Australian Bureau of Statistics, a discount rate of 4% as a long-run average rate of return is assumed in deriving the age-price profile from the age-efficiency profile.

4.3 Aggregate capital values and growth rates

To obtain the real growth rate of aggregate productive capital stock or of capital services (assumed to be a fixed proportion of the productive capital stock), the growth rates of the different types of assets—structures, equipment, and "others"—at a particular point in time t are aggregated using the Tornqvist index T:

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

where Z denotes the growth rate of constant-price productive capital stock K.

The asset-specific weight in the Tornqvist index is the arithmetic mean of a previous-year and a current-year value denoting the share of this asset's user cost U_i in aggregate user costs U:

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

The user cost of a particular type of asset (type of productive capital) is defined as the rental rate times the current-price productive capital stock (q*K), with the rental rate covering depreciation and a rate of return, less appreciation of the asset during the period:

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

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:

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

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, 1985-2017（hyperbolic）
Unit: 1 billion of 1985 Yuan

Province	1985	1990	1995	2000	2005	2017
Beijing	43	99	192	364	721	2604
Tianjin	32	56	95	166	313	2142
Hebei	76	118	200	402	723	3492
Shanxi	43	64	87	135	256	1304
Inner Mongolia	25	41	76	123	337	2818
Liaoning	79	132	207	289	522	2261
Jilin	32	51	80	122	229	1759
Heilongjiang	56	86	122	195	310	1457
Shanghai	59	110	213	418	699	2011
Jiangsu	83	187	408	799	1606	7514
Zhejiang	13	26	136	389	941	3784
Anhui	38	66	107	182	316	1701
Fujian	25	41	78	165	303	1766
Jiangxi	34	51	85	148	312	1523
Shandong	101	176	287	509	1041	4982

Province	1985	1990	1995	2000	2005	2017
Henan	80	132	212	396	744	5352
Hubei	56	85	145	294	509	2750
Hunan	39	58	83	134	234	1316
Guangdong	78	134	332	685	1336	6348
Guangxi	35	44	71	119	215	1587
Hainan	6	14	35	50	74	366
Chongqing	37	48	78	149	330	1738
Sichuan	60	88	129	233	428	1999
Guizhou	23	32	42	70	136	755
Yunnan	57	69	109	177	284	1768
Tibet	6	8	12	16	33	229
Shaanxi	33	57	79	120	211	1173
Gansu	27	40	49	72	133	589
Qinghai	11	16	21	39	81	597
Ningxia	11	15	20	27	54	478
Xinjiang	26	43	86	141	246	1258
National	**1678**	**2613**	**4304**	**7187**	**12864**	**55545**

Table D.2   Wealth Capital Stock at Constant Prices, 1985-2017（geometric）

Province	1985	1990	1995	2000	2005	2017
Beijing	51	116	228	436	862	3182
Tianjin	38	67	115	202	376	2574
Hebei	95	147	244	483	870	4239
Shanxi	54	80	109	167	308	1590
Inner Mongolia	31	50	92	150	390	3422
Liaoning	102	163	253	358	628	2810
Jilin	40	63	99	151	275	2148
Heilongjiang	152	106	152	240	381	1765
Shanghai	71	132	253	502	850	2487
Jiangsu	99	220	481	954	1914	9169
Zhejiang	15	31	151	448	1097	4622

Province	1985	1990	1995	2000	2005	2017
Anhui	46	80	130	222	382	2042
Fujian	31	50	93	196	363	2115
Jiangxi	43	64	104	180	371	1850
Shandong	122	213	351	618	1243	6071
Henan	99	162	259	478	892	6429
Hubei	70	106	176	352	615	3285
Hunan	49	73	103	165	284	1587
Guangdong	94	163	388	811	1592	7652
Guangxi	45	57	87	144	258	1918
Hainan	8	17	41	61	92	438
Chongqing	47	61	96	180	389	2080
Sichuan	73	109	160	283	517	2417
Guizhou	29	40	53	86	164	892
Yunnan	76	89	135	215	345	2078
Tibet	8	10	15	20	40	270
Shaanxi	41	70	99	149	257	1429
Gansu	34	51	63	90	161	712
Qinghai	14	20	27	48	97	700
Ningxia	14	19	25	35	66	554
Xinjiang	32	52	103	172	298	1504
National	**2082**	**3237**	**5268**	**8781**	**15571**	**67522**

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