Human Capital in China

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Importance of Human Capital Measurement

- **Research shows that human capital has a significant effect on innovation, productivity growth, economic development, individual welfare, and country sustainability**
- **Understanding the role of human capital relies on the appropriate measure of human capital**
- **It is important to develop complimentary and multi-faceted measures of human capital**
- **We must understand human capital in interpreting results to form policy implications**

Choices

- **Barbara M. Fraumeni (ed.) *Measuring Human Capital*, editor and co-author of the introduction and three chapters, Academic Press, Cambridge, MA, 2021.**

- **Introduction by Gang Liu and myself, available as a NBER Working Paper and an IZA Discussion Paper**

Major Measures of HC

- **Monetary**
  - **World Bank (CWON)**
  - **UNEP and Kyushu Inclusive Wealth Report (IWR)**
- **Index**
  - **World Bank (WB)**
  - **UN Human Development Index (HDI)**
  - **Institute for Health Metrics and Evaluation (IHME)**
  - **World Economic Forum (WEF)**

Index Measures

- **Core categories for WB, HDI, and IHME**
  - **Education**
  - **Health**
- **HDI also includes the standard of living**
- **WB and HDI use expected years of school, IHME average**
- **WB and IHME include the quality of education and stunting, HDI includes neither**

WEF

- **Most unlike the other measures**
- **Four dimensions are capacity, deployment, development, and know-how**
- **Includes results from their Executive Opinion Survey**
- **Uses information from LinkedIn**
- **Measures the skill diversity of recent tertiary graduates with a Herfindahl-Hirschman Index (HHI) of concentration among the broad fields of study**

Correlations Among Measures

- **Two types: Level and ranking**
- **For the indexes: WB, HDI, IHME, are uniformly high**
- **For the monetary measures: WB and IWR, ranking is high, but level is not**
  - **WB uses market exchange rates**
  - **IWR uses purchasing power parity**
- **WEF correlations with others could be very different**

CHLR Human Capital Project

- **A large human capital database, 1985-2019**
  - National and provincial level data on population, human capital and other economic variables, including for Hong Kong & Taiwan
- **Provincial living-cost adjustment index**
- **Physical capital stocks, 1952(3)-2017**
- **Freely available to public**
  - Downloading at http://humancapital.cufe.edu.cn/ or http://cedcdata.cufe.edu.cn/cedc/metadata/list.html

Physical Capital Estimation to Complement HC

- **Provincial physical capital estimates**
  - To be jointly used with human capital measures in research

- **Methodology**
  - Holz, Carsten A., and Sun Yue, "Physical Capital Estimates for China's Provinces, 1952-2015 and Beyond." *China Economic Review*
  - OECD Manuals Measuring Capital (2001, 2009) and Measuring Productivity (2001)

Types of Physical Capital Stocks

Wealth capital stock

Purchasing price

Year 0

Sales price if sold at end of year…

Year 1

Year 2

…

Year 10

Productive capital stock

Year 0

Year 1

…

Year 10

Physical Capital Measured

- **Wealth capital stock**
  - Most similar to J-F human capital stock as both have a lifetime component

- **Capital services, which are associated with productive physical capital stocks**
  - Relevant for production models
  - $CSF_t=(r_t + d_t$ -capital $gain_t)*P_tK_t$
  - CSF quantity is normally determined with a Törnqvist index

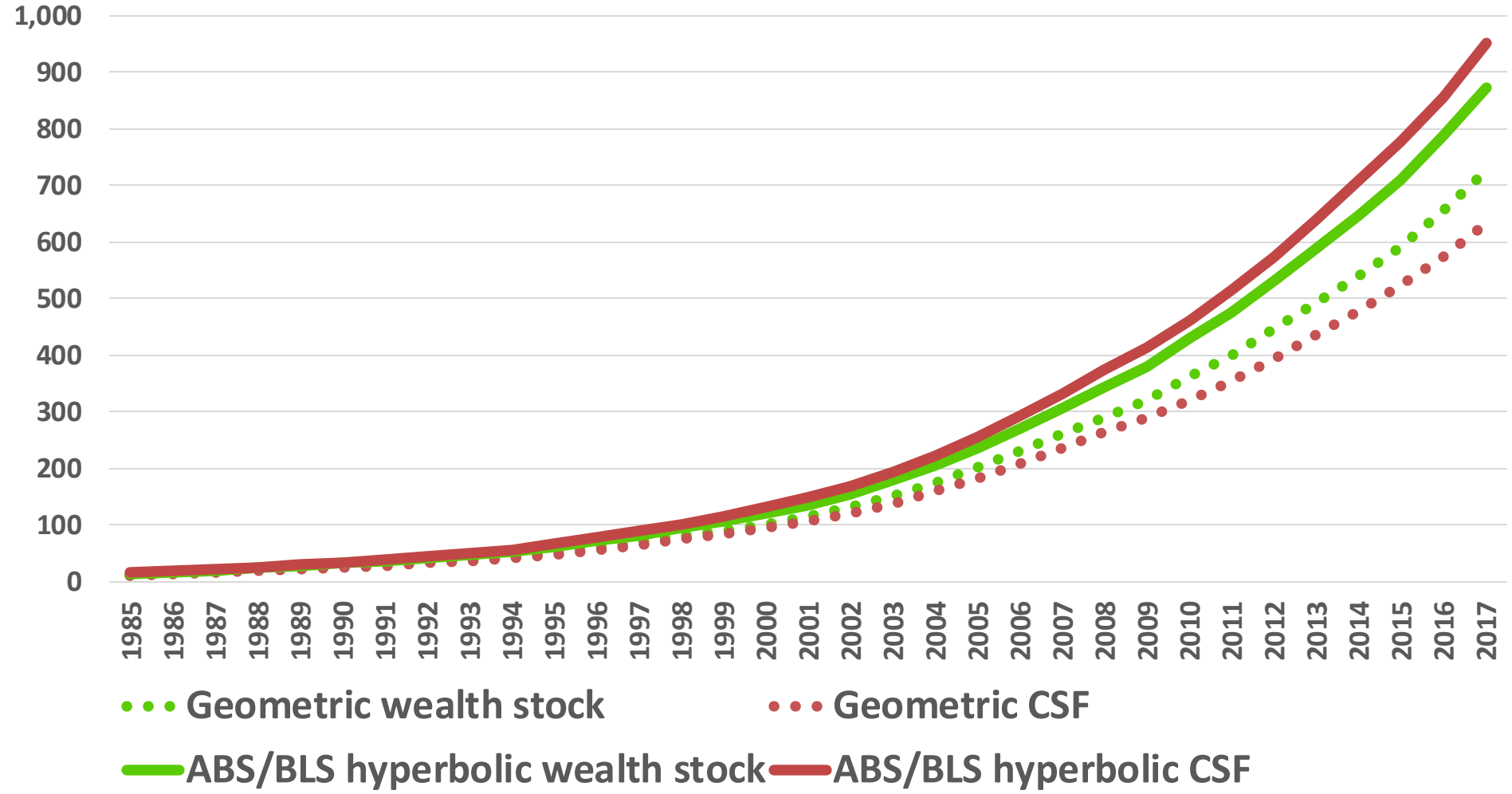
- **Physical capital stocks are created with a perpetual inventory method**
  - $K_t = (1-\delta_t)\ K_{t-1} + I_t$

Available Data

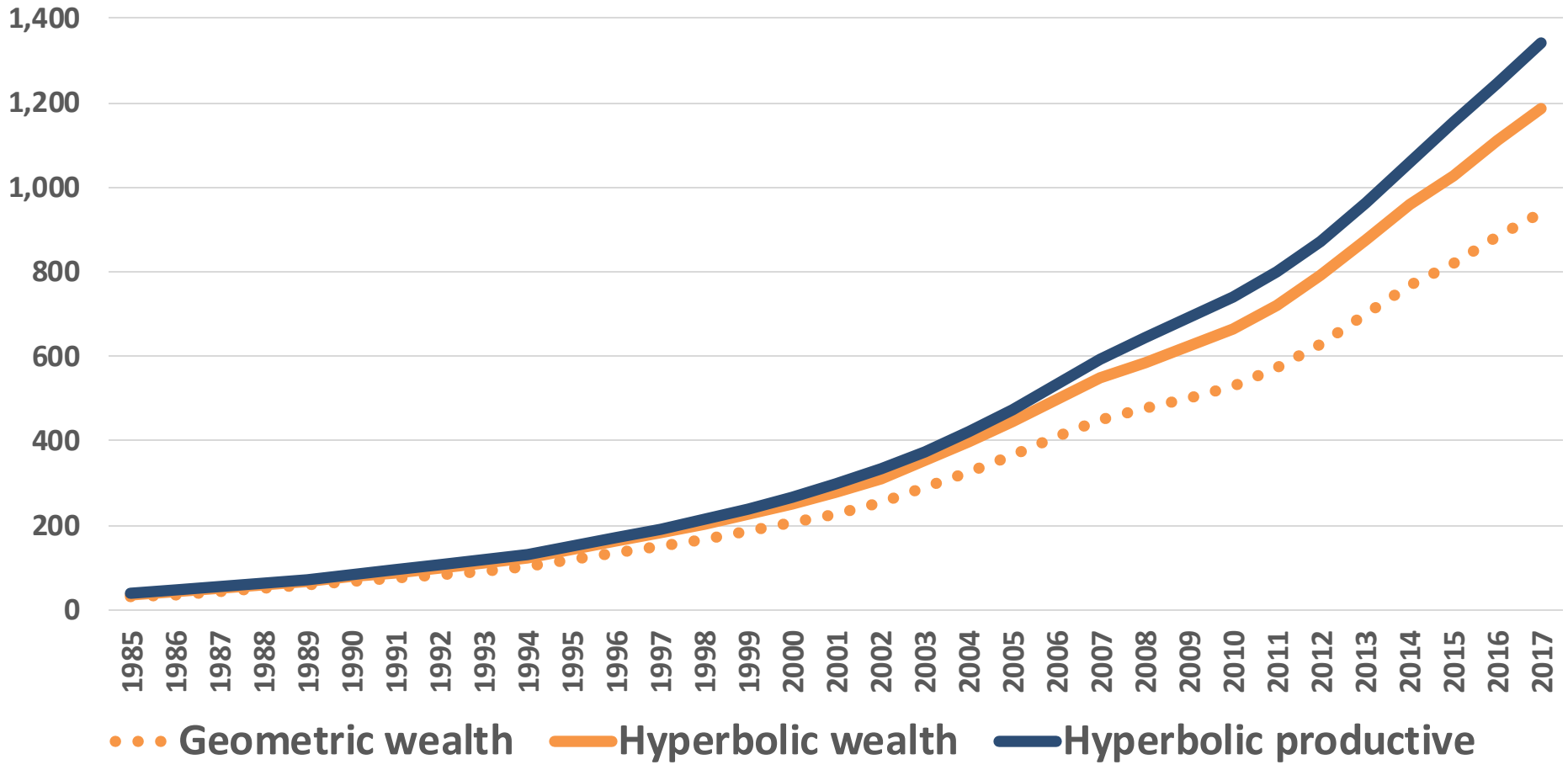
- **Double declining geometric, BEA geometric and ABS/BLS hyperbolic variations**
  - Wealth stock
  - Productive stock
  - CSF and its components, including Törnqvist indexes

- **For the nation and the provinces**
  - 1952-2017, nominal and real

Beijing 1985 RMB Geometric & ABS/BLS Hyperbolic Wealth Stocks & Capital Service Flows (1.0 in 1952)



Beijing 1985 RMB Geometric & ABS/BLS Hyperbolic Structures Wealth & Productive Stocks (billions RMB)



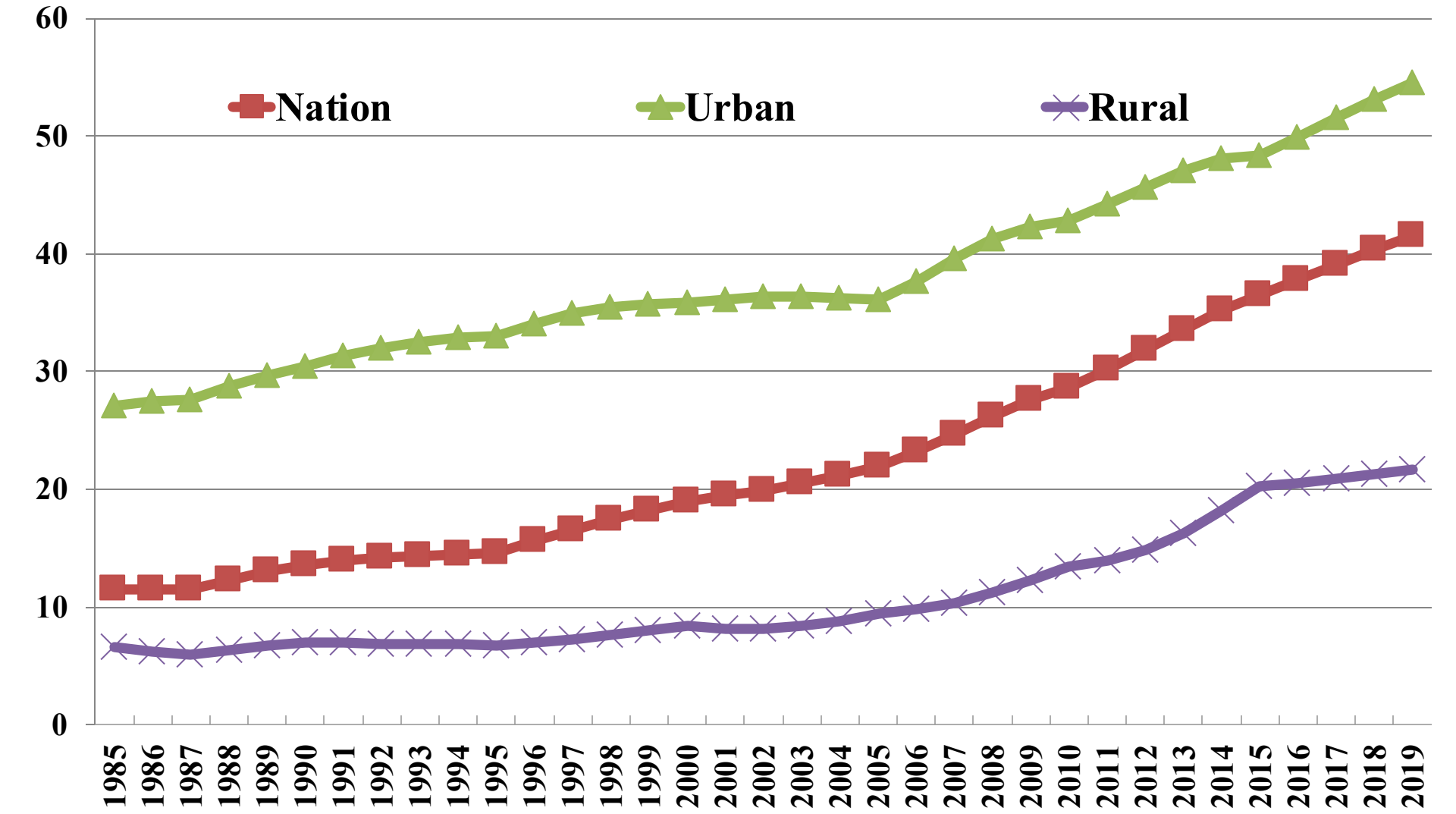
J-F HC Methodology with Modifications

- **Jorgenson-Fraumeni lifetime income-based approach**
  - Uses market value, i.e., lifetime earnings, to represent human capital services
  - Used by the World Bank
- **Modifications of J-F Framework to apply for China**
  - Incorporates the Mincer human capital model to estimate individual earnings
  - Augments the Mincer model with macro-variables (provincial level) to overcome data availability at provincial level

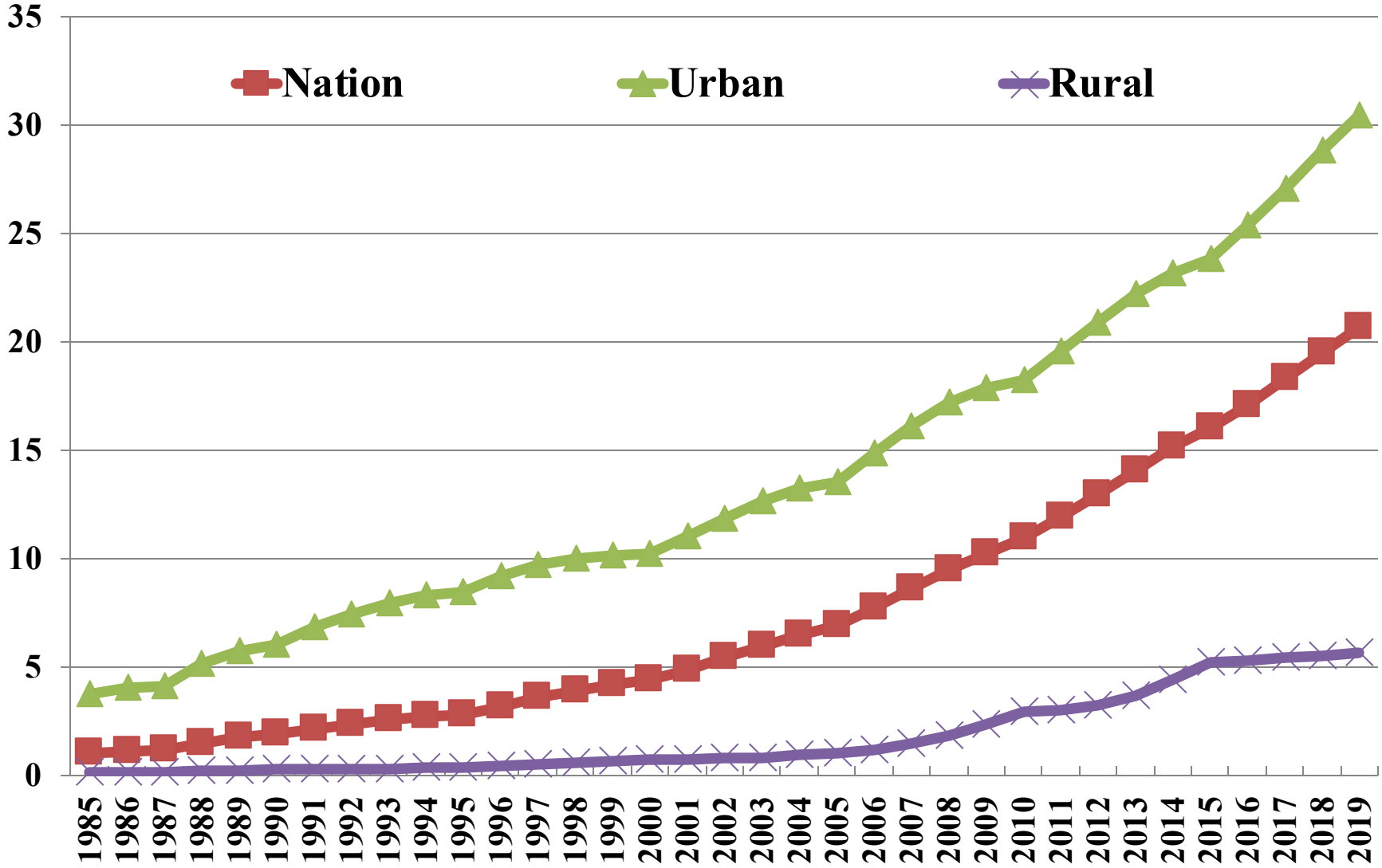
Descriptive Statistics of the Labor Force

- **Average age**
  - In 1985, urban at age 33, rural at age 32
  - By 2019, both at age 39
- **Average years of school**
  - Nation increased from 6.1 to 10.5
  - Rural increased from 5.5 to 9.1
  - Urban increased from 8.2 to 11.4

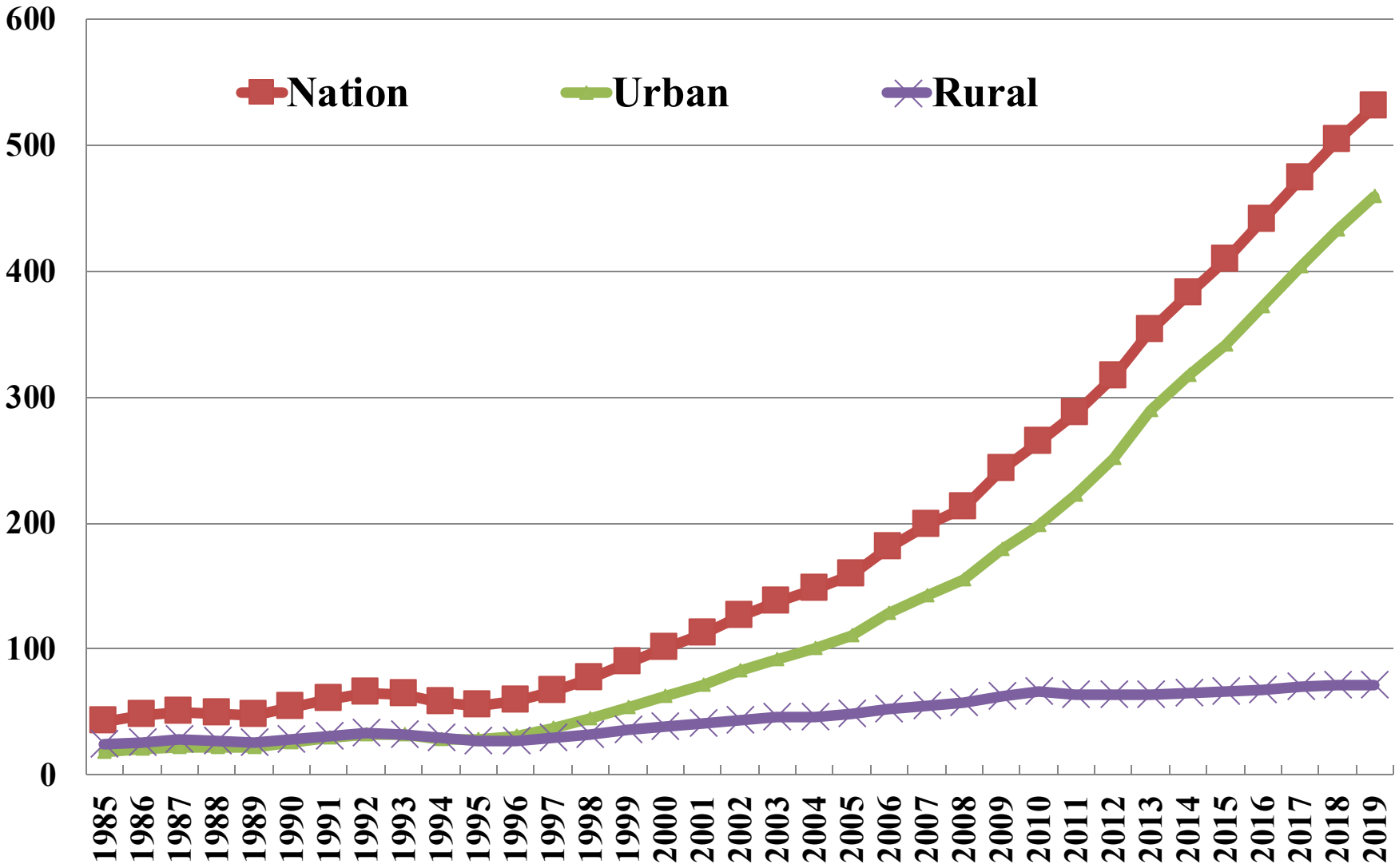
Proportion of Labor Force with at least a High School Degree



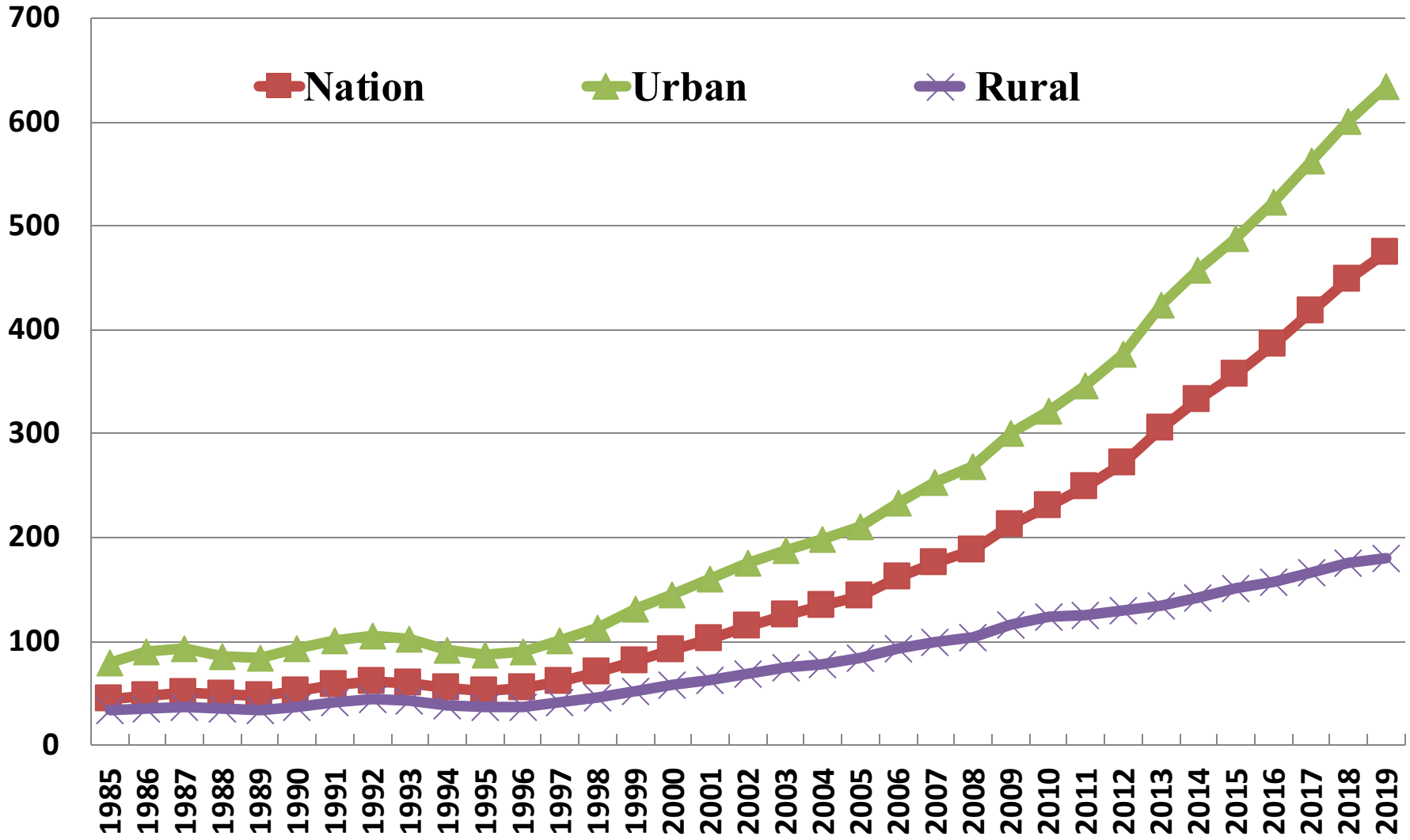
Proportion of Labor Force with at least a College Degree



J-F HC Measure: National Human Capital Stock (Trillions of 1985 RMB)



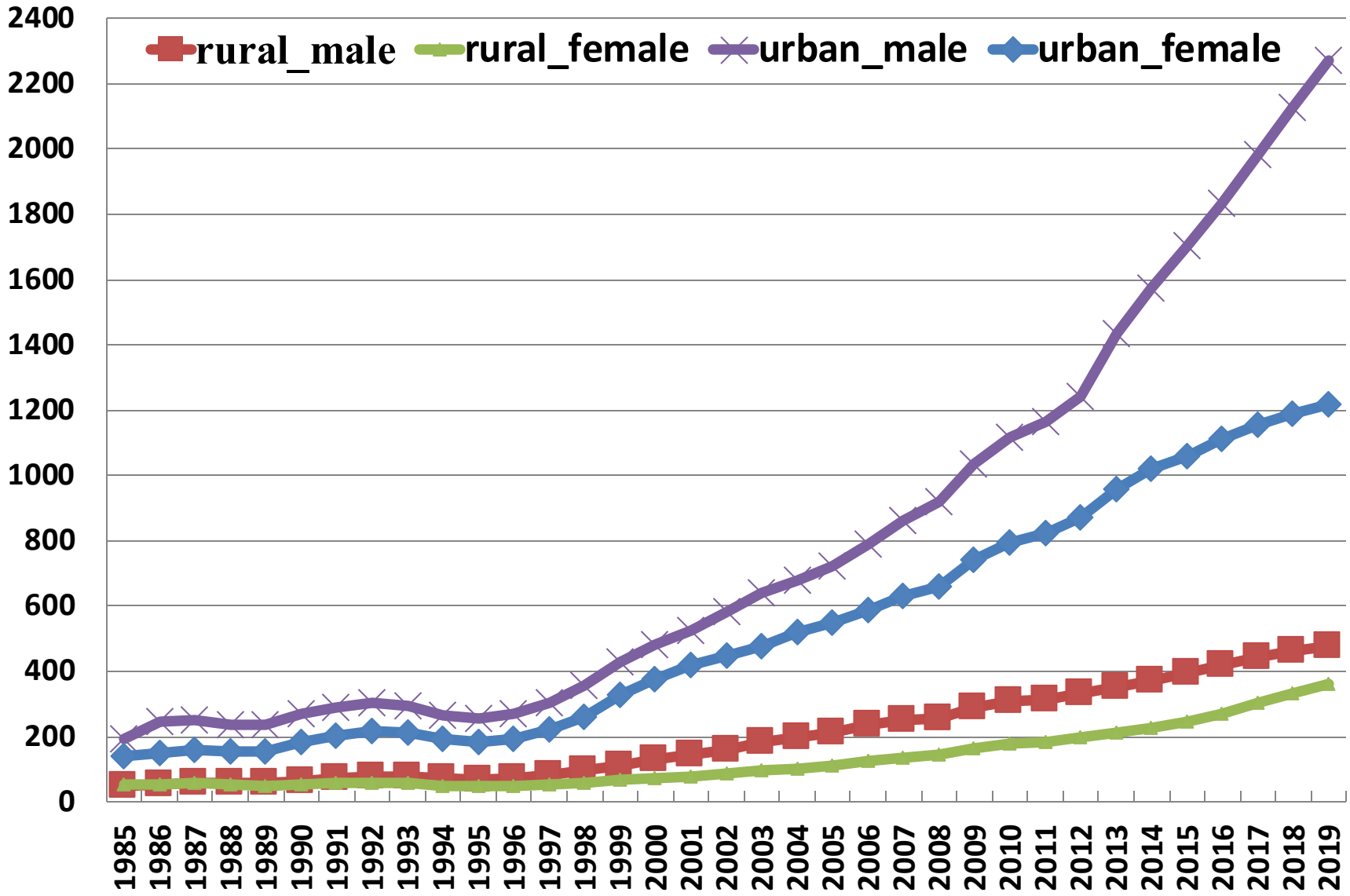
J-F HC Measure: National Human Capital per Capita (Thousands of 1985 RMB)



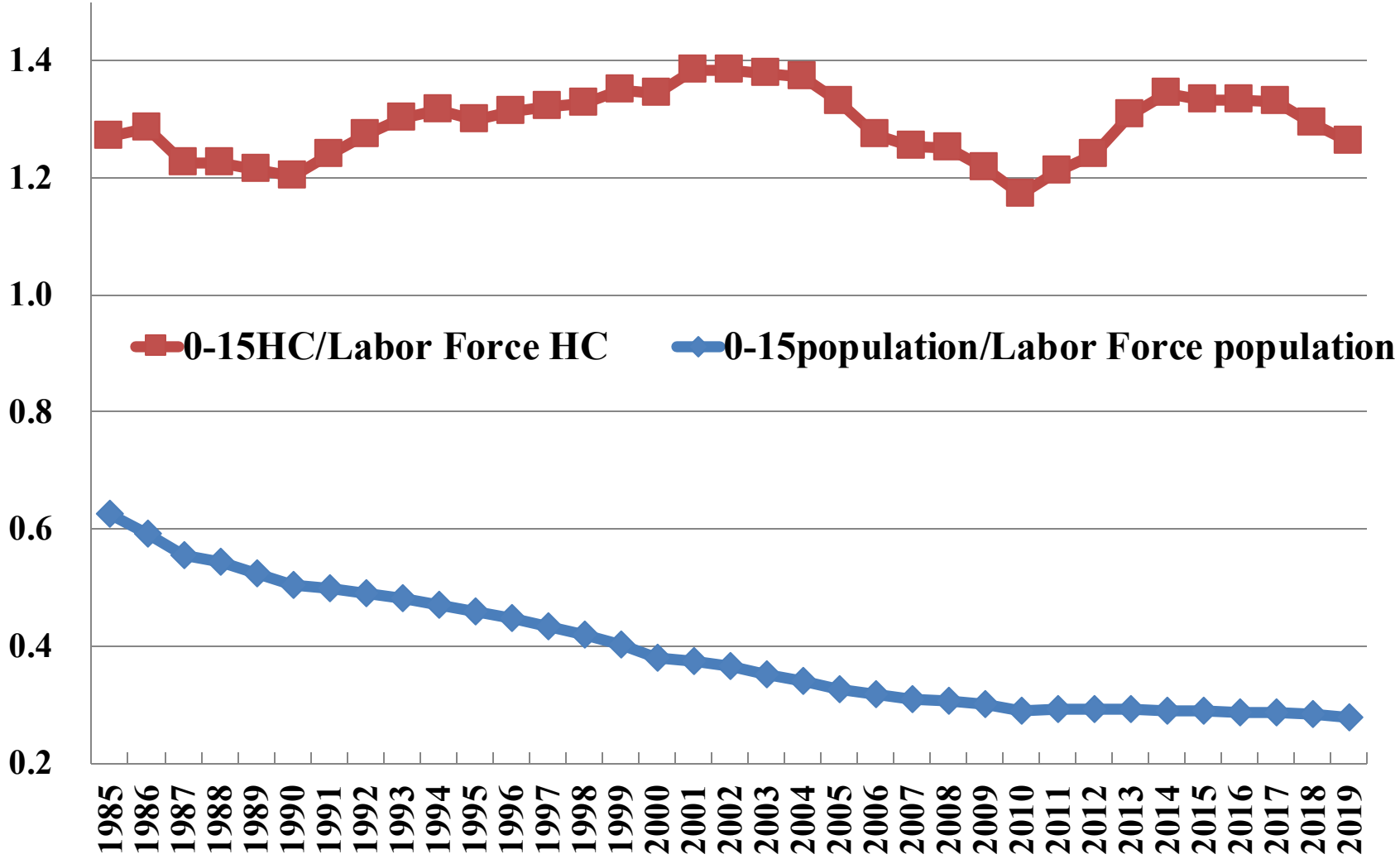
Total Human Capital & Labor Force Human Capital per Capita Average Growth Rates (1985 RMB)

	Total HC		Labor Force HC	
	Rural	Urban	Rural	Urban
1985-1995	1.0%	0.8%	1.0%	-1.6%
1996-2006	9.5%	9.9%	8.8%	9.1%
2007-2019	5.2%	8.0%	5.4%	8.7%

J-F HC Measure: Newborn Human Capital per Capita (Thousands of RMB)



Population Share & Human Capital Share for those 0-15 years as a % of the Labor Force



Top 5 Provinces in per capita Human Capital 2019 (Thousands of RMB)

Province	Total HC
Beijing	1,082.4
Shanghai	802.6
Tianjin	789.1
Zhejiang	684.0
Jiangsu	683.5

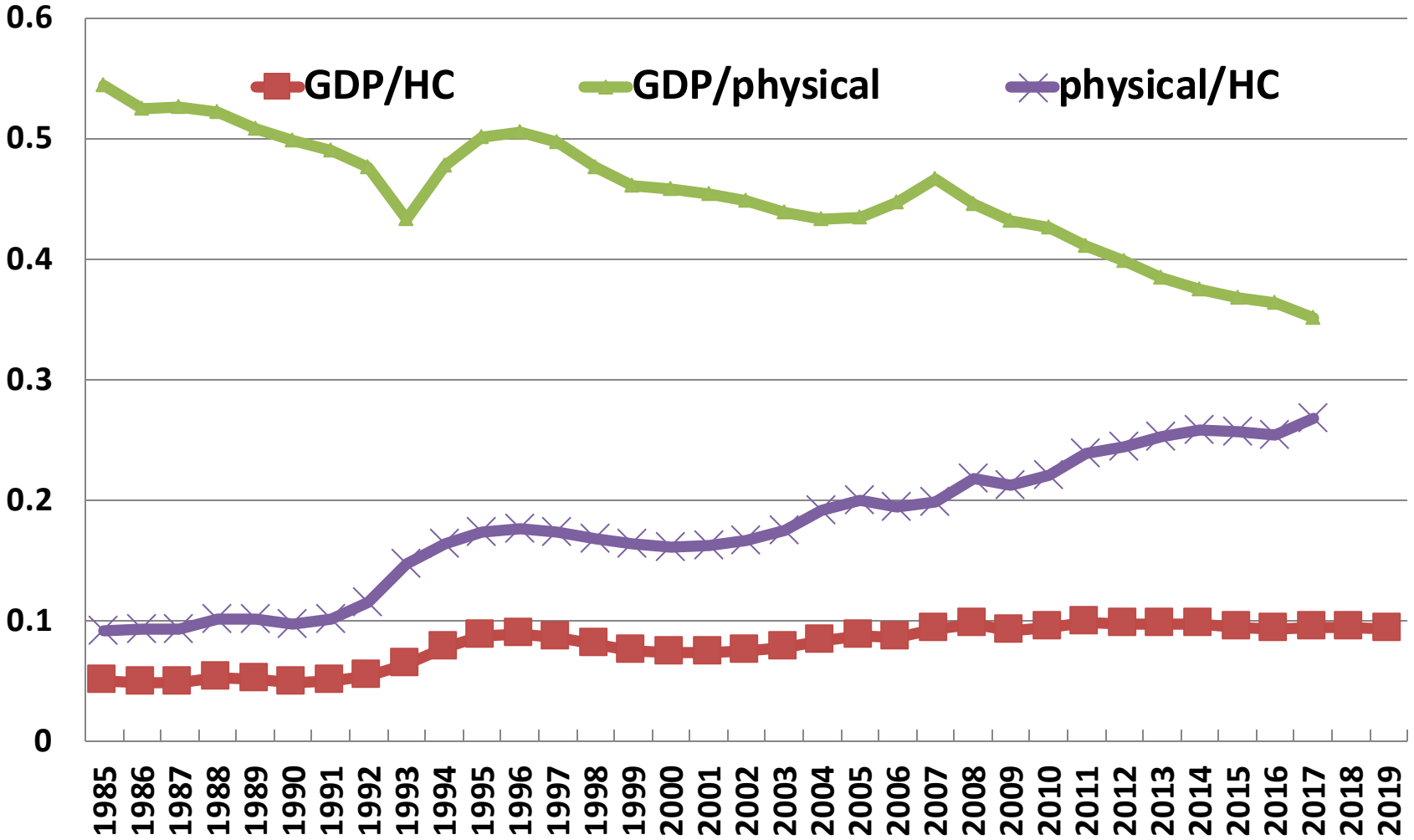
Province	Labor Force HC
Beijing	550.5
Tianjin	399.7
Shanghai	383.6
Zhejiang	347.7
Jiangsu	320.6

Bottom 5 Provinces in per capita Human Capital 2019 (Thousands of RMB)

Province	Total HC
Xinjiang	336.8
Xizang	329.7
Yunnan	327.1
Gansu	278.7
Qinghai	224.6

Province	Labor Force HC
Xinjiang	208.5
Hainan	200.3
Yunnan	194.0
Gansu	178.8
Qinghai	150.6

Ratios of GDP, Human Capital, and Physical Capital



Forthcoming in 2022 Inclusive Wealth Report

- **Previous:**

  Urban Institute (Kyushu University) and United Nations Environmental Program, *Inclusive Wealth Report 2018*, Abingdon, Oxon, England, Routledge, 2018.

- **Latest forthcoming in 2022, IWR 2022, UNEP.**

- **Chapter by Gang Liu and myself:**

  "Human Capital Growth –
  with Region and Gender in Perspective"

Preponderance of HC Wealth

- **World Bank – 146 countries**
  - 64% of world wealth is HC in 2018
  - China's share of global wealth more than doubled between 1995 and 2018, from 7 to 21%

  World Bank, *The Changing Wealth of Nations 2021: Managing Assets for the Future*. Washington, DC, 2021

- **Inclusive Wealth Report – 165+ countries, 1990-2019**
  - 58% of world wealth is HC in 2019

- **Both include HC, produced capital, and natural capital (WB also net foreign assets) and are lifetime income approaches**

IWR Methodology

- **Largely follows the model of Arrow,.et al. (2012)**

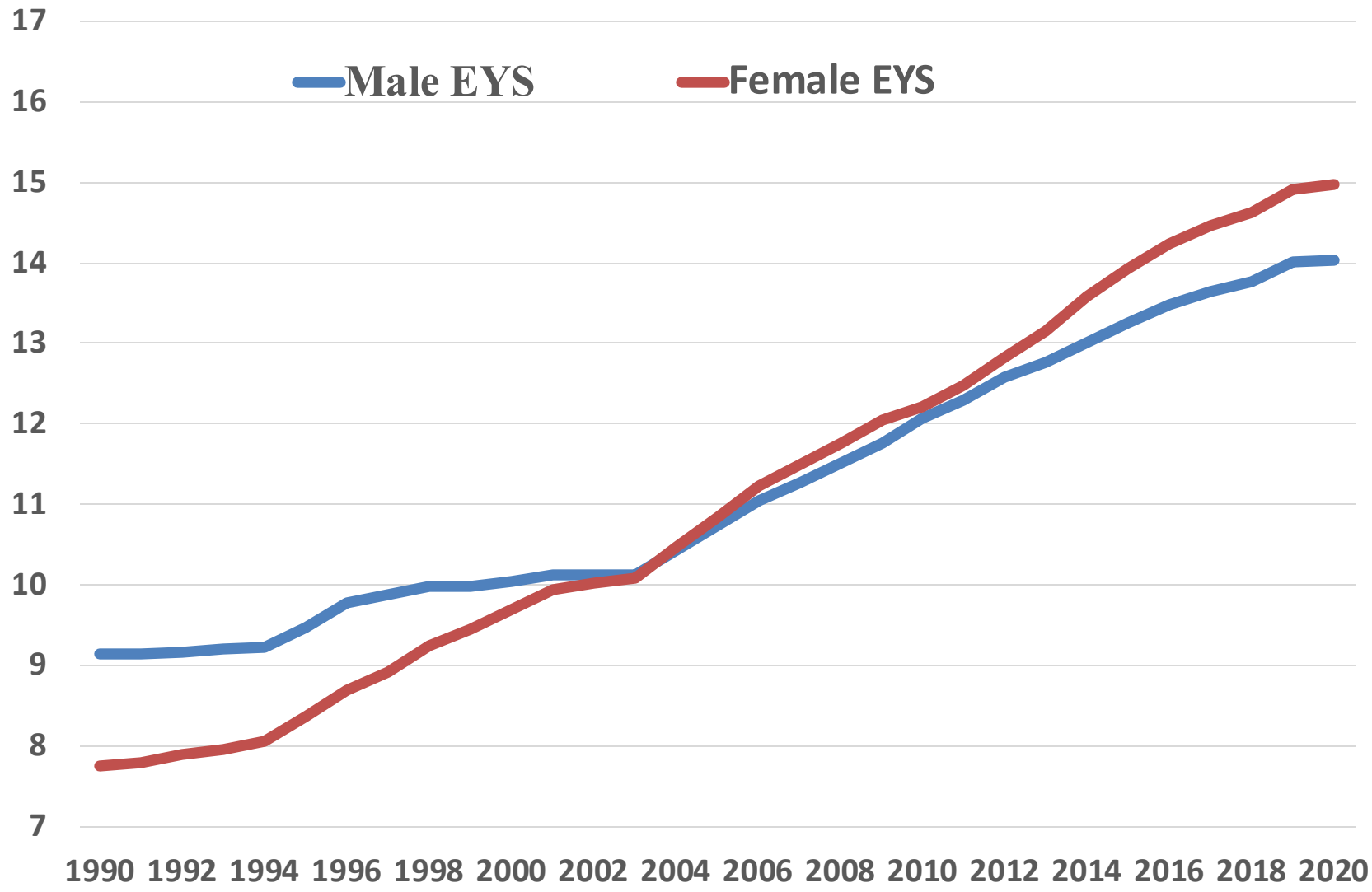
$$HC = \underbrace{e^{\rho \cdot Edu}}_{Term_1} \cdot \underbrace{P_{5+Edu}}_{Term_2} \cdot \underbrace{\int_0^T w \cdot e^{-\delta\tau} d\tau}_{Term_3}$$

where ρ is the return of years of schooling, *Edu* is the expected years of schooling (EYS), P_{5+edu} is the population who have just finished the EYS, T is the employee's expected remained working years, w is the average annual compensation, and δ is the discount rate

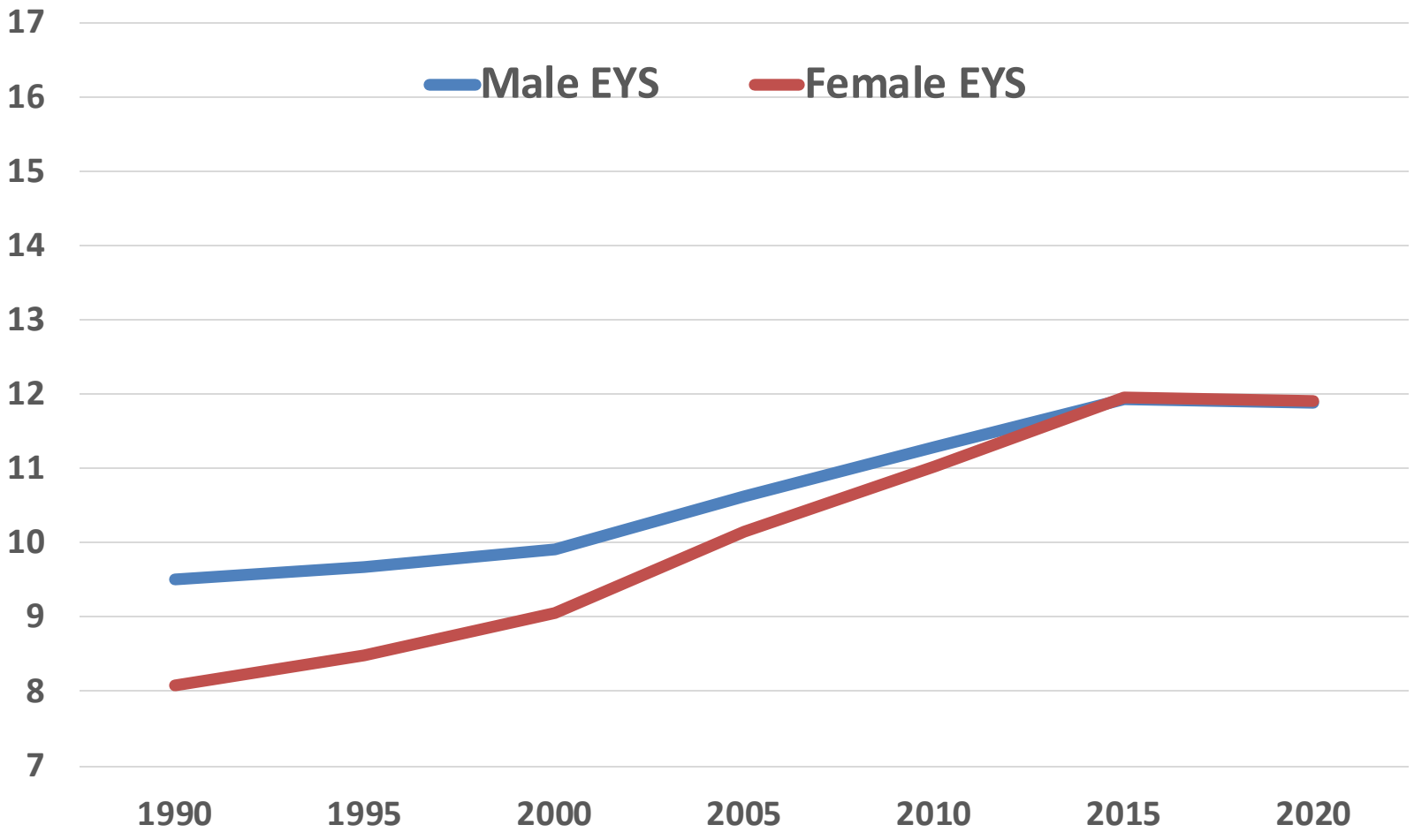
Expected Years of School (EYS)

- **Main change between previous IWRs**
- **EYS is also used by the Human Development Index**
- **Looks forward as opposed to the average number of years of school already completed, e.g., from Barro-Lee**
- **EYS as of those individuals just entering school (around age 5)**

EYS for China by Gender



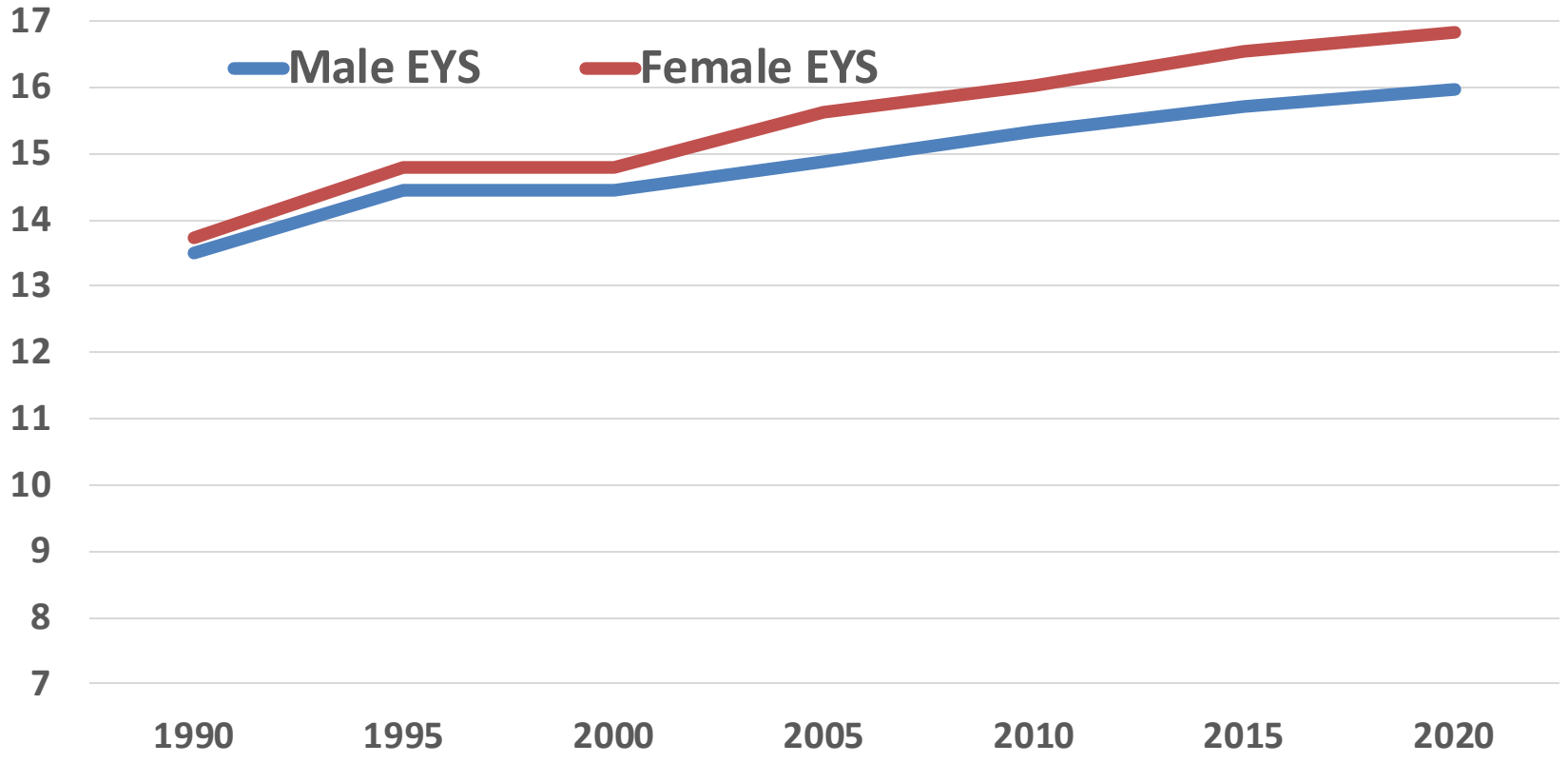
EYS for World by Gender



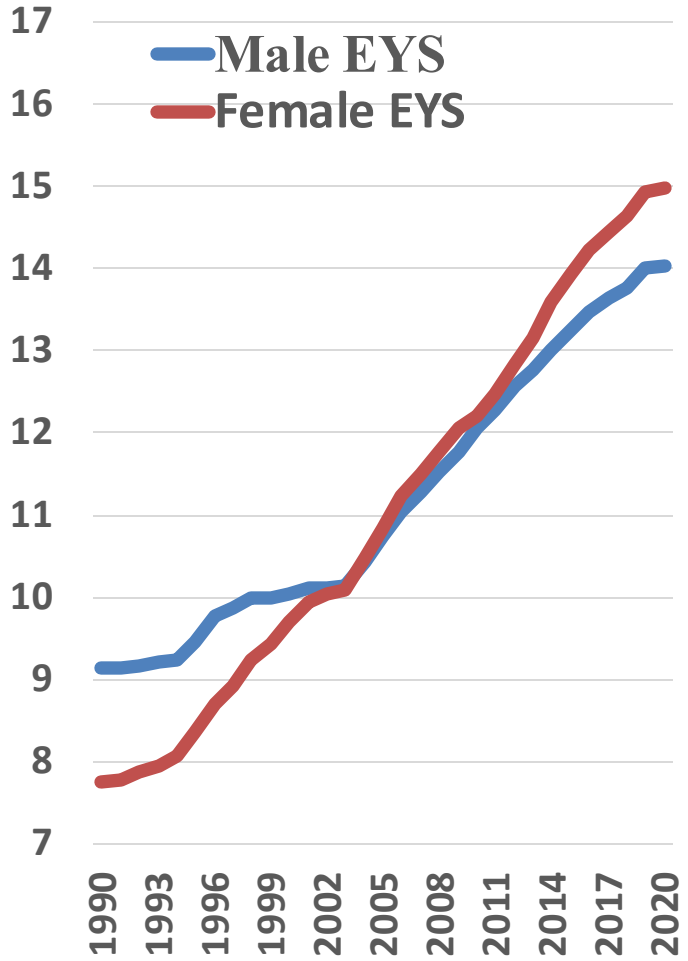
24 Advanced Economies Countries

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom of Britain and Northern Ireland, and the United States of America.

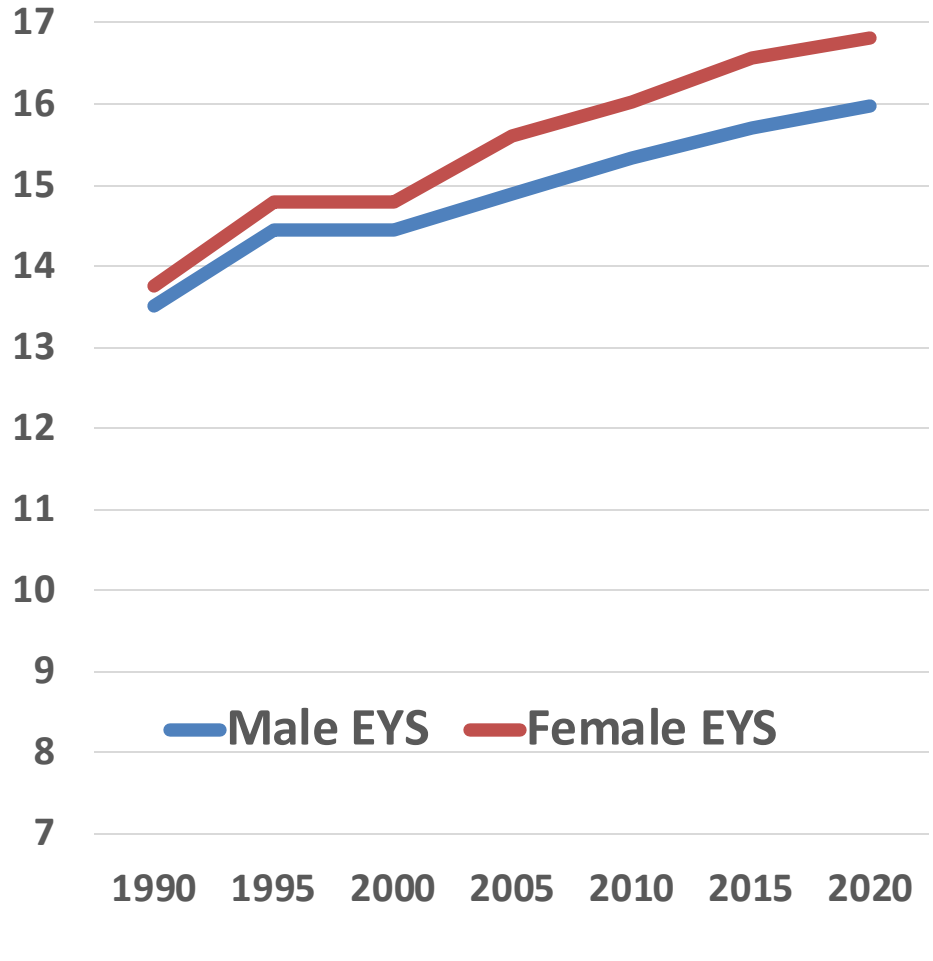
EYS for Advanced Economies by Gender



Comparison: China vs. Advanced Economies

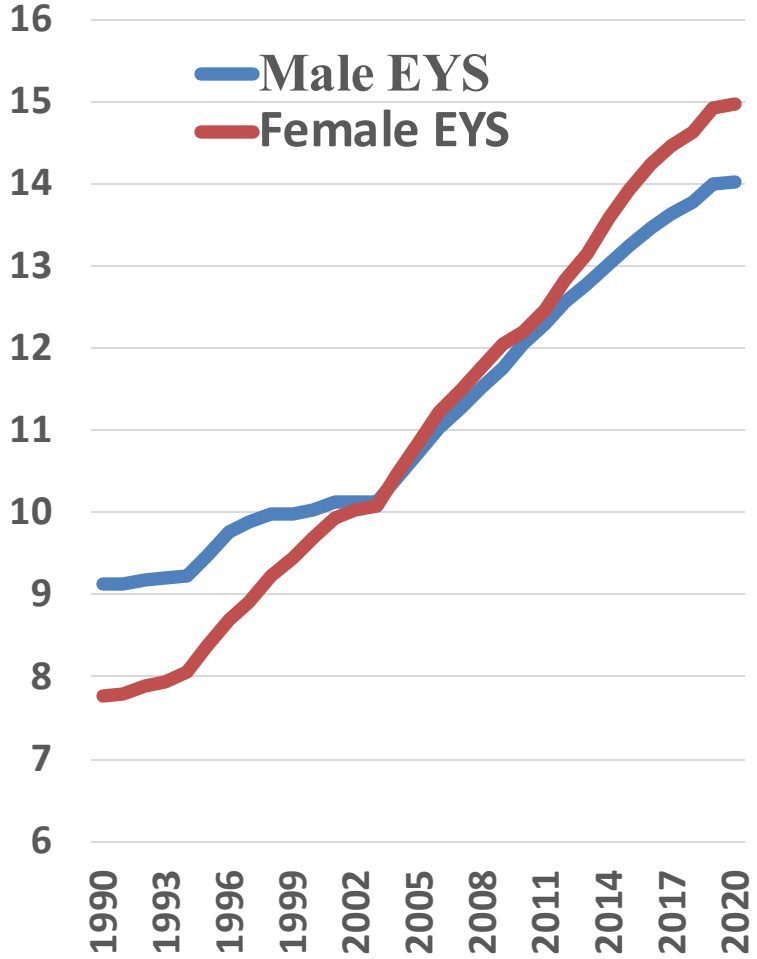


China

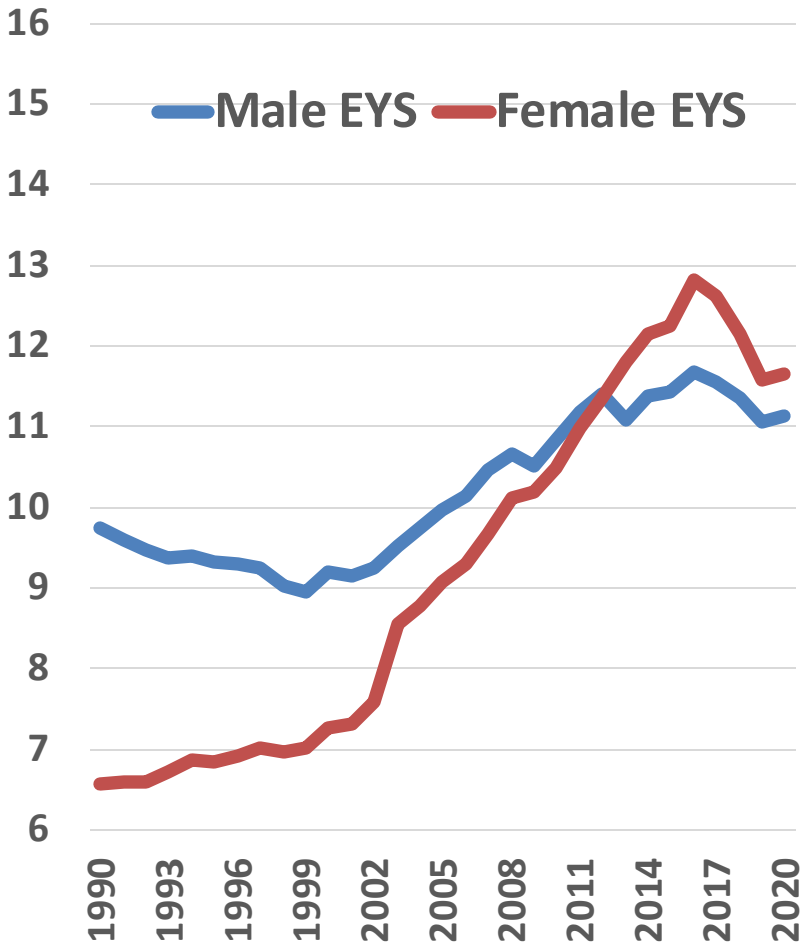


Advanced Economies

Comparison: China vs. India

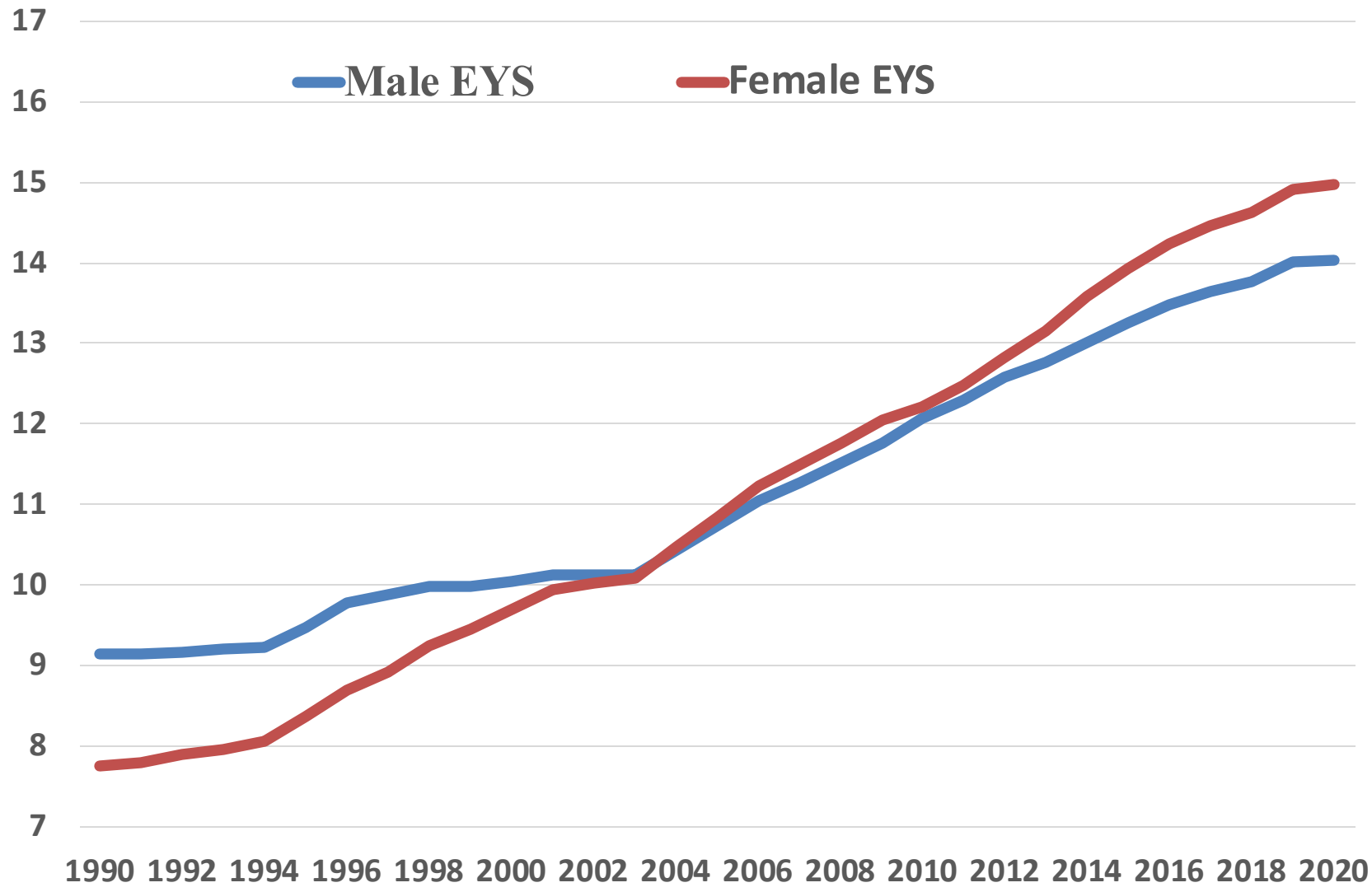


China

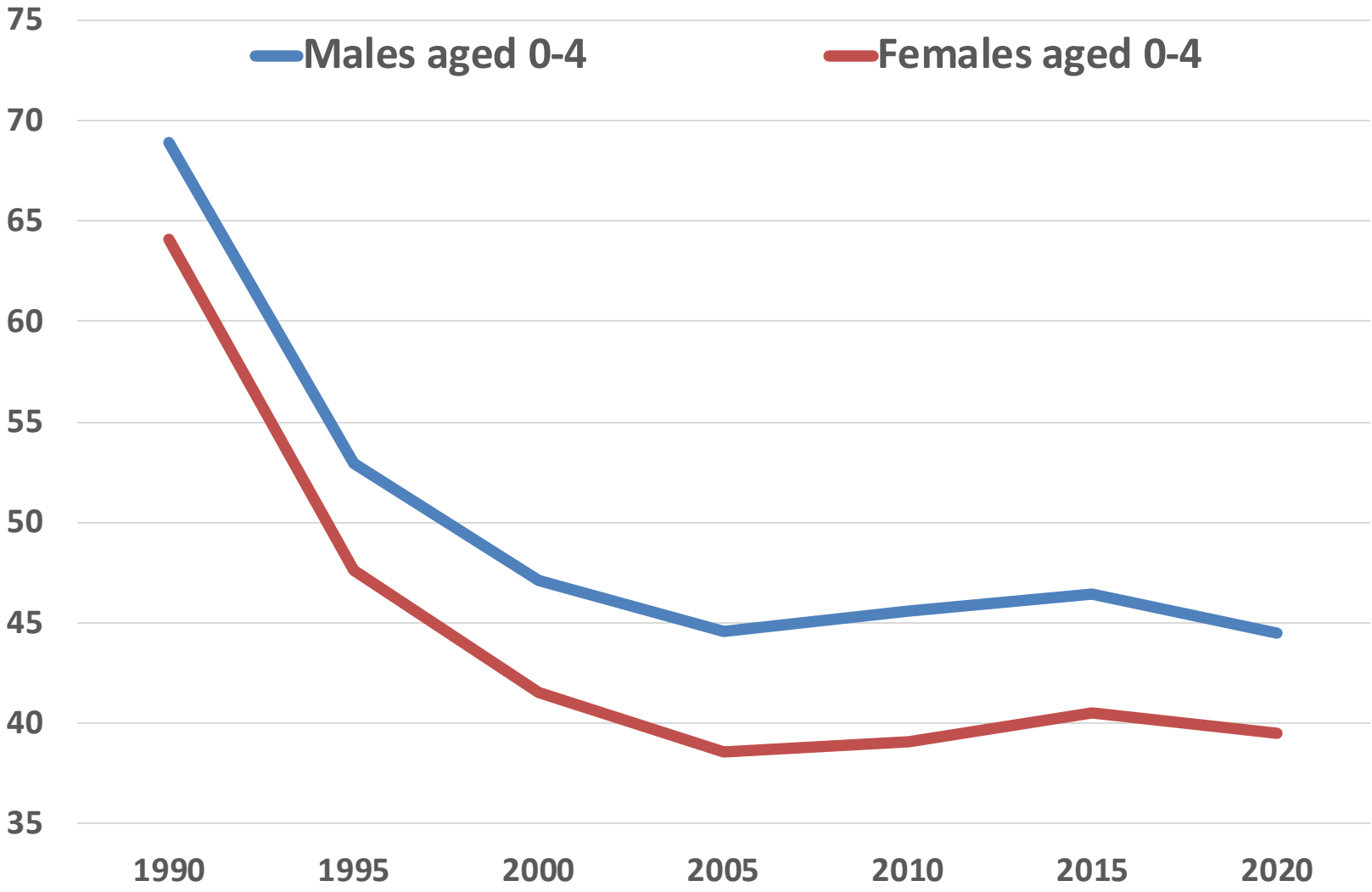


India

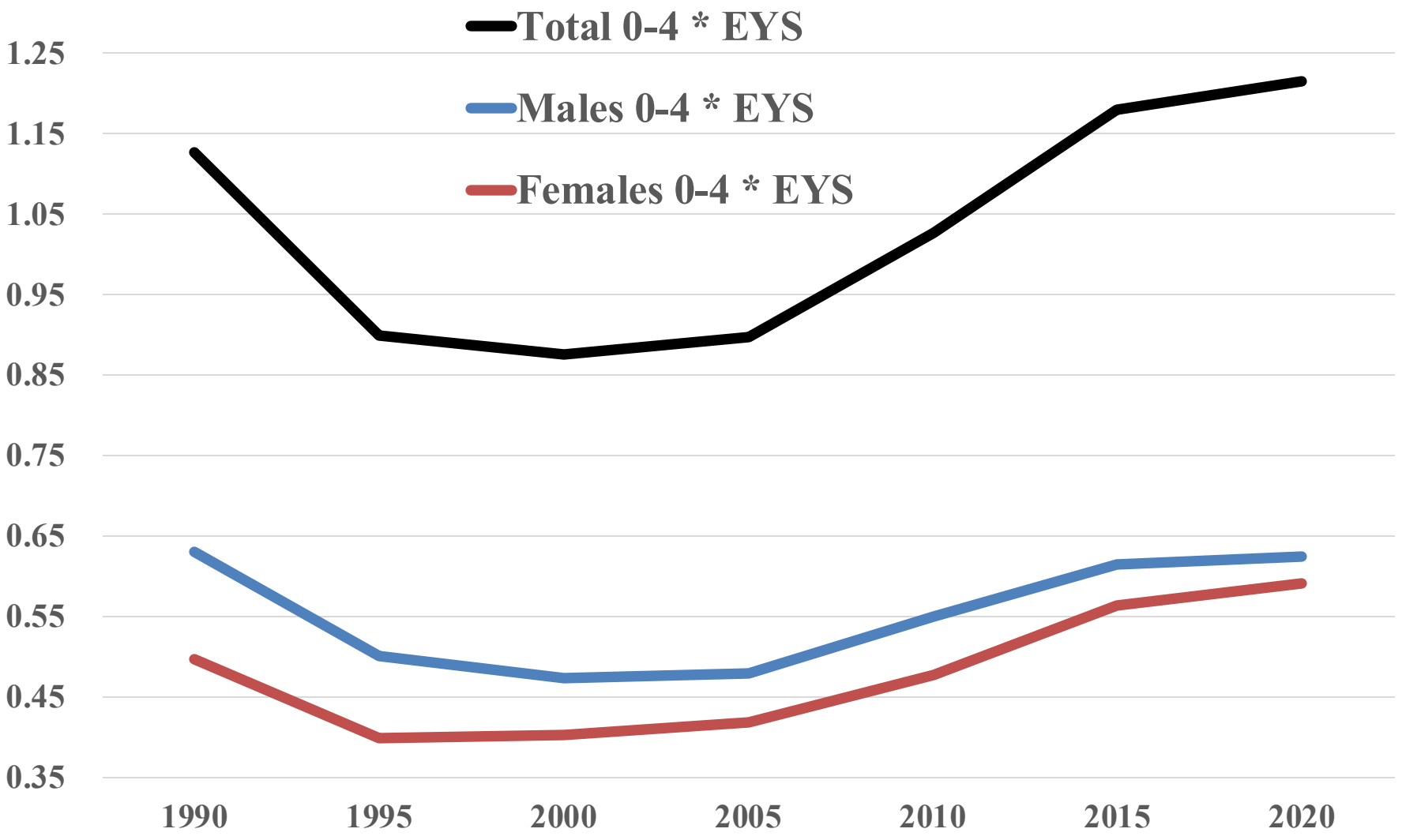
EYS for China by Gender



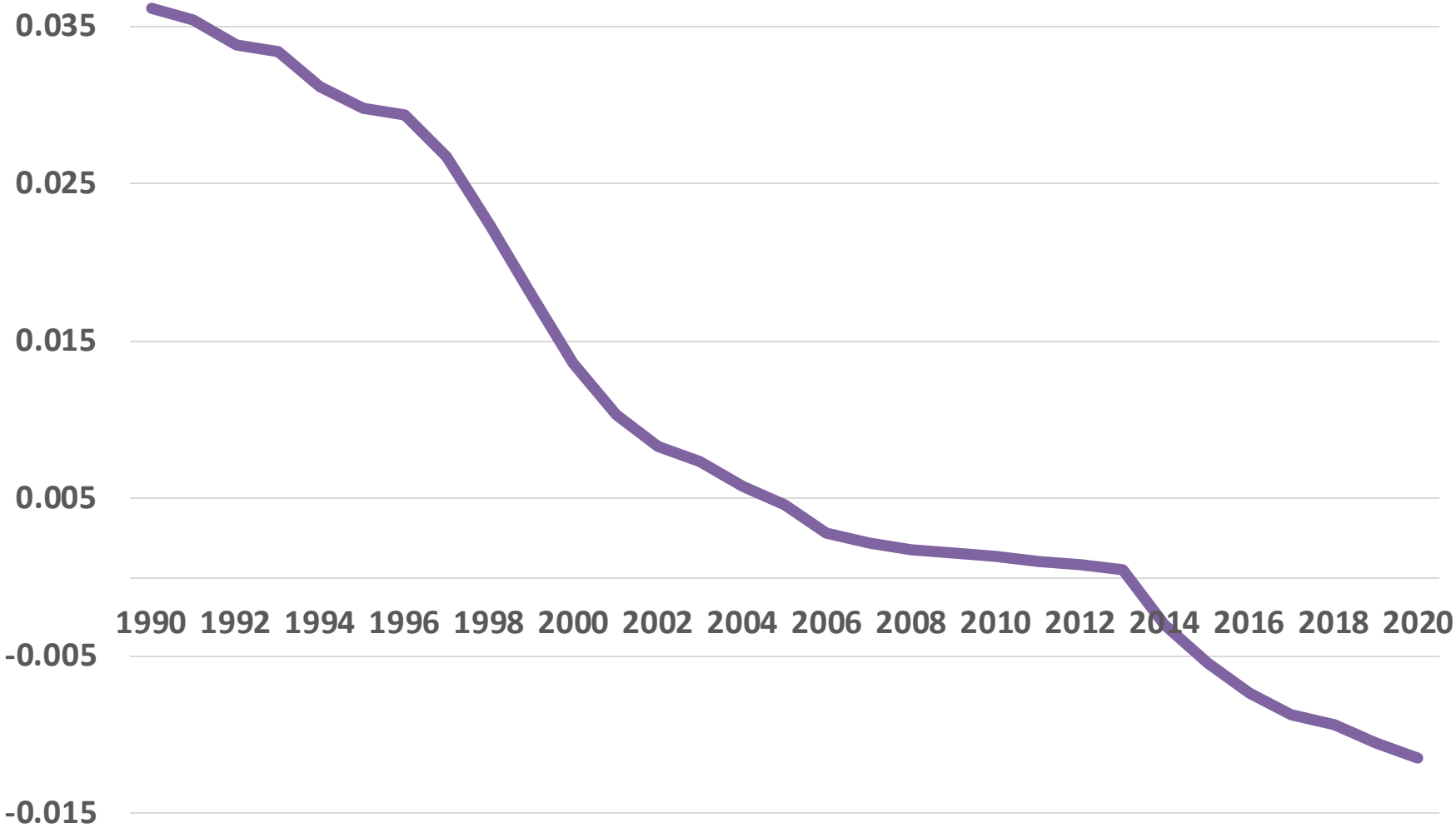
Population aged 0-4 in China by Gender Every Five Years (Millions)



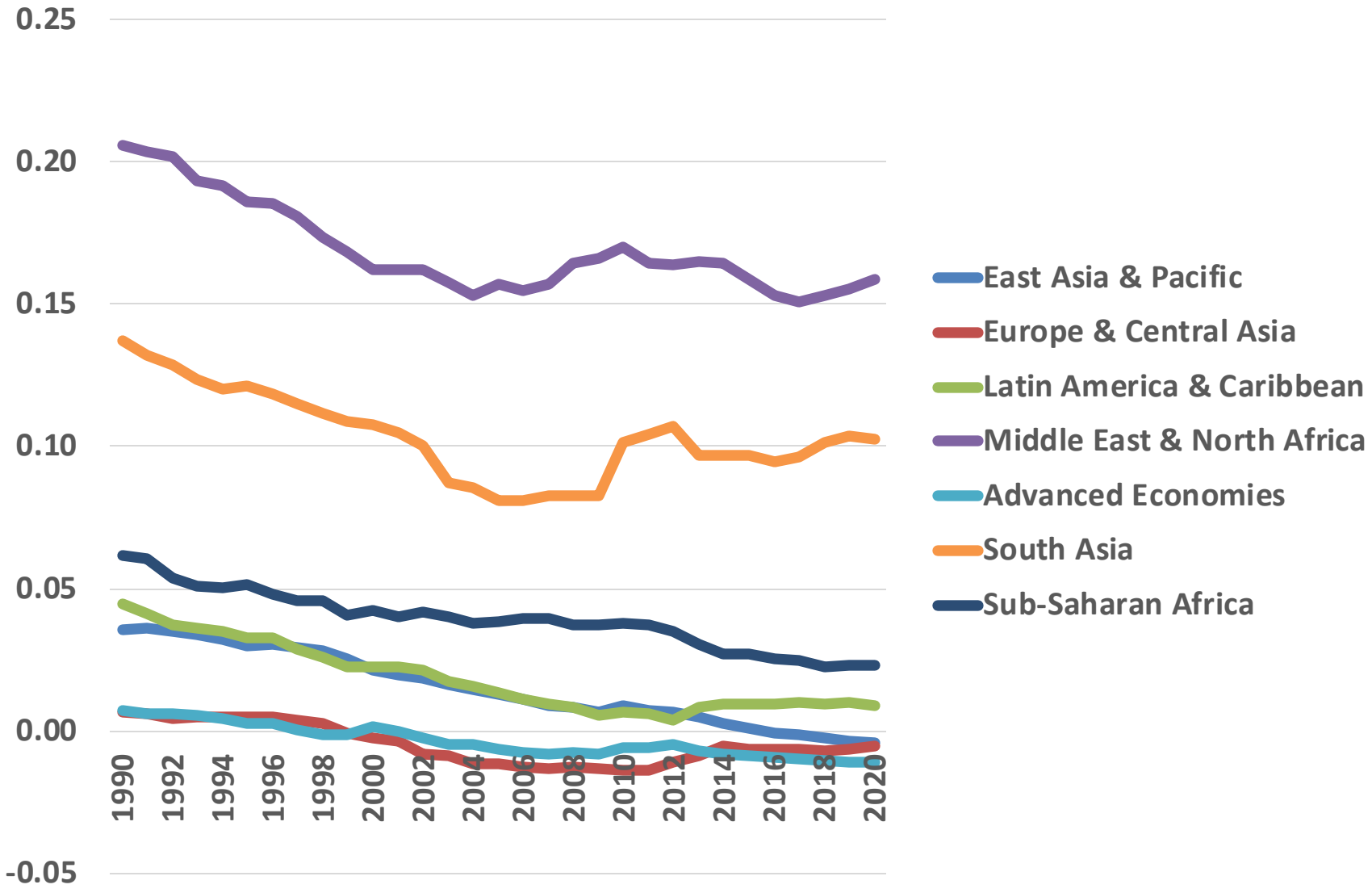
For China, by Gender, Net Effect of Decrease in Age 0-4 with an Increase in EYS, Every Five Years (Billions)



Gini Coefficient, China



Gini Coefficient by Region



Decomposition of HC

$$HC = \underbrace{e^{\rho \cdot Edu}}_{Term_1} \cdot \underbrace{P_{5+Edu}}_{Term_2} \cdot \underbrace{\int_0^T w \cdot e^{-\delta \tau} d\tau}_{Term_3}$$

- Term 1 = education effect
- Term 2 = educated population
- Term 3 = HC compensation
- In term 3, *w* is held constant over 1990-2020 and is the same for males and females because of the lack of public data to do otherwise, only T varies by year and gender

Decomposition of HC by Gender for China

(1) $\mathrm{HC}_{\mathrm{gender}} = \prod_{term} Term_{term,gender}$,

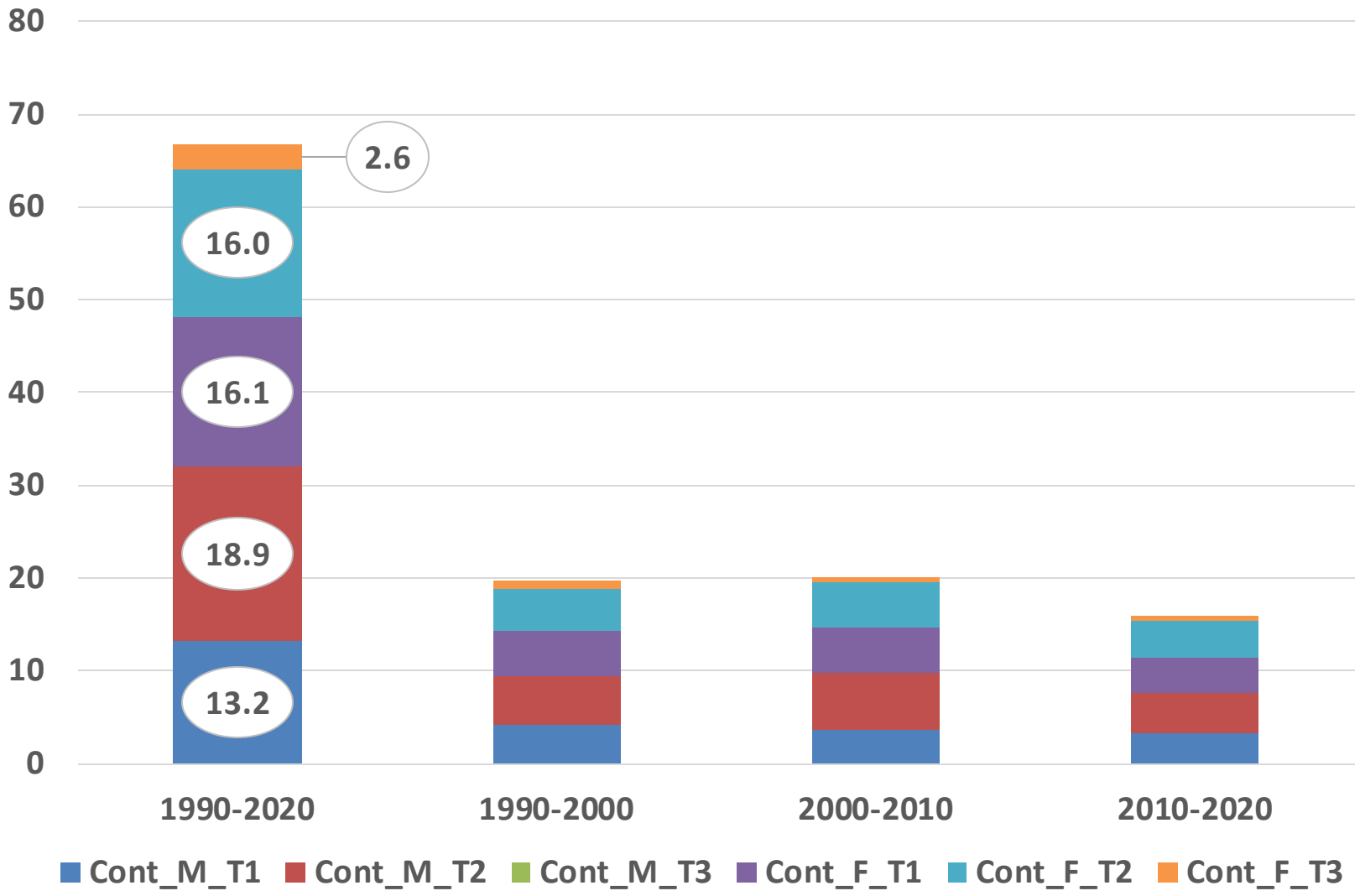
where term = 1, 2, 3;

gender = male, female.

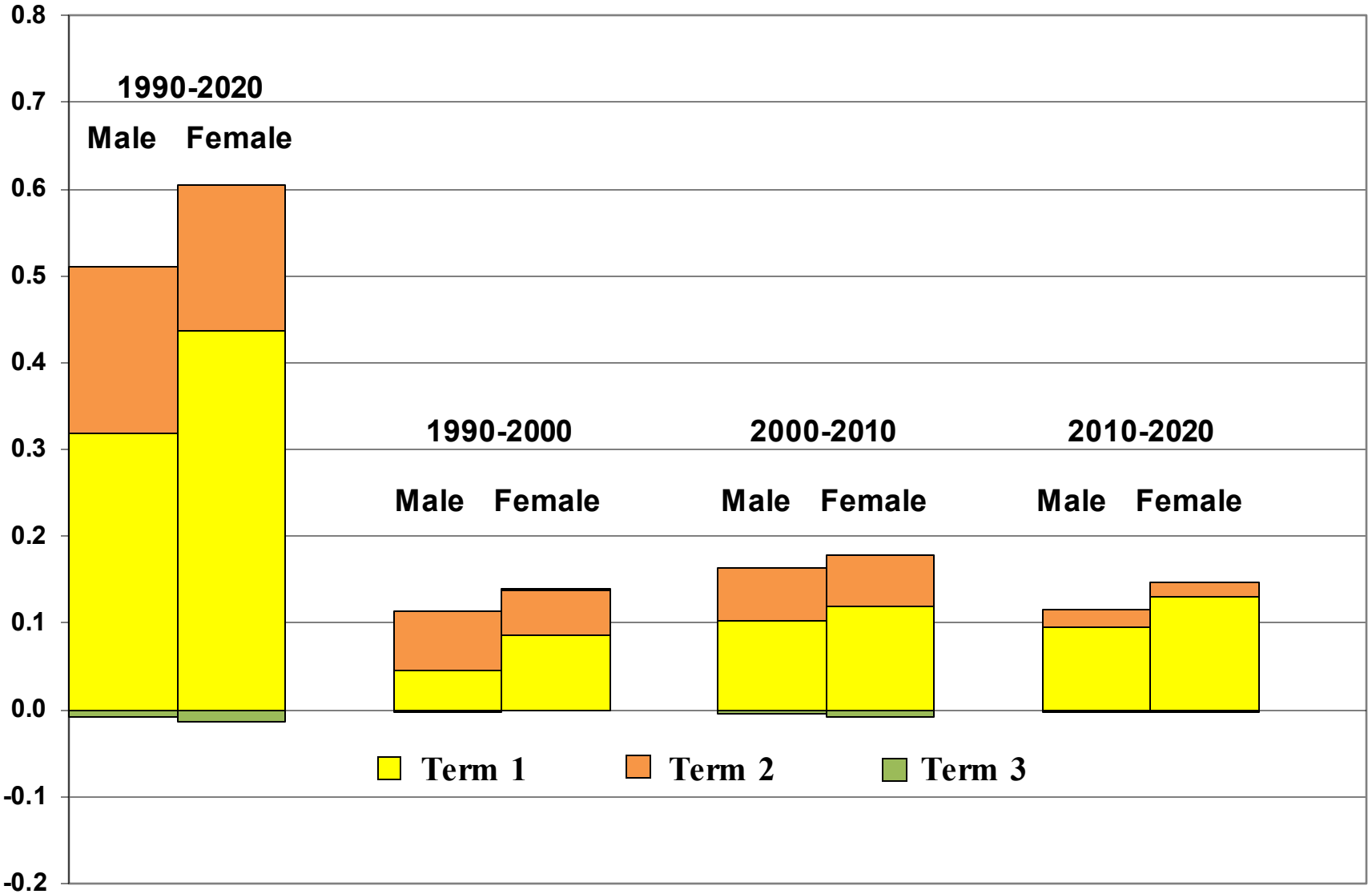
(2) Contribution (term, gender) =

$$\left(\frac{\Delta HC_{gender}}{\Delta\left(lnHC_{gender}\right)} \Delta lnTerm_{term,gender}\right) / HC$$

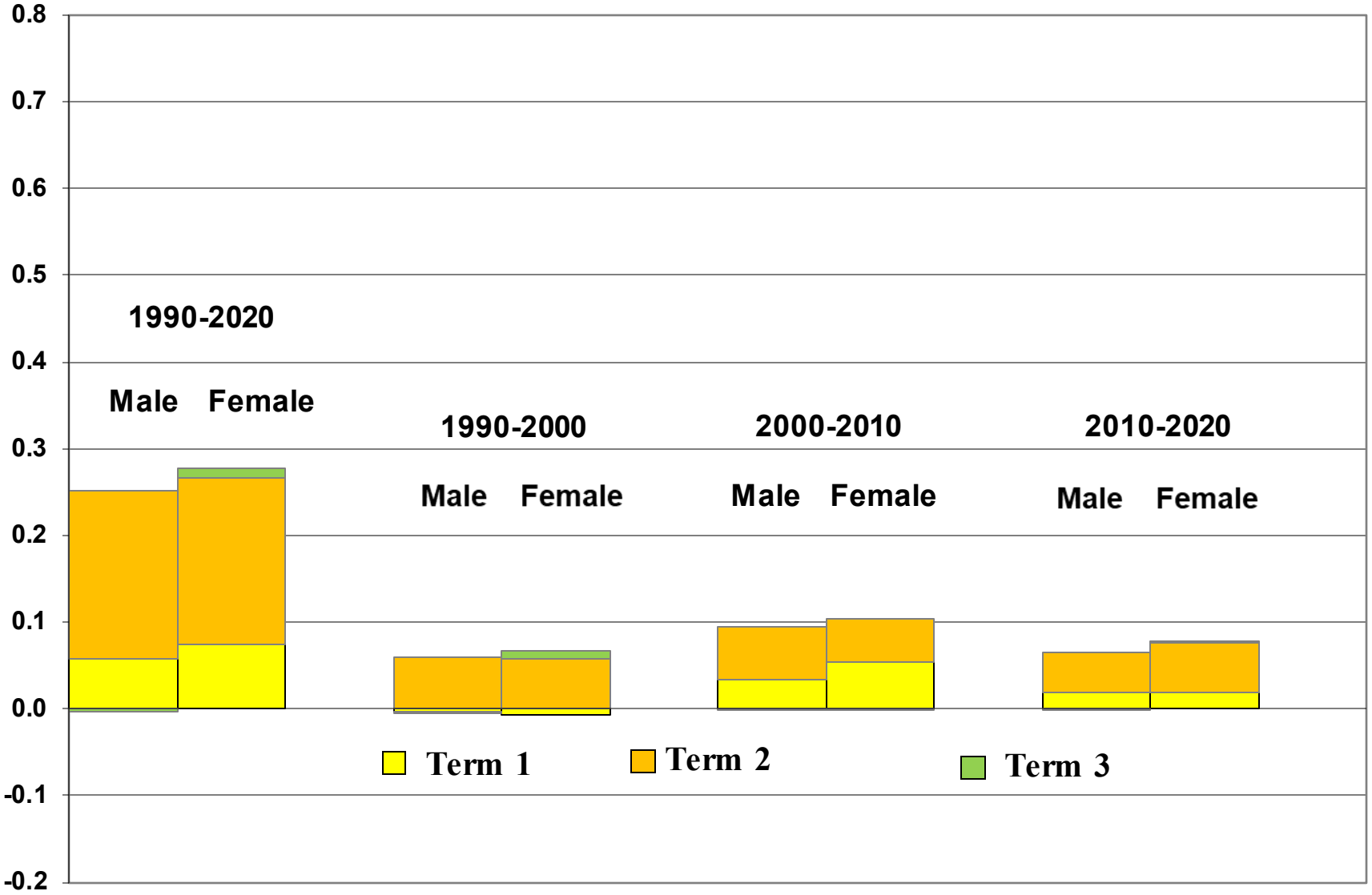
Contributions, World



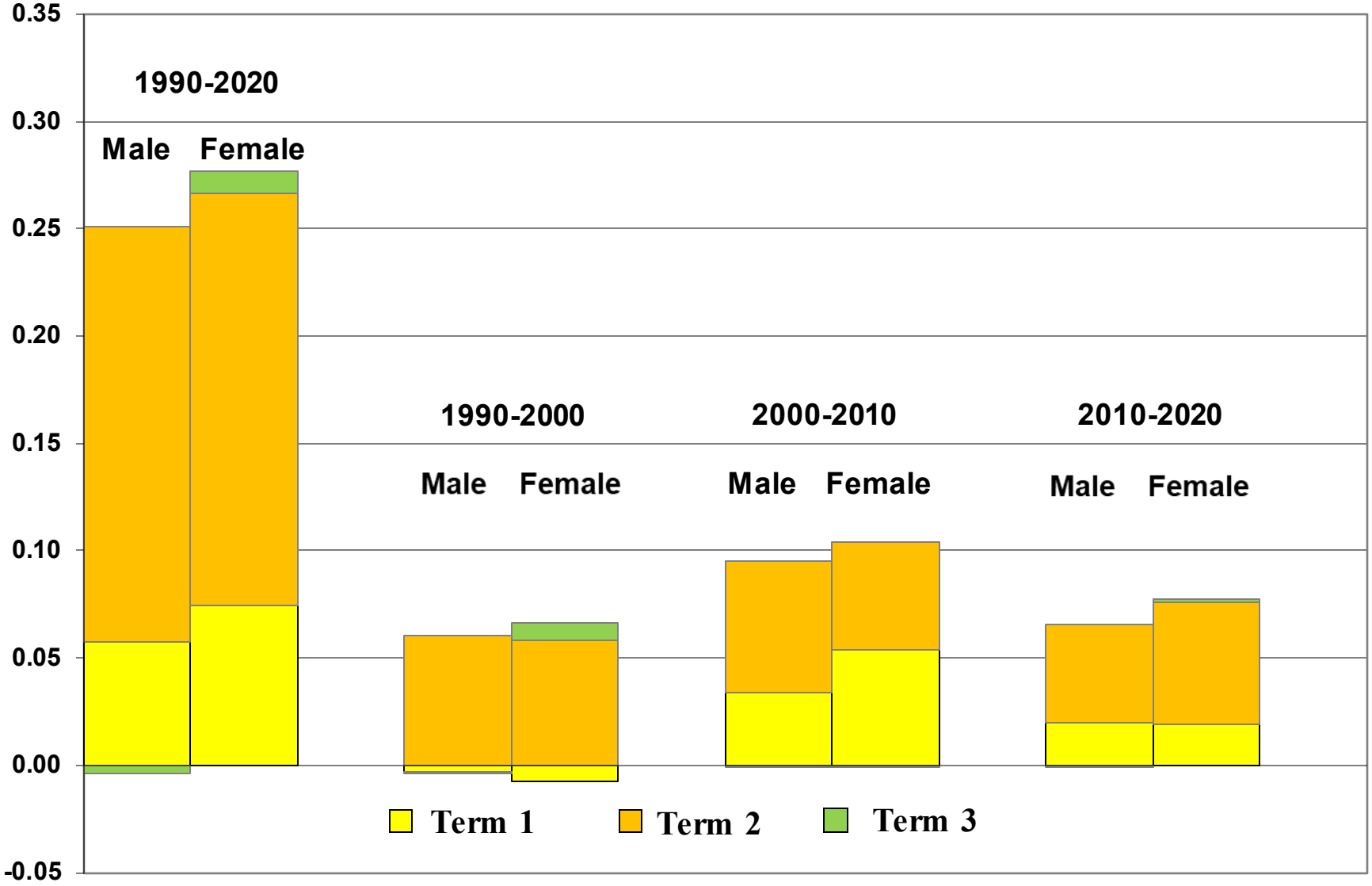
Contributions, China



Contributions, India



Contributions, USA



Conclusion

- **Human capital is very important "asset" of any country**
- **China has a very large population, which has substantially invested in greater education**
- **Gender HC inequality in China is low**
- **In spite of a slowdown in population growth in China, human capital is growing**
- **As is true in many countries, women play a significant role in this growth**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