Facilitating Agricultural Transformation and Green Development in China: the Past Efforts and the Way Forward

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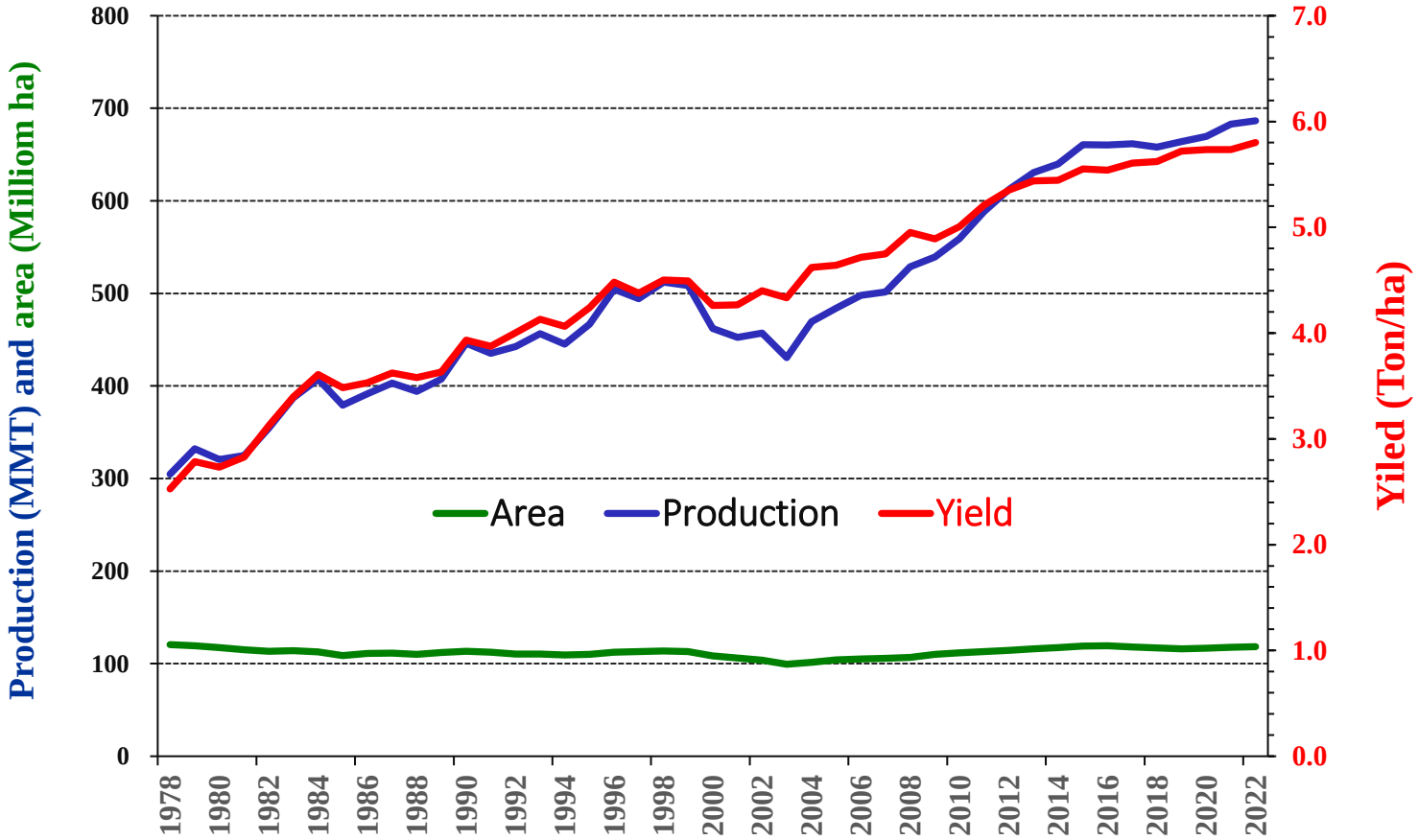
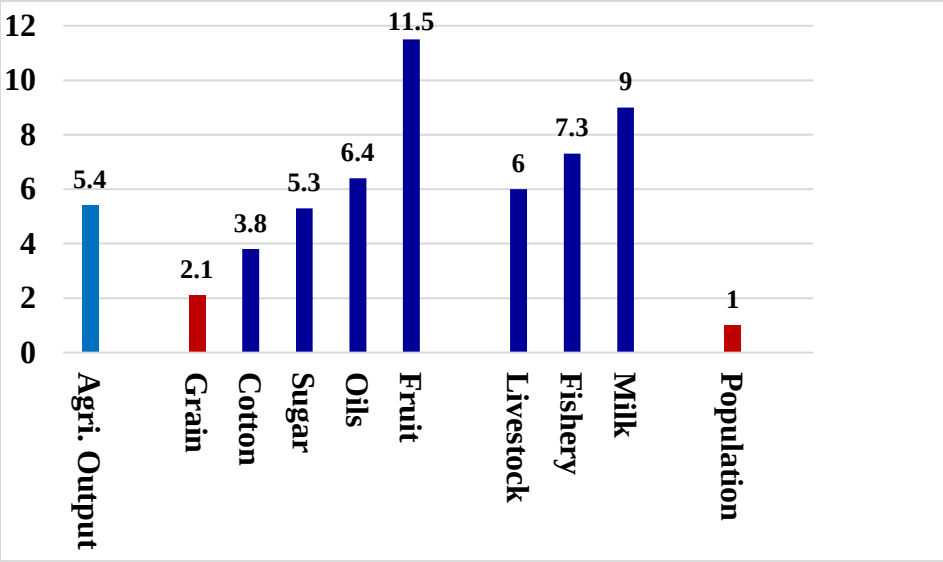
Grain area, yield and production in 1978-2022

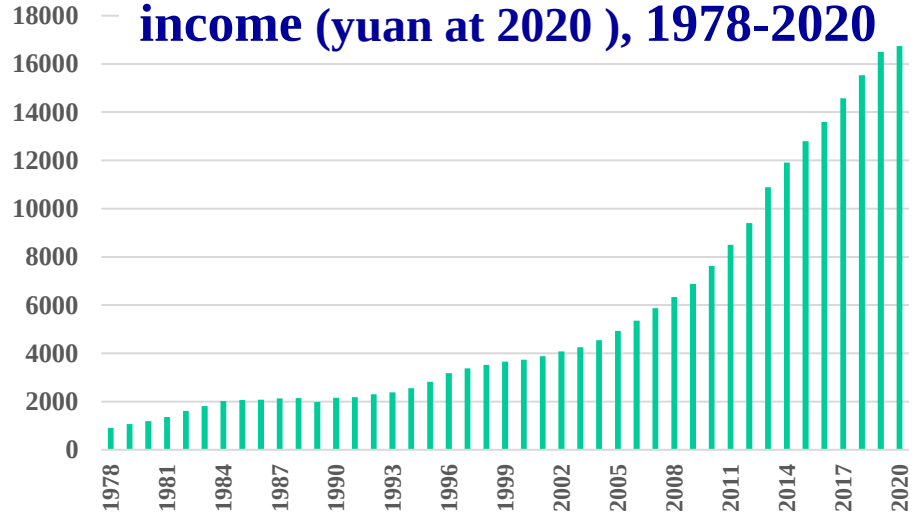


	Grain area/total crop area %
1978	80
2022	70

Annual growth of agriculture and population in the past 4 decades, %



Rural household per capita income (yuan at 2020), 1978-2020



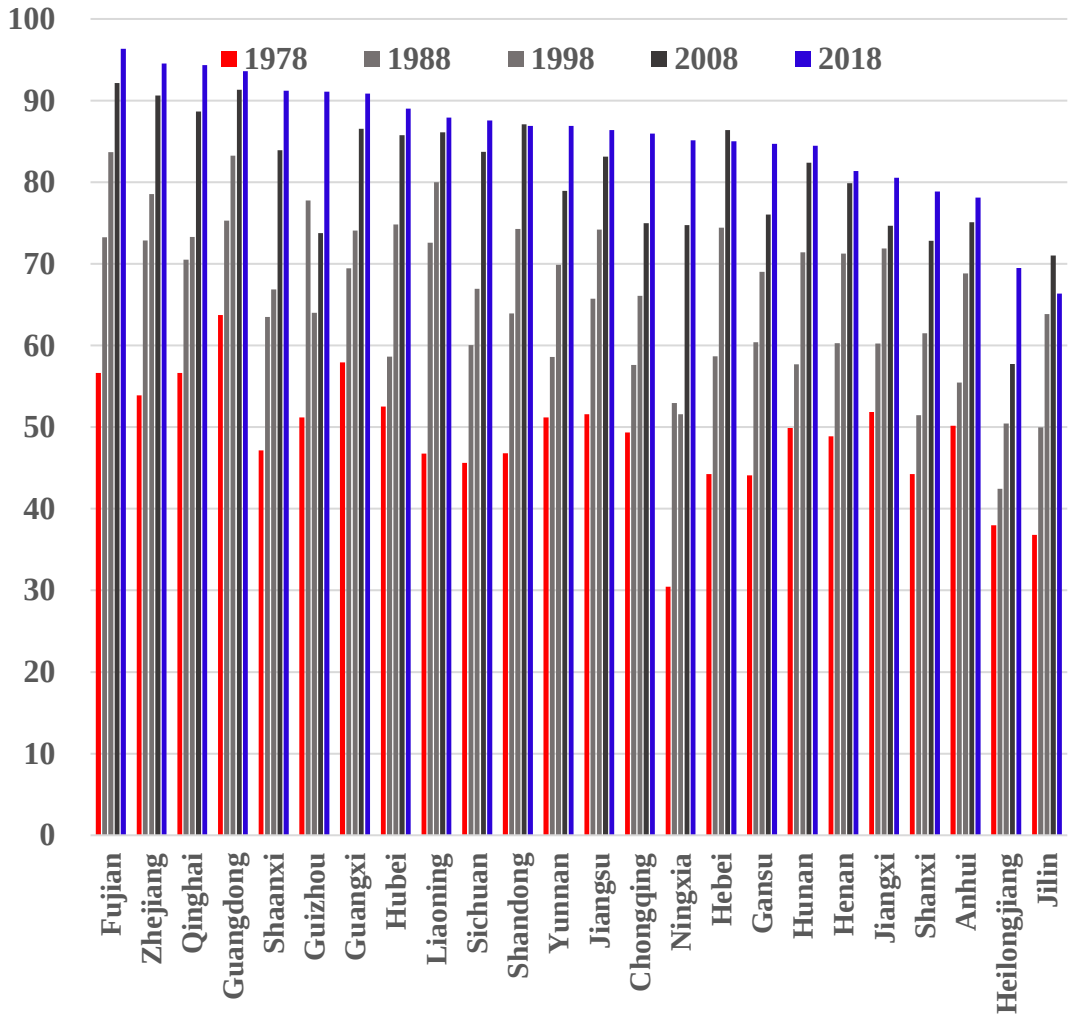
Rural labor transformation

Share of rural labor with full or part-time **non-farm works**

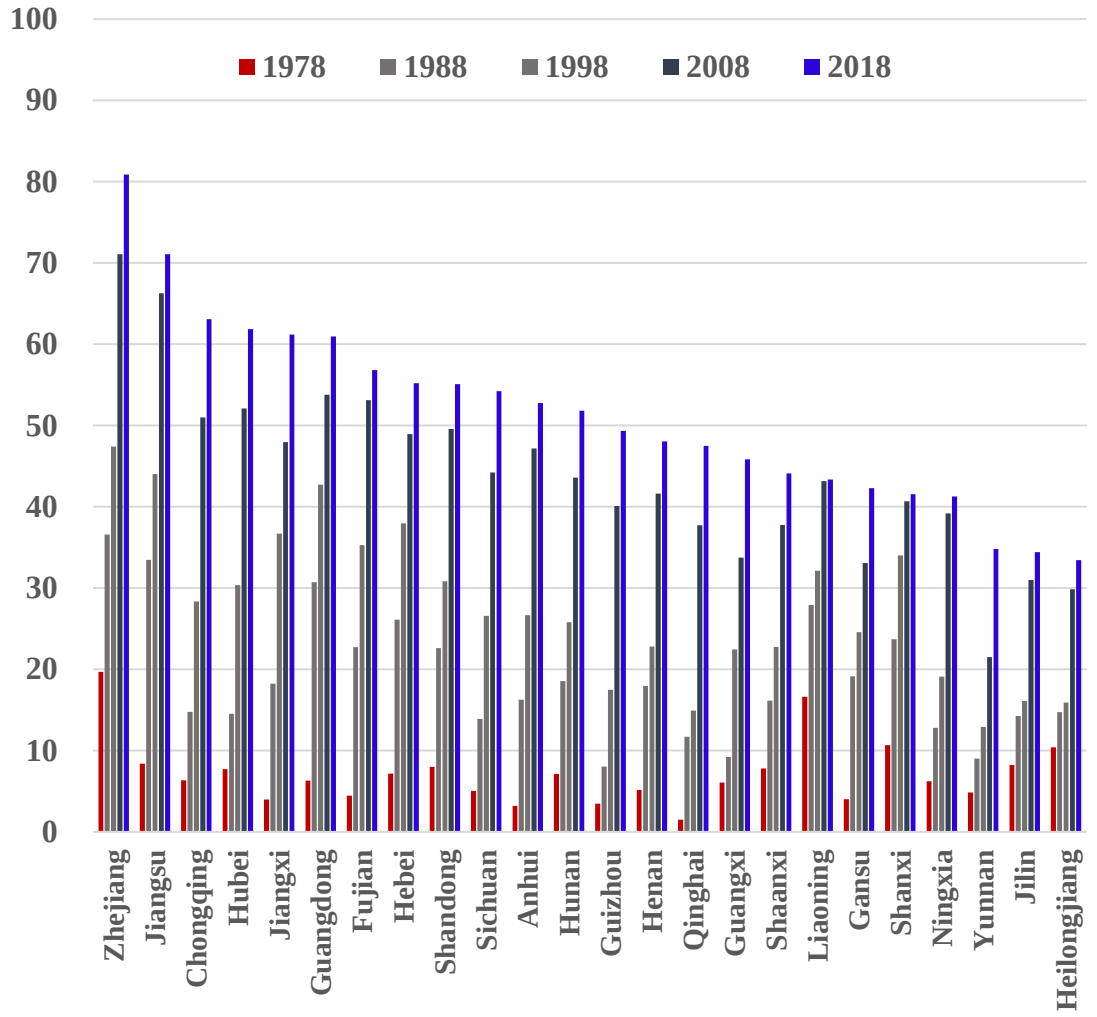
- **1978: 9%**
- **2020: 85%**

Agricultural growth + non-farm work
→ Income growth
→ improve national & household food security

Rural transformation within agriculture (RT1): Share of high-value agriculture (non-grain) in 1978-2018

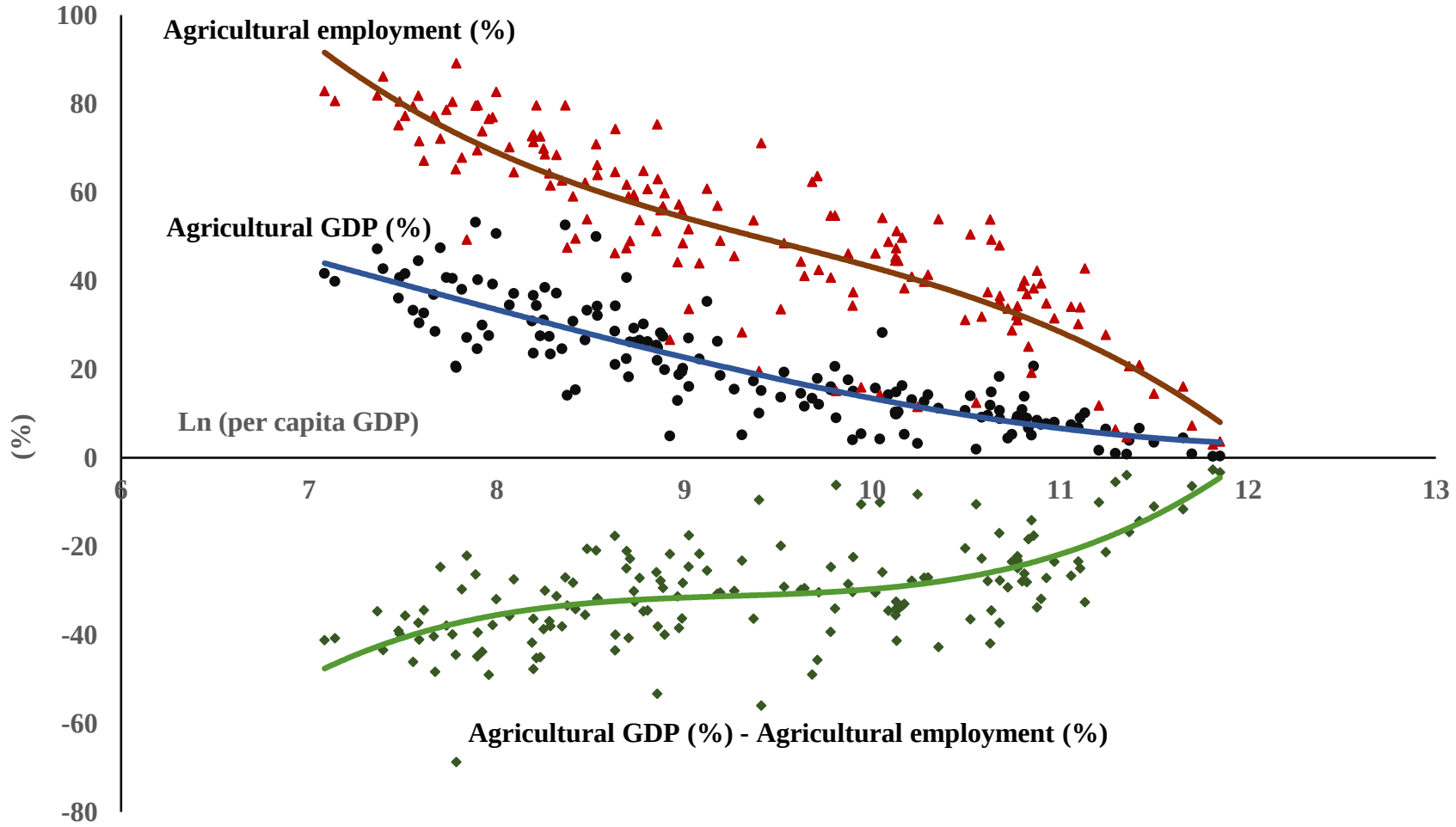


Rural transformation of employment (RT2): Share of rural labor in non-farm employment in 1978-2018



Structural transformation (ST) in China

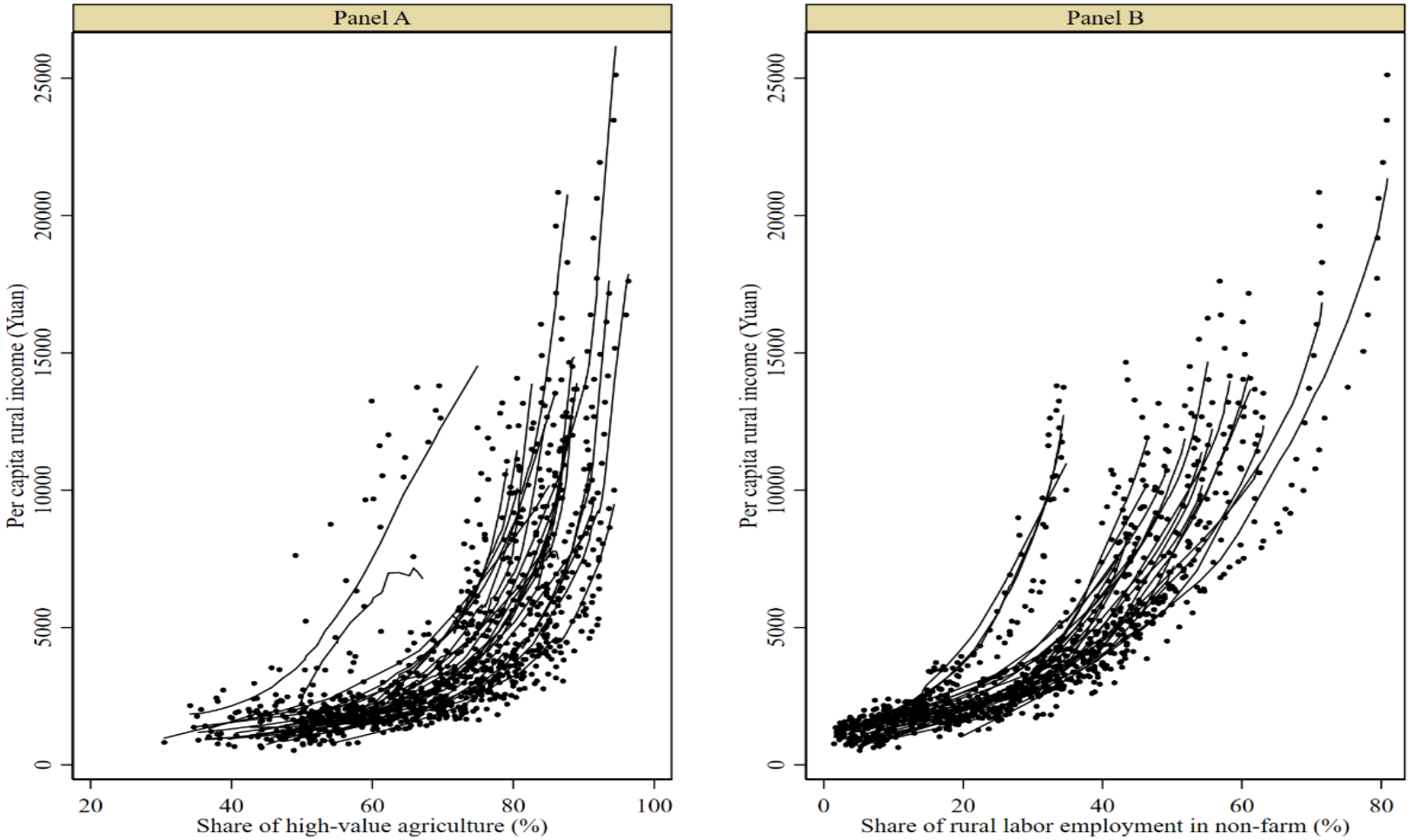
Convergence of shares of agricultural GDP and employment by province in 1978-2018



Pathway of rural transformations in China

	Paths of Transformation
1	**Primary on staple food production:** before the early 1990s
2	**Diversification/commercialization:** since the early 1990s
3	**Farming + part time off-farm:** since the middle 1990s **Mechanization + full time off-farm:** since the late 1990s
4	**Grain security + high value agriculture**: since 2000 **Green agriculture:** since the early 2000s, especially since 2017 **Integrated urban-rural:** since the middle 2000s

Rural transformation and per capita rural income by province in 1978–2018



How?

Pathway and IPIs of rural transformation in China

Stage	Major features	Major Institution, Policy & Investment (IPIs)
1	**Primary on staple food production:** before the early 1990s	**Institution** (land-HRS) **+ irrigation + tech-1** (seed, chemical, etc)
2	**Diversification/commercialization:** since the early 1990s	**Plus agri. mkt + road infrastructure + tech-2** (tech for high-value agri.)
3	**Farming + part time off-farm:** since the middle 1990s **Mechanization + full time off-farm:** since the late 1990s	**Plus labor. mkt + land mkt and consolidation + custom services tech-3** (capital intensive tech +labor saving tech)
4	**Grain security + high value agriculture** **Green agriculture + Integrated urban-rural**	**The way forward?** • **Past experiences** • **Challenges faced**

Huang (2018) paper on rural transformation, in Chinese
Huang (2022), Rural Transformation and Policies: Past Experience and Future Directions, *Engineering*, 18(2022):21-26

4 major sources of agricultural growth and RT

- **制度创新 Institution innovation**
- **技术进步 Technology change**
- **市场改革 Market reform policy**
- **农业投入 Investment in agriculture**

Huang (2018), Forty Years of China's Agricultural Development and Reform and the Way forward in the Future, *Journal of Arotechnical Economics*, No. 3(2018): 4-15

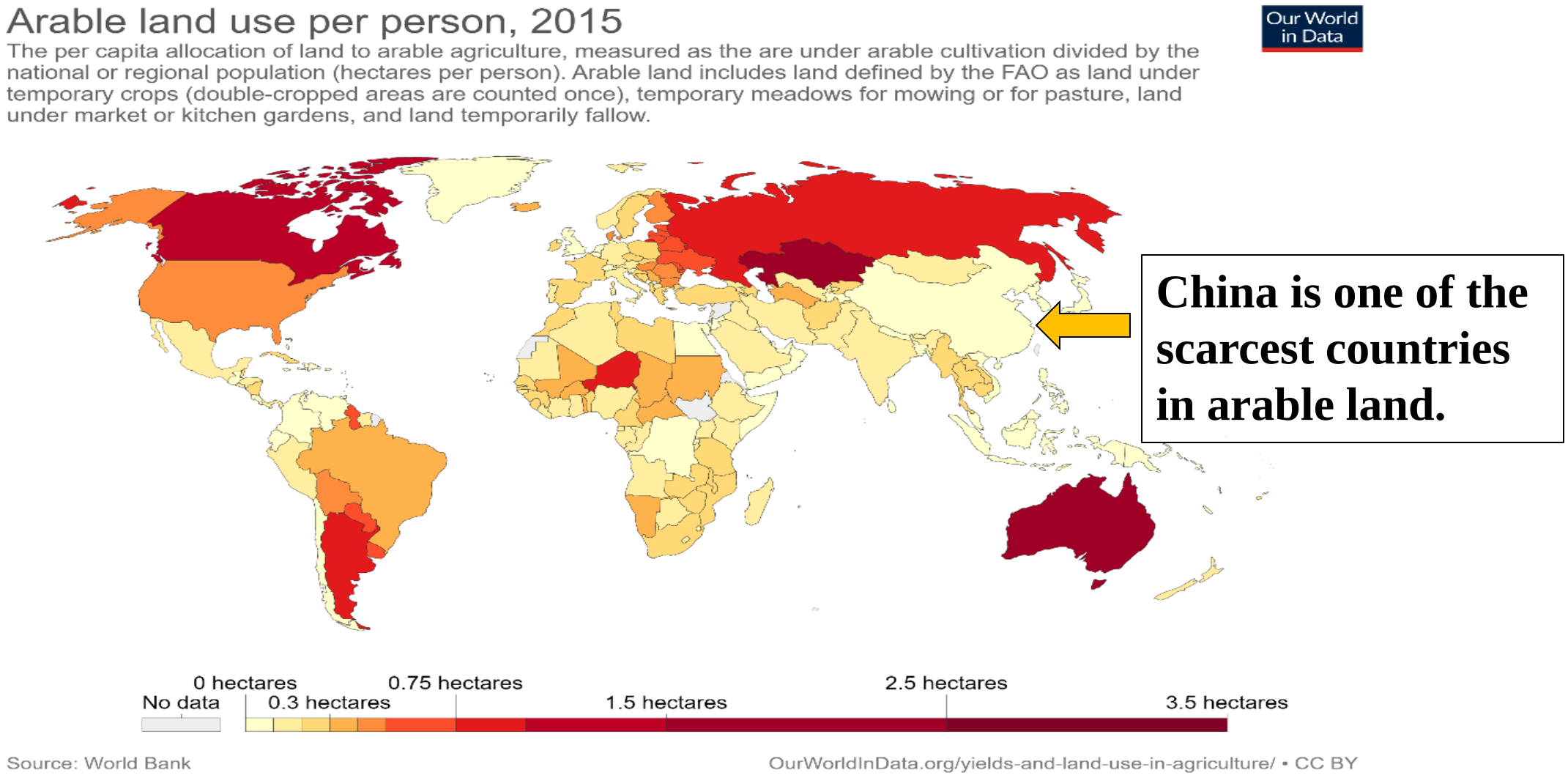
The challenges

- **Food security:** Despite rapid growth of agricultural production in the past 4 decades, feed and food imports have been rising since the early 2000s.

- **Environmental degradation and sustainability:** Past production growth has been in expensive of resource and environmental degradation.

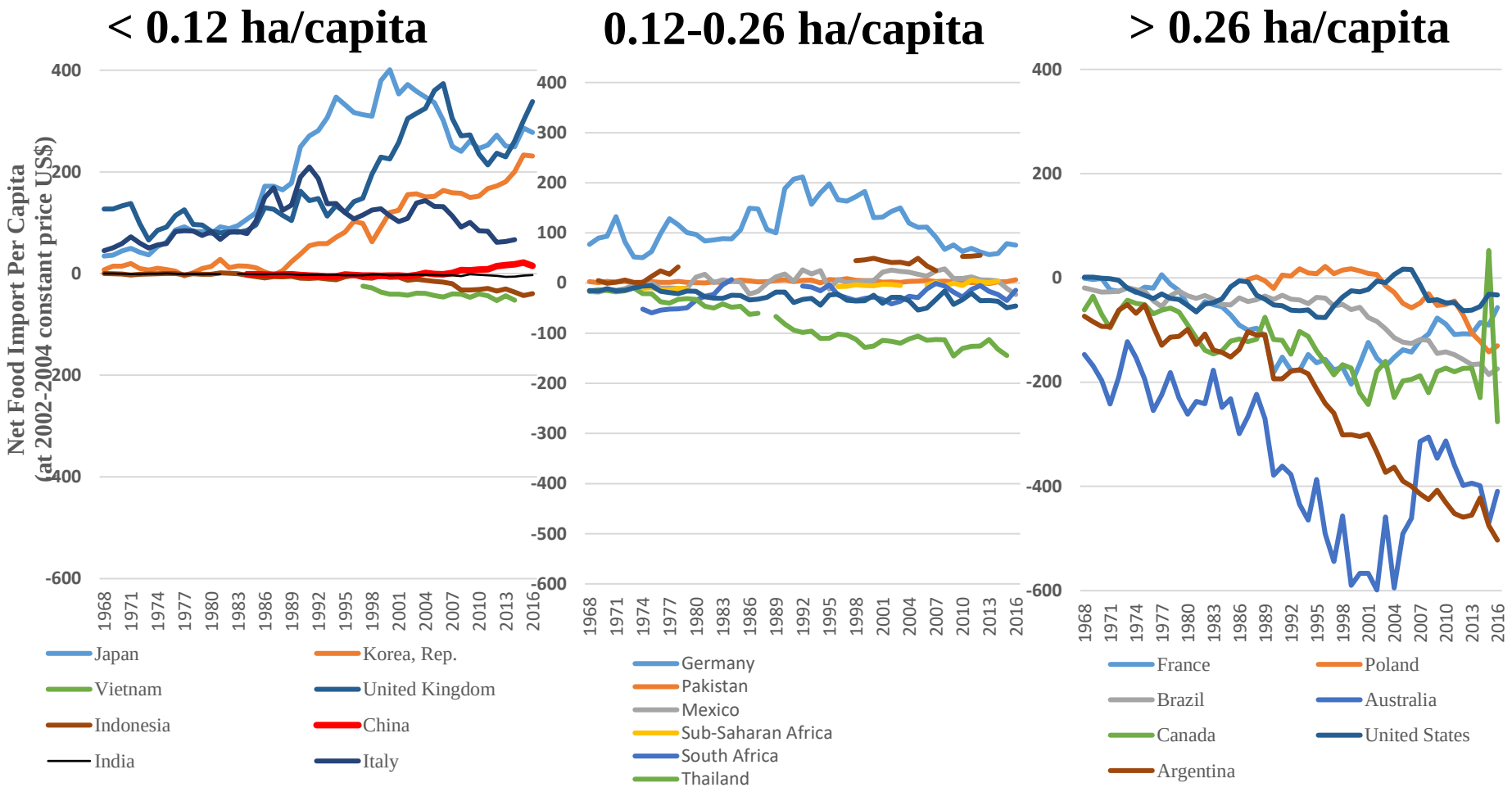
- **Falling groundwater table**
- **Soil deterioration**
- **Non-point pollution**
- **Rising ecological stress**
- **…**

Trade is one of important measures to ensure national and global food security and sustainable use of land



Important role of trade in ensuring national and global food security

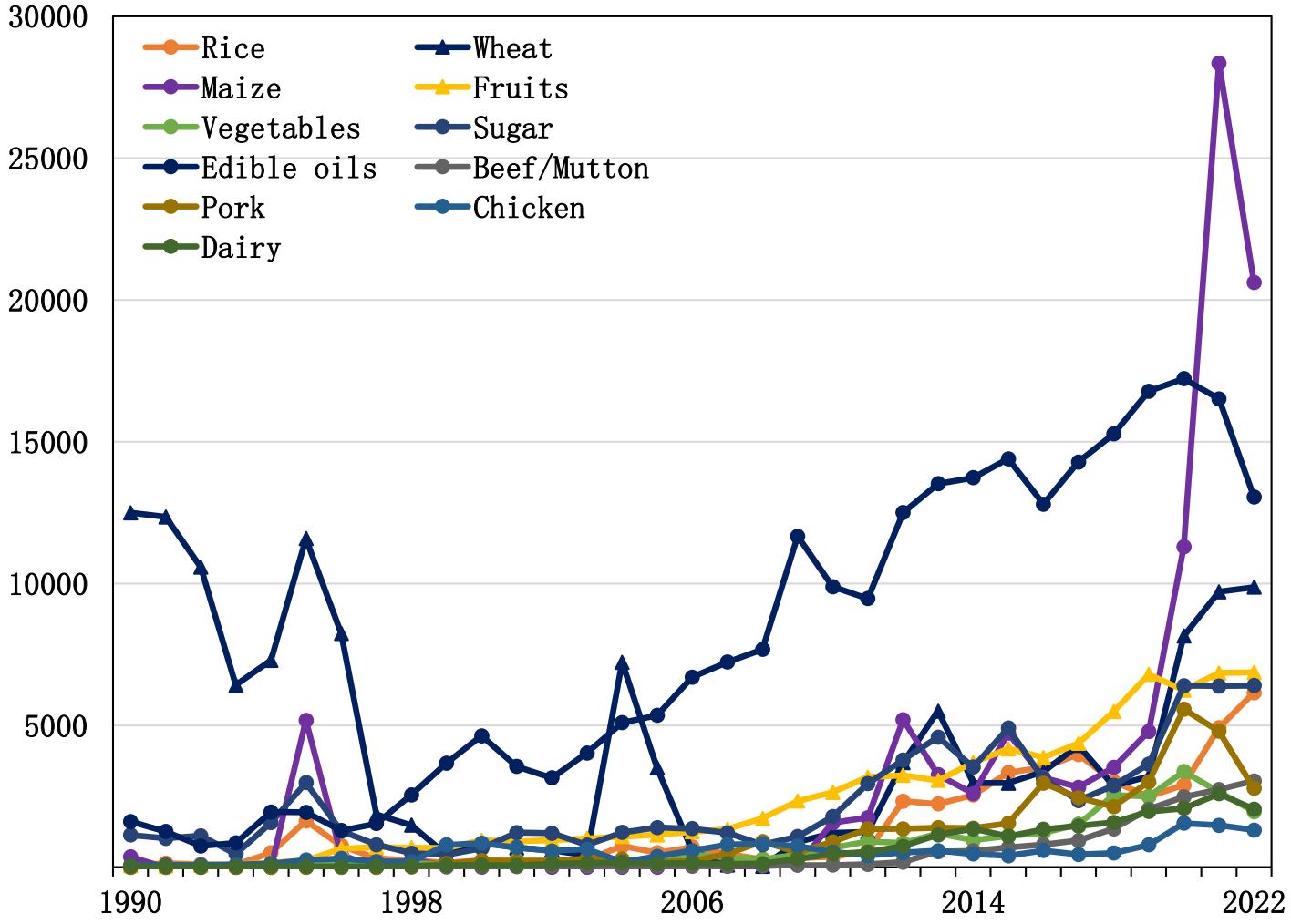
Per capita net food import (US$) in the past 50 years



2015年：世界平均0.19公顷；中国0.09公顷

Source: FAOSTAT, 2018; WDI

Imports of major agricultural products (1000 ton)

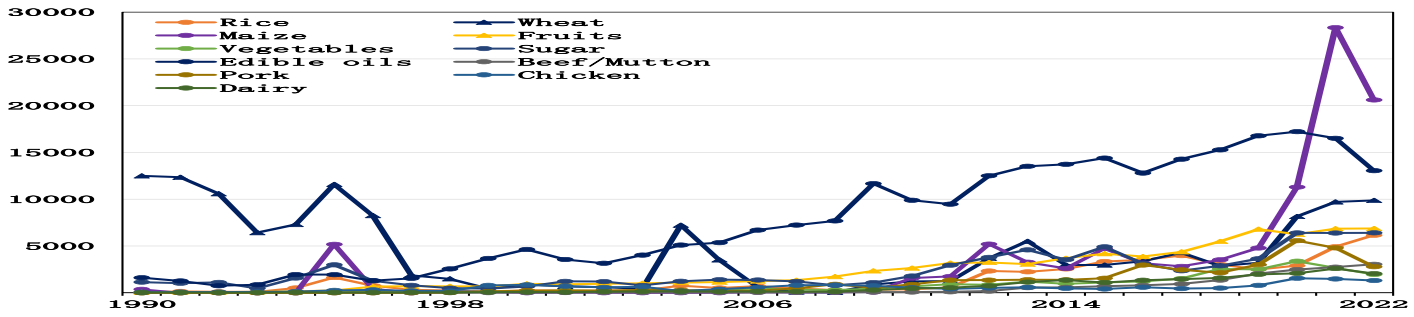


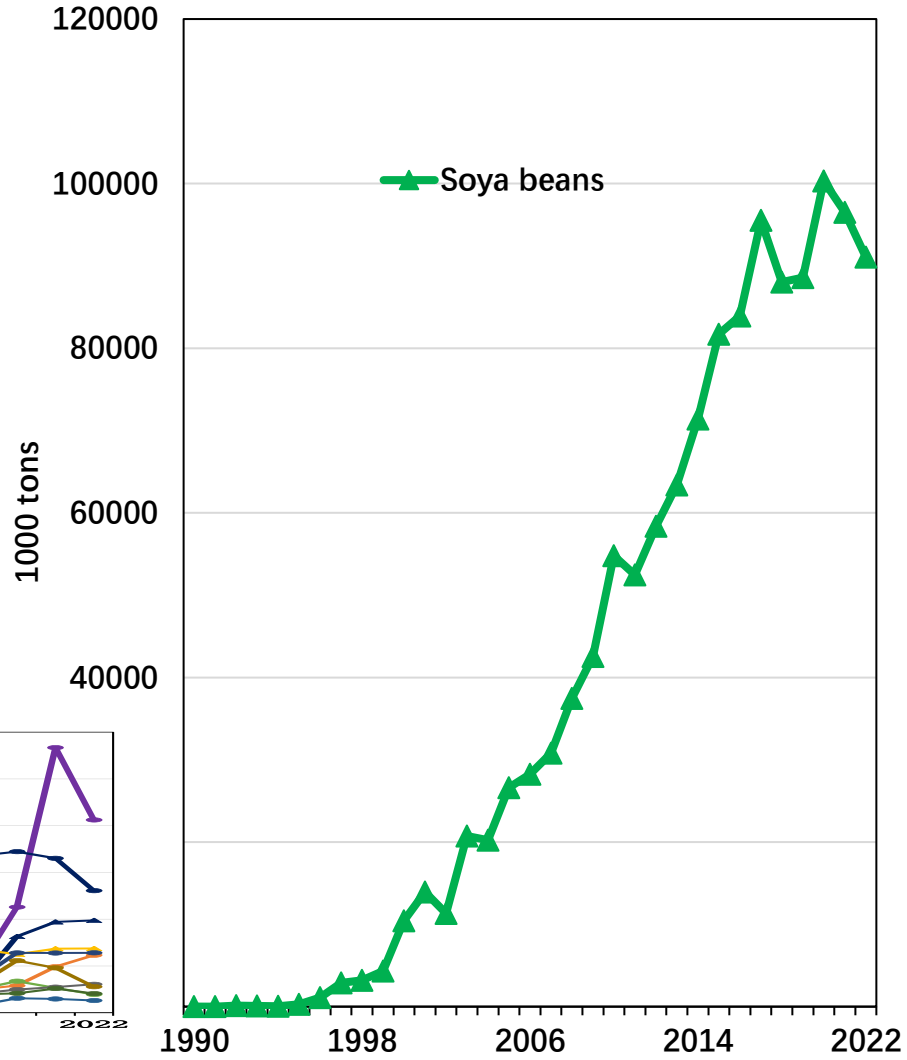
Source: FAOSTAT

There is a big misunderstanding of China's grain security in China and abroad

Imports of major agricultural products

Except for soybean used for protein feed and edible oil, all other imports are limited and controllable considering the size of China





Source: FAOSTAT

National strategies and policies: Grain security

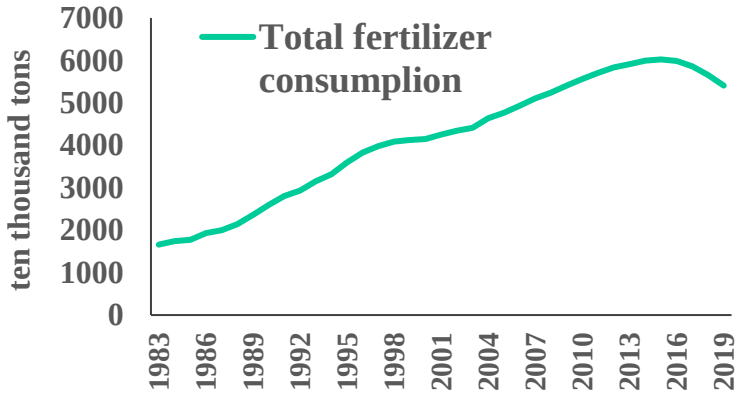
- **"Store Grains (Food) in Technology" Strategy 藏粮于技战略**
  - **Enhancing R&D innovation capacity, particular biotech & breeding program (种业振兴) and digital tech**
  - **Public agri. R&D expenditure: USD$ 4.1 billion in 2015, ranking the top in the world, and has continued to increase significantly since 2015**

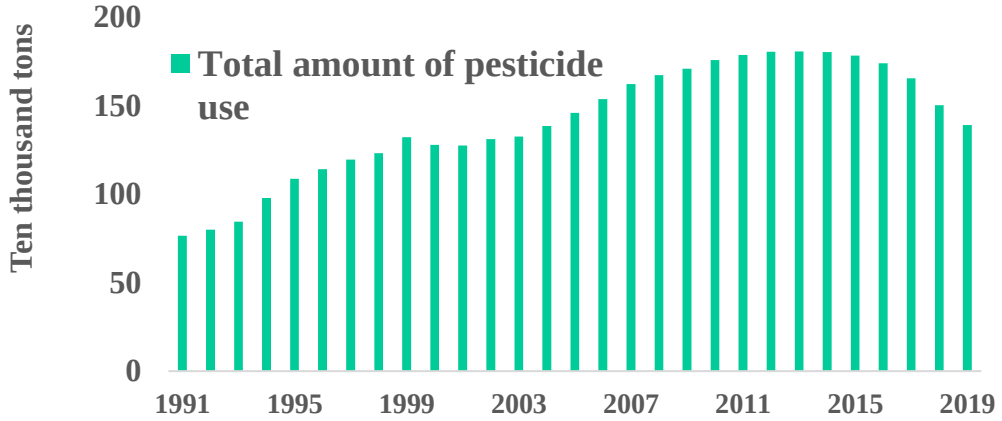
- **" Store Grains (Food) in Land " Strategy 藏粮于地战略**
  - **Set a red line of cultivated land: 1.8 billion mu (120 million ha)**
  - **Improve soil quality: the Construction of High-Standard Farmland** (highly resilience to drought and flood, water saving, stable and high yield, and ecological friendliness)**:**
    - **400 million mu in 2015**
    - **800 million mu in 2020**
    - **1.08 billion mu in 2025 under the national plan**
    - **1.20 billion mu in 2030 under the national plan**

- **Anti-Food Waste Law in 2021:** aimed to reduce food losses and waste by law
- **Grain Security Law in 2024《中华人民共和国粮食安全法》**

National strategies and policies: Greener agriculture

1. **Grain for Green Program by converting the sloped farmland to forest (or grass) land** (pilots → national) **since 1999**
   - Moer than 500 billion yuan (6.9 ¥ = 1 US$ in 2019) and covered >33 million ha in 1999-2018
2. **Protecting Natural Forest Resource Program by completely stopping commercial logging** (pilots → national) **since 1999**
   - 1999-2018 : >380 billion yuan, covered 2,966 million mu (or 64% of China's forest area)
3. **Ecological Compensation Program to reduce grazing intensity through compensation** (pilots → national) **since 2011**
   - 2011-2020 : >171 billion yuan, Covered all grassland rich provinces
4. **Zero-growth plan of chemical uses: a** special S&T project to reduce chemical uses





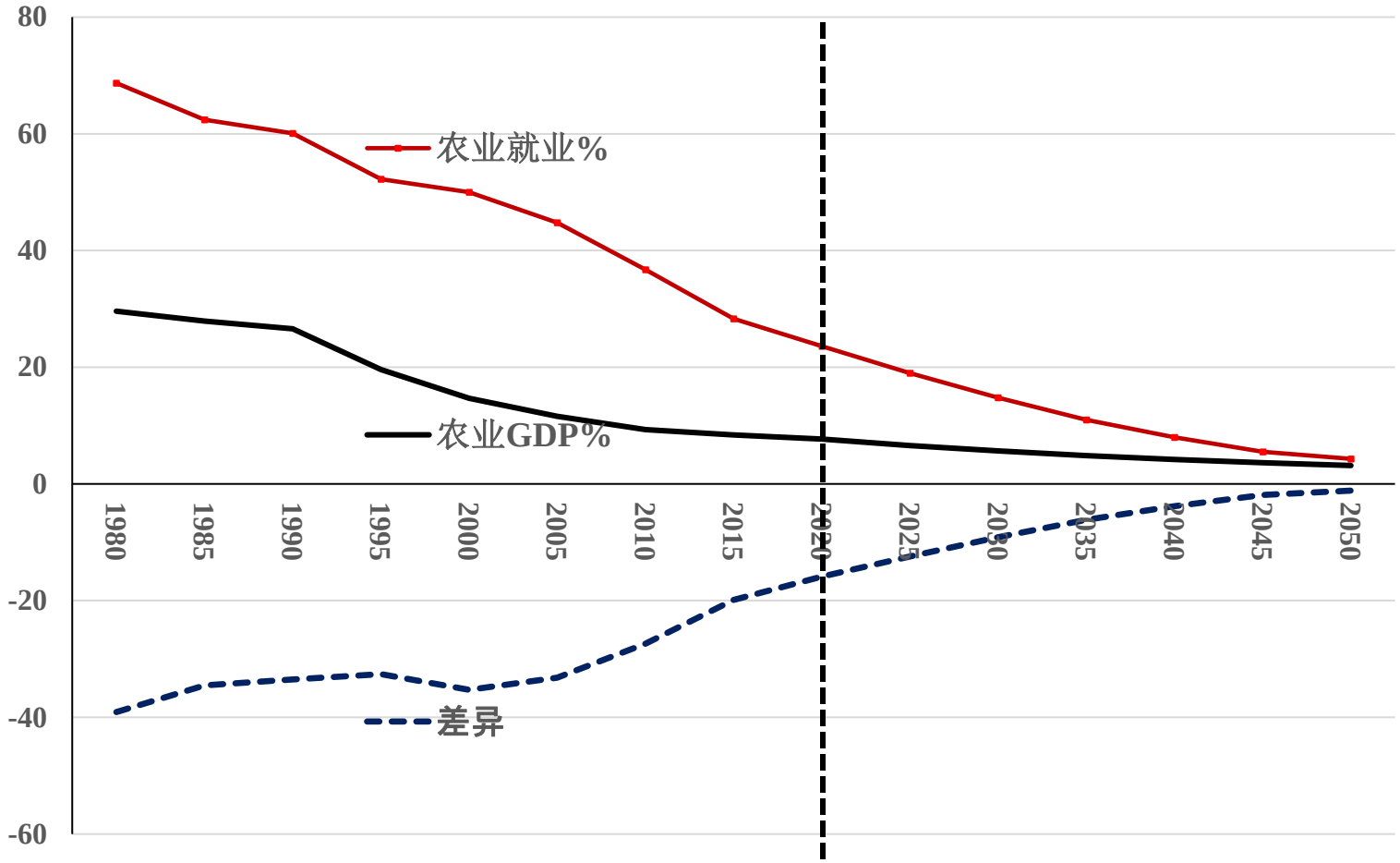
National strategies and policies: Greener agriculture

5. More greener development since 2017

- **2017:** "the Opinions on Innovating Systems and Mechanisms to Promote Green Agricultural Development"
- **2018:** The Technical Guidelines on Green Agricultural Development in 2018-2030. Establish an efficient, safe, low-carbon, circular, intelligent and integrated technology system for greener agricultural development, and promote greener agricultural S&T innovations
- **2020:** Implement a 10-year plan to ban fishing in the Yangtze River
- **2021:** The Green Development Plan for Agriculture during the 14th Five-Year Plan (2021-2025)
- **2023: Mainstream agriculture into climate change** to reduce emission and increase carbon sink in agriculture
- …

The Way Forward

1980~2050年中国农业：GDP占比和就业占比
Agricultural GDP and employment shares in 1080-2050



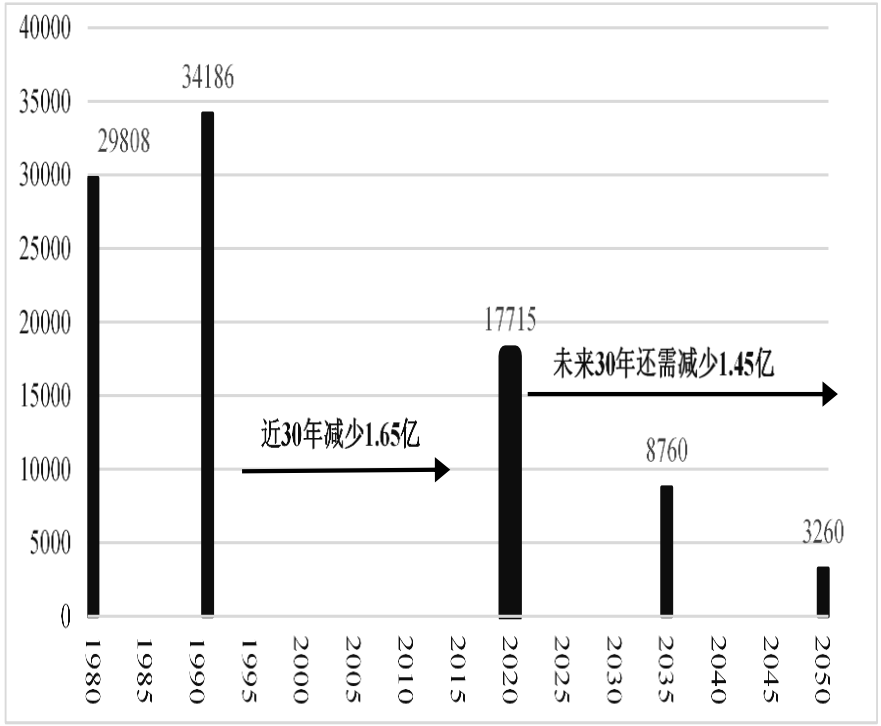
Achieving common prosperity of farmers with all other people: Ideal Vision I 农民和其他国民共同富裕 - 愿景1

- Labor productivity in agri. & non-agri. must converge: $Y_{agri}=Q/L$
- How? Urbanization, facilitating small & medium-sized cities, county-towns and townships

Shares of agricultural GDP and employment and labor productivity gap in 1970-2050

	1970	2000	2020	2050
Ag. GDP %	40	15	8	3.2
Ag. labor %	81	50	24	4.3
Labor productivity Non-Agri /Agri	2.0	3.3	3.1	1.3

Agri. Labor (10,000) in 1980-2050



Huang et. al. (2022), Development Visions and Policies of China's Agriculture by 2050, *Strategic Study of CAE*, Vol. 24, No. 1(2022):11-19.

China's agricultural labor and cultivated land in 2020 and 2050: A big country with small farms 大国小农

	2020	2050
Agri. labor %	**23.6**	**4.3%**
Agri. labor (thousand)	**177,150**	**32,600**
Crop sector (thousand)	**159,000**	**29,300**
Cultivated land (100 million mu)	**19.2**	**18.0**
Land/labor (mu)	**12**	**61**

≈ 4 ha

愿景-2: 保障粮食安全+实现农民共同富裕

Achieving grain security and all farmers' common prosperity: Ideal Vision II

Crop Sector: Need to move towards **"20-80 Pattern" "二八格局"** in order to ensure grain security and achieve common prosperity among small and large farmers

- **Large farms: "20%"**
  - will produce grain and other bulk commodities to ensure national grain security; and
  - will rely on the scale of farms and income support policy to raise their income.
- **Small farms: "80%"**
  - will develop high-value agriculture to ensure national nutrition and health; and
  - will raise their incomes through high-value agricultural production

Need two separate policy support systems

- **Grain and other bulk commodities**
- **High-value agriculture**

Huang (2022). Facilitating Farmer's Income Growth and Common Prosperity through Accelerating Rural Economic Transformation, *Issues in Agricultural Economy*, No. 7 (2022): 4-15.

Pathway and IPIs of rural transformation in China

Stage 阶段	Major features 主要特征	Major Institution, Policy & Investment (IPIs) 主要制度、政策和投资
1	**Primary on staple food production:** before the early 1990s	**Institution** (land) **+ irrigation + tech-1** (seed, chemical, etc)
2	**Diversification/commercialization:** since the early 1990s	**Plus agri. mkt + road infrastructure + tech-2** (tech for high-value agri.)
3	**Farming + part time off-farm:** since the middle 1990s **Mechanization + full time off-farm:** since the late 1990s	**Plus labor. mkt + land mkt and consolidation + custom services tech-3** (capital intensive tech +labor saving tech)
4	**Grain security + high value agriculture** **Green agriculture + Integrated urban-rural** **Farm: Toward division of large- (e.g., grain) & small-scale (high-value) farms**	**How?** • **4 driving forces or new IPIs: New Institutions, New Policies (e.g., tech., market reform, supporting policies, etc.) and New Investment** • **Appropriate IPIs matter** • **Sequence of IPIs is important**

Thanks!