



# **China's Role in the Future Food Security Situation of Asia: A Threat or An Ally**

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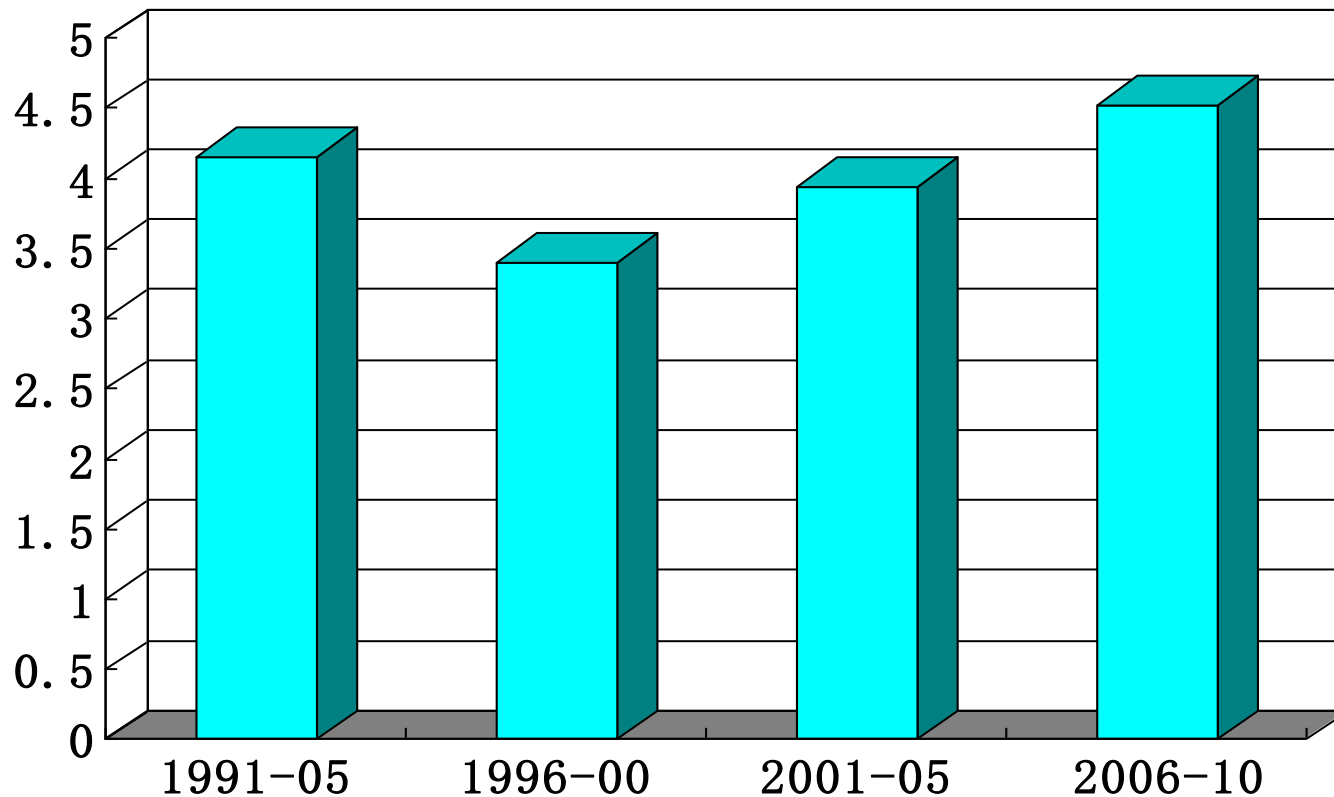
# Questions and concerns in early 1990s

- **In the early 1990s**
  - **“Who will feed China?”**
  - **“Will China starve the world?”**
  - **“When?” ... by 2010 or 2020**

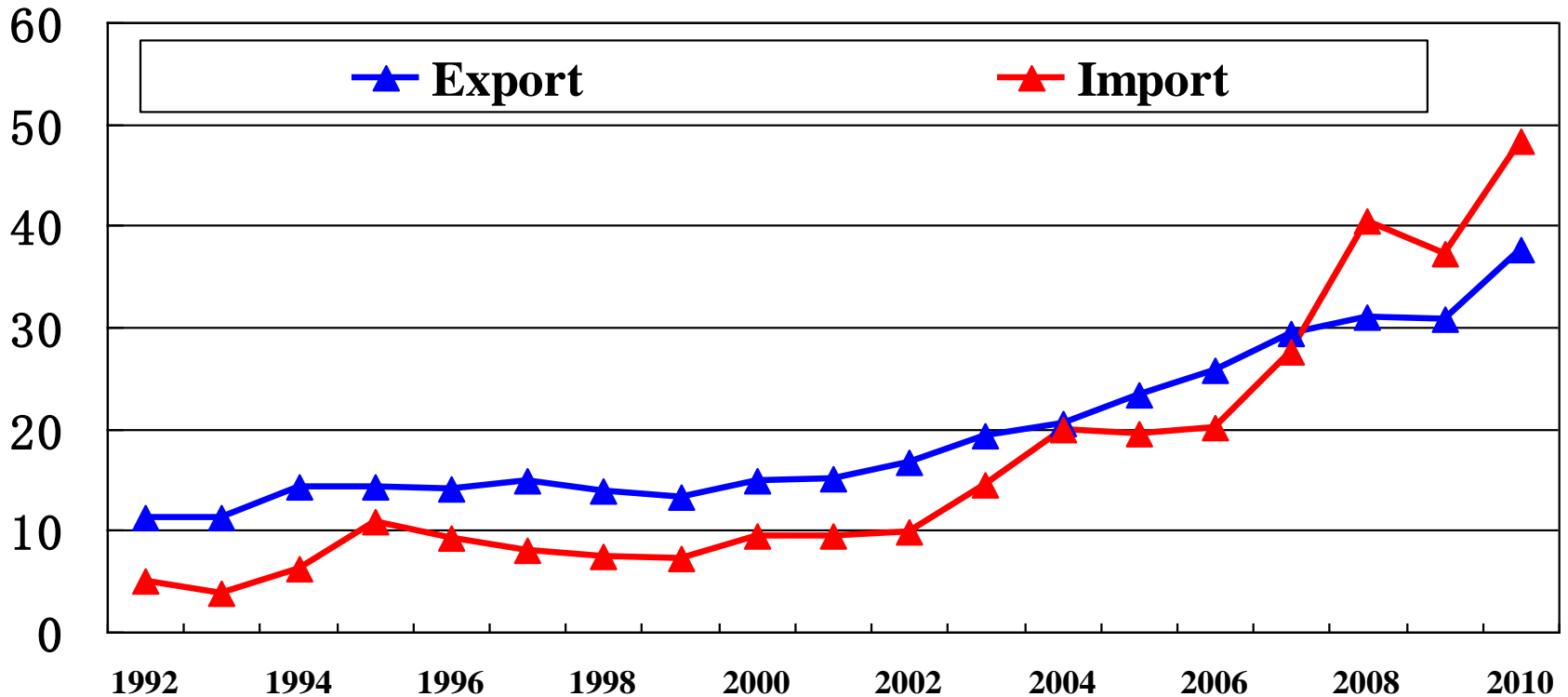
**What have happened since early 1990s**

**Average 4% of annual growth rate of agricultural GDP in the past 2 decades:  
5.4 times of population growth rate (0.74%)**

Annual growth rate of agri. GDP in 1991-2010

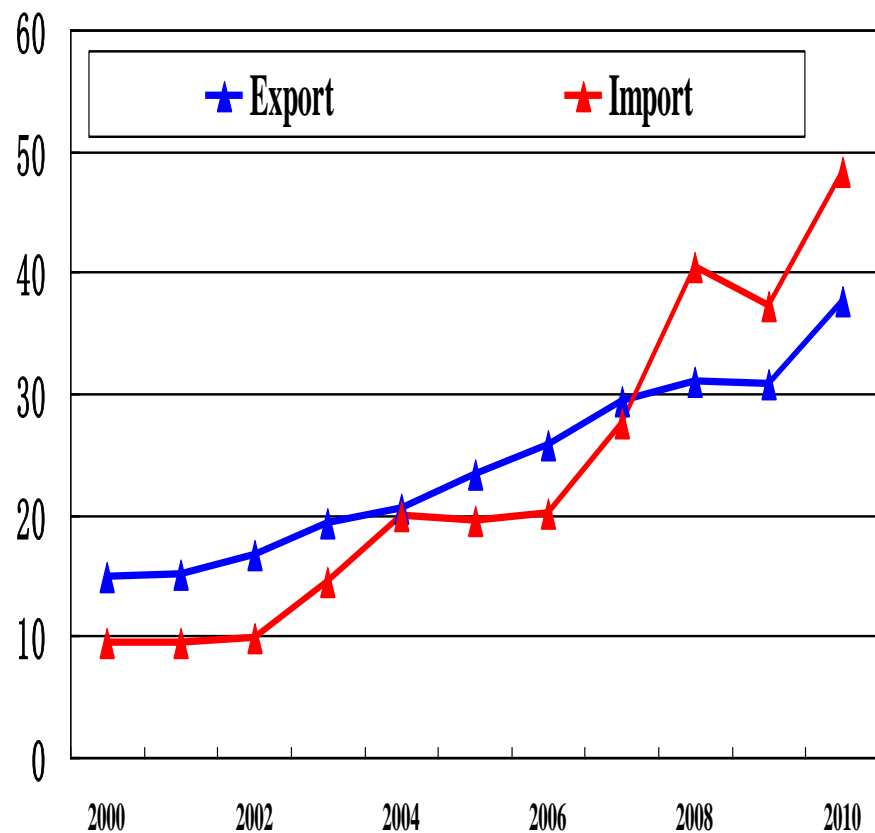


# China food trade: export and import (bil. US\$) in 1992-2010

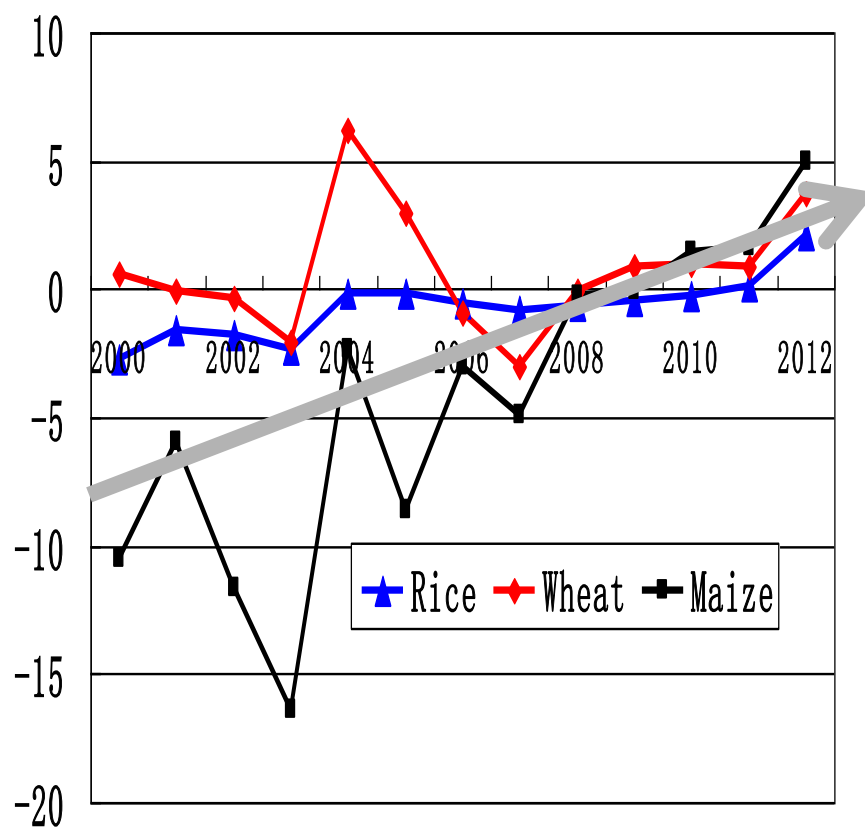


**In the past two decades, on average China was a net food exporter**

## China food trade: **export** and **import** (bil. US\$)



## Net import of rice, wheat and maize (million tons)



**With import > export in recent years, concerns on food security were raised again...**

# Questions:

- **How China has been able to meet its growing demand for foods** (with 20% of world population but only 8% of world cultivated land) **in the past?**
- **If the dynamics of China's economy will continue, what will be implications for grain and food security in China, Asia and the rest of world?**

# **The rest of presentation**

- **Major drivers of agricultural growth**
- **Prospects of food economy in the future**
- **Concluding remarks**

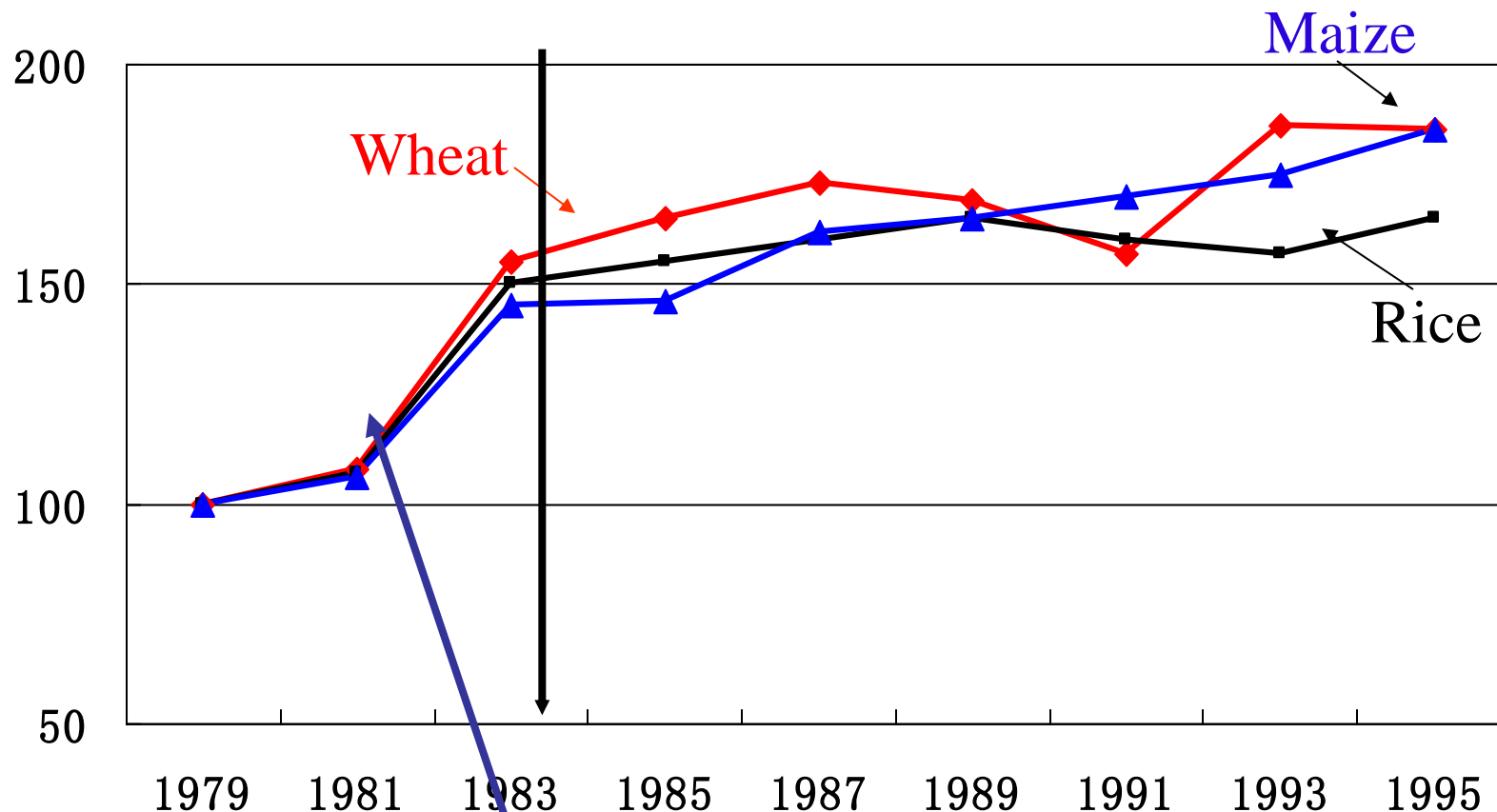
# **Major drivers of agricultural growth: 4 major policies**

- Institutional change**
- Technology**
- Market**
- Investment**
- ...**



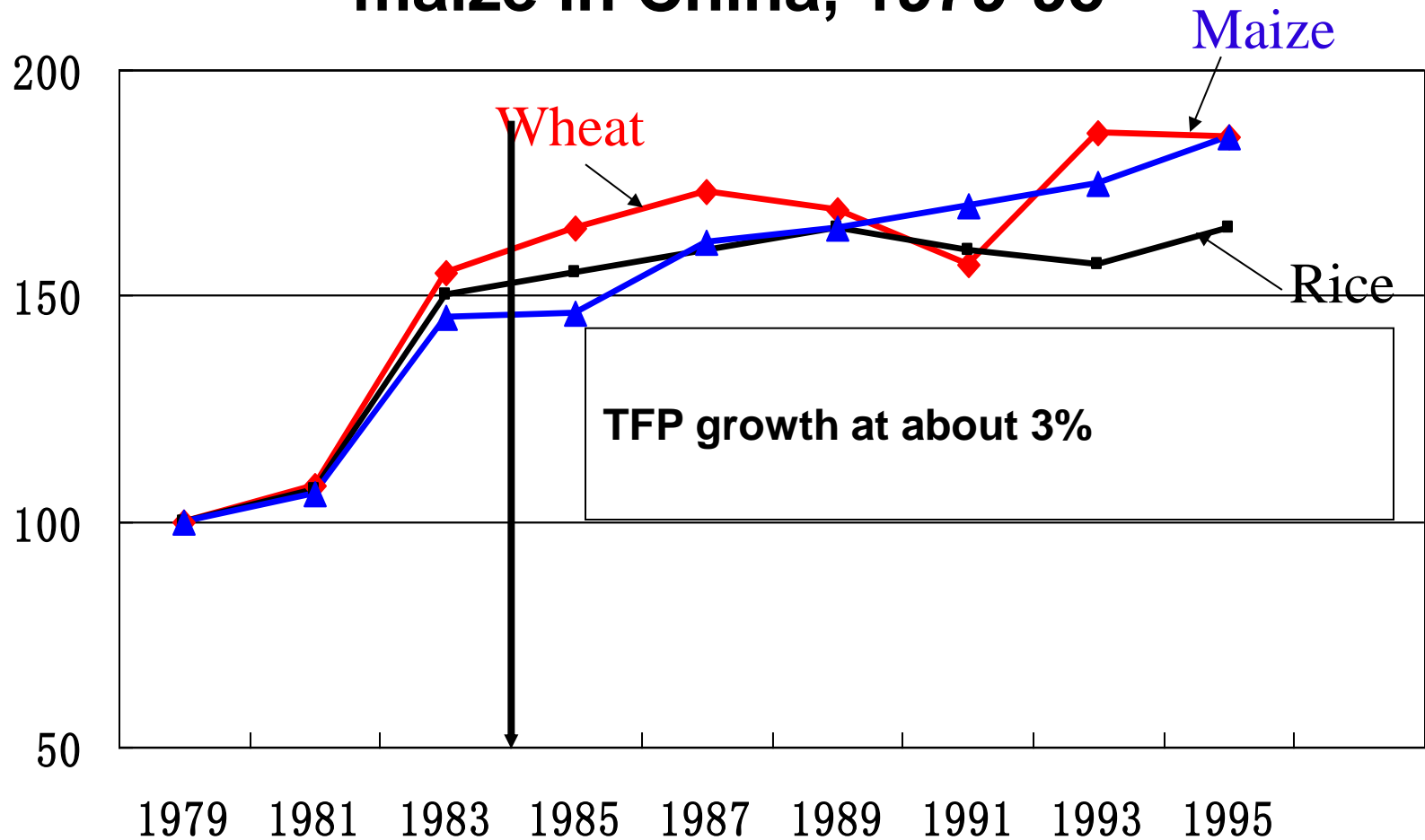
# Total Factor Productivity for rice, wheat and maize in China, 1979-95

(note: similar trends for other products)



**Institutional change (decollectivization, allocated land equally to all households in each village) was a major source of growth in 1979-84**

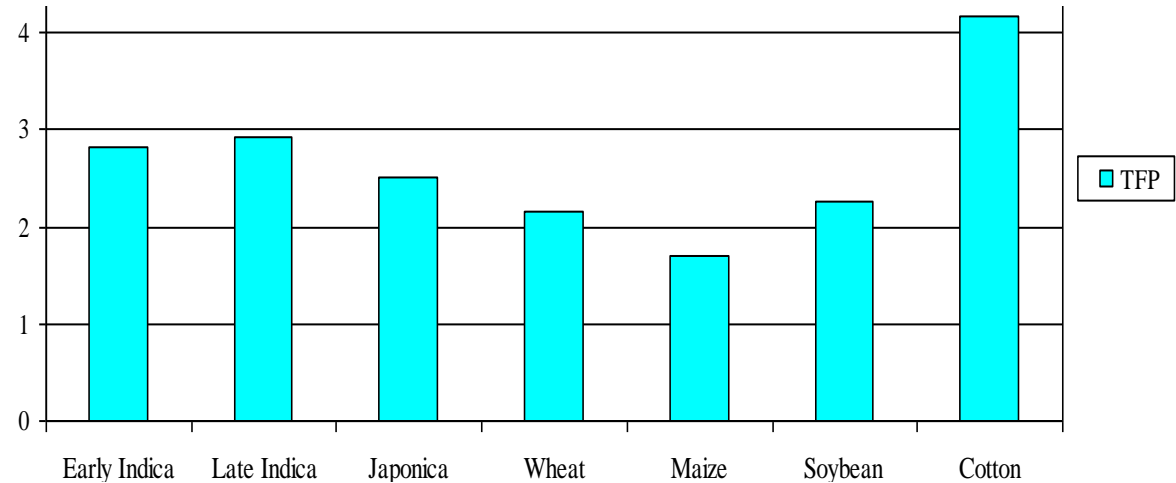
# Total Factor Productivity for rice, wheat and maize in China, 1979-95



After middle 1980s, **technology** has been major factor affecting productivity growth

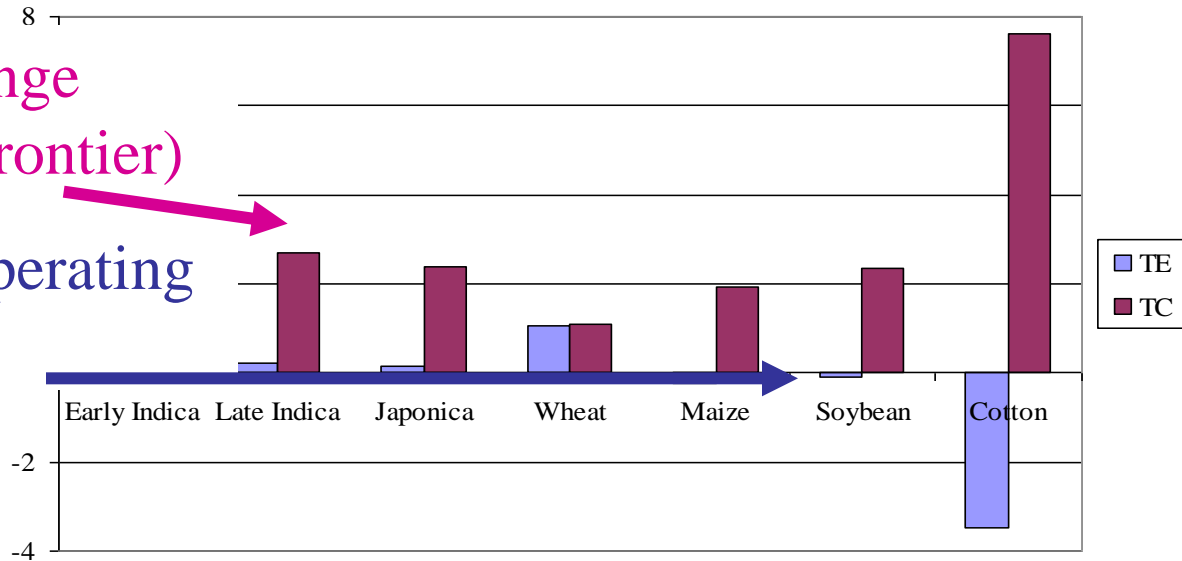
# Total Factor Productivity for major crops, 1995-2004

Total Factor Productivity Rises



Mostly Technical Change  
(rising of production frontier)

... China is already operating efficiently (at frontier)



# Major findings on Bt cotton impacts in 1999-2001 (per hectare)

- Reduce pesticide use: 34 kg 923 yuan
- Increase yield: 9.6% 930 yuan
- Increase seed cost: 570 yuan
- Reduce labor input: 41 days 574 yuan
- Increase net income: 1857 yuan  
(US\$ 225)

# Major drivers of agricultural growth in the past

- Institutional change
- Technology
- **Market: infrastructure and reform**
- Investment
- ...

# Integration in China's Markets (% of market pairs that have integrated price series; Note: similar results for rice, wheat and other products)

	1991-92	1997-00	2001-2003
Corn	46	<b>93</b>	<b>100</b>
Soybean	56	<b>95</b>	<b>98</b>

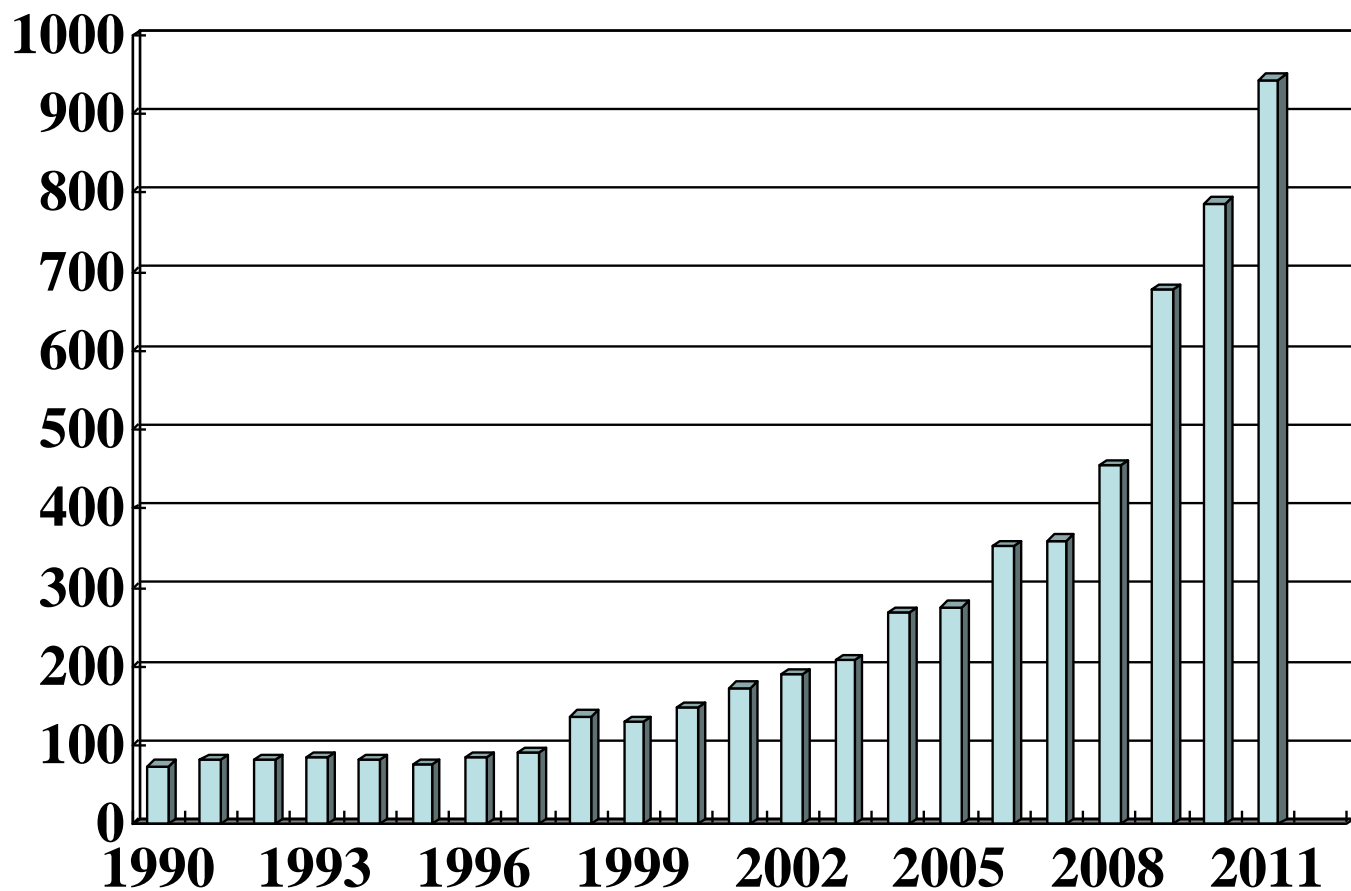
When using statistical tests (on more than 800 pairs of markets), almost all markets move together in an integrated way, up from only about  $\frac{1}{2}$  in the early 1990s (when markets were NOT integrated)

# Major drivers of agricultural growth in the past

- Institutional change
- Technology
- **Market: infrastructure and reform**
  - **Facilitated agricultural structural change**
  - **Helped farmers: cheaper inputs' prices and higher output prices**
- Investment
- ...

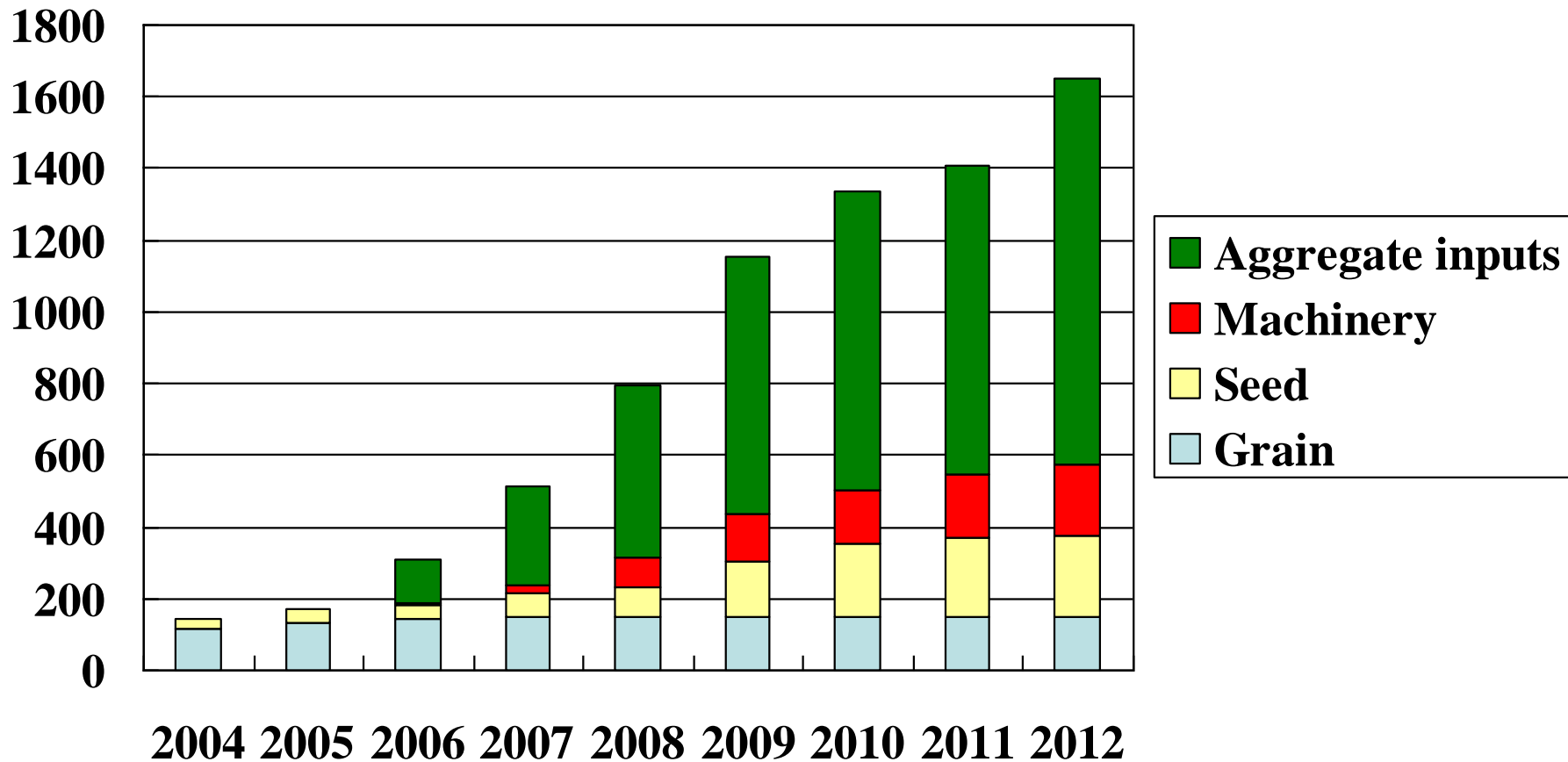
# Investment into agricultural sector

## Government budget support (billion yuan in 2008 prices)





# Agricultural subsidies (100 million yuan)



Total **subsidy** in 2012 was 164.3 billion yuan (26.1 billion US\$), about 3.13% of agricultural GDP. Most are “income transfer” as **they are decoupled from production.**

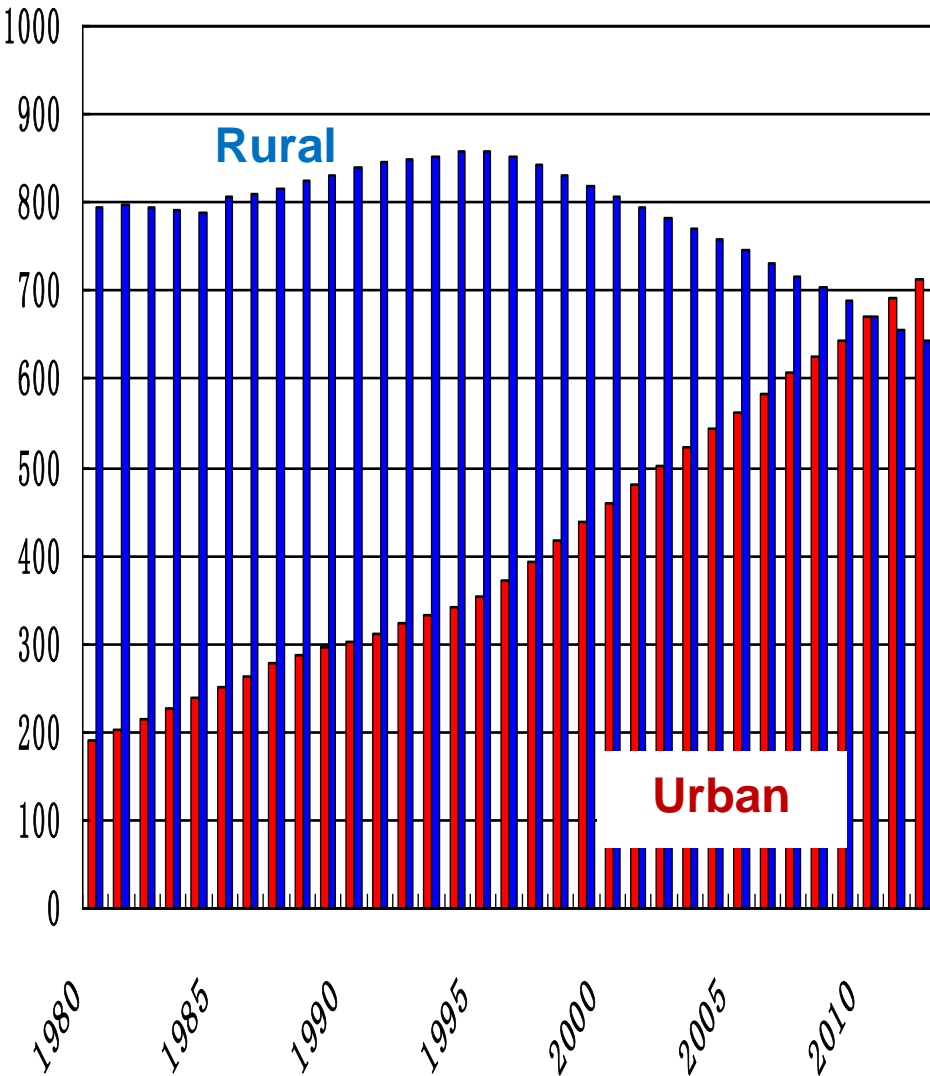
Source: Ministry of Finance

# The rest of presentation

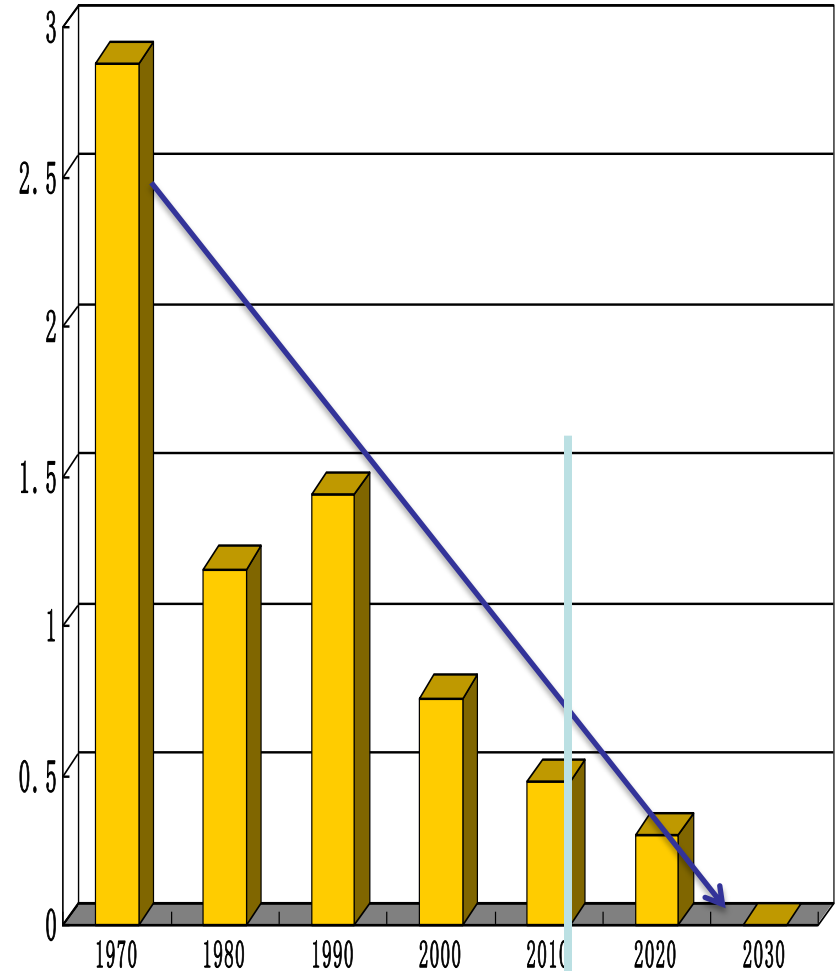
- Major drivers of agricultural growth
- **Prospects of food economy in the future**
- Concluding remarks

# Population in rural and urban

million



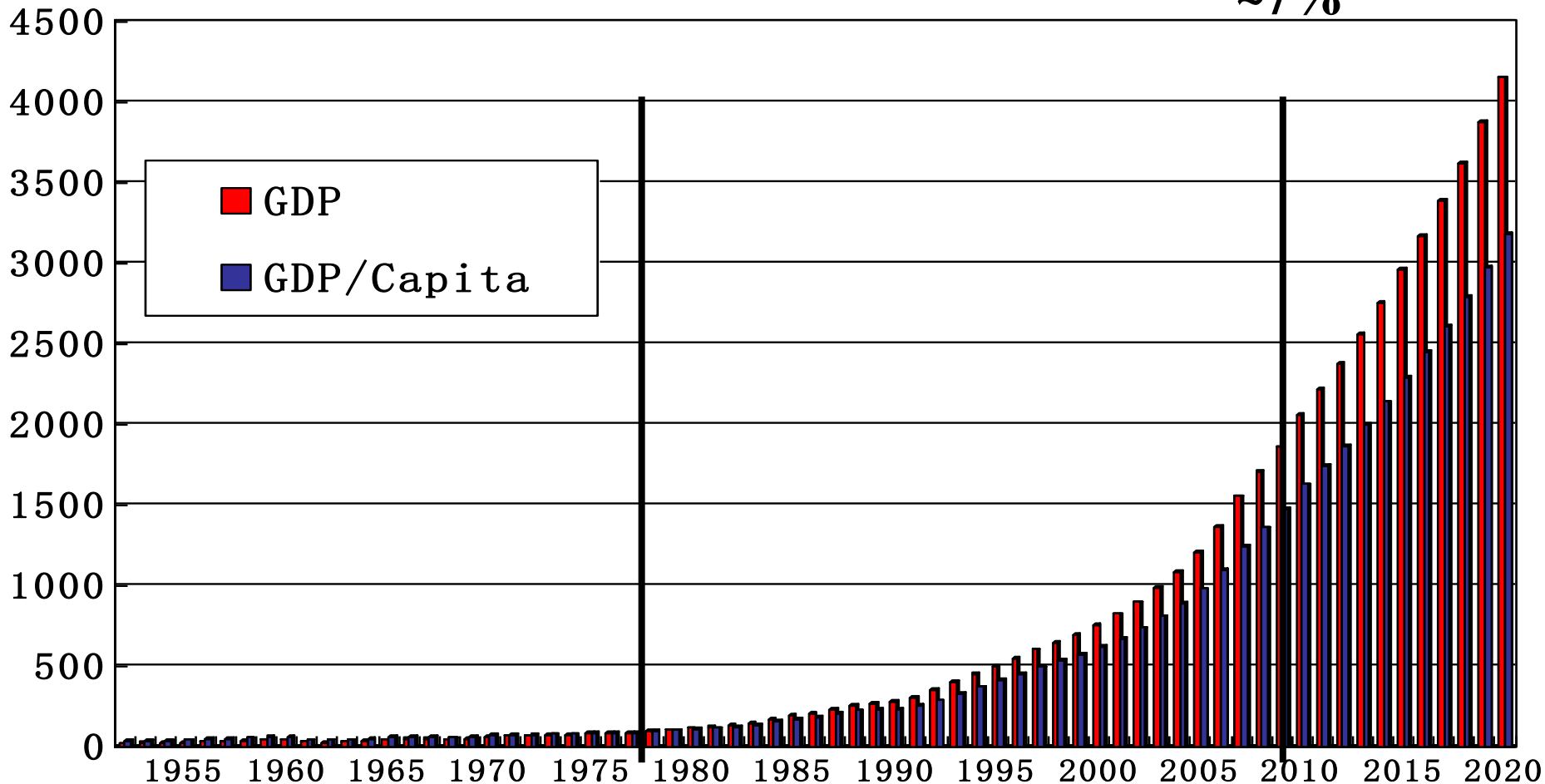
Although population will keep rising, its growth rate will fall significantly in the coming decades



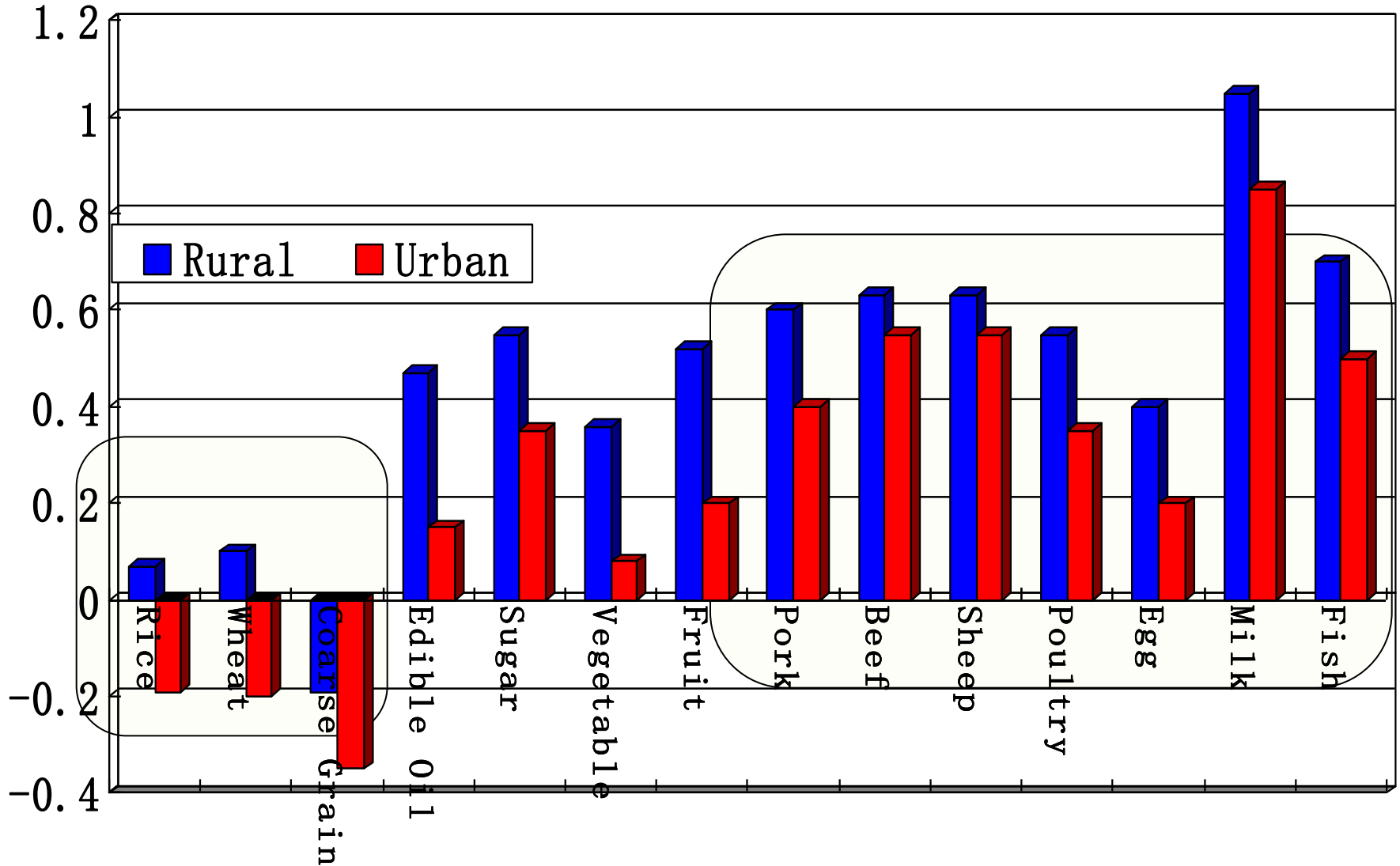
**Slow growth in  
1950s-1970s  
Income/capita: 4%**

**Rapid growth in  
1980s-2000s  
Income/capita: ~10%**

**Double in  
2010-2020  
Income/capita:  
~7%**



# Income elasticities of demand for various foods in rural and urban in 2010, China



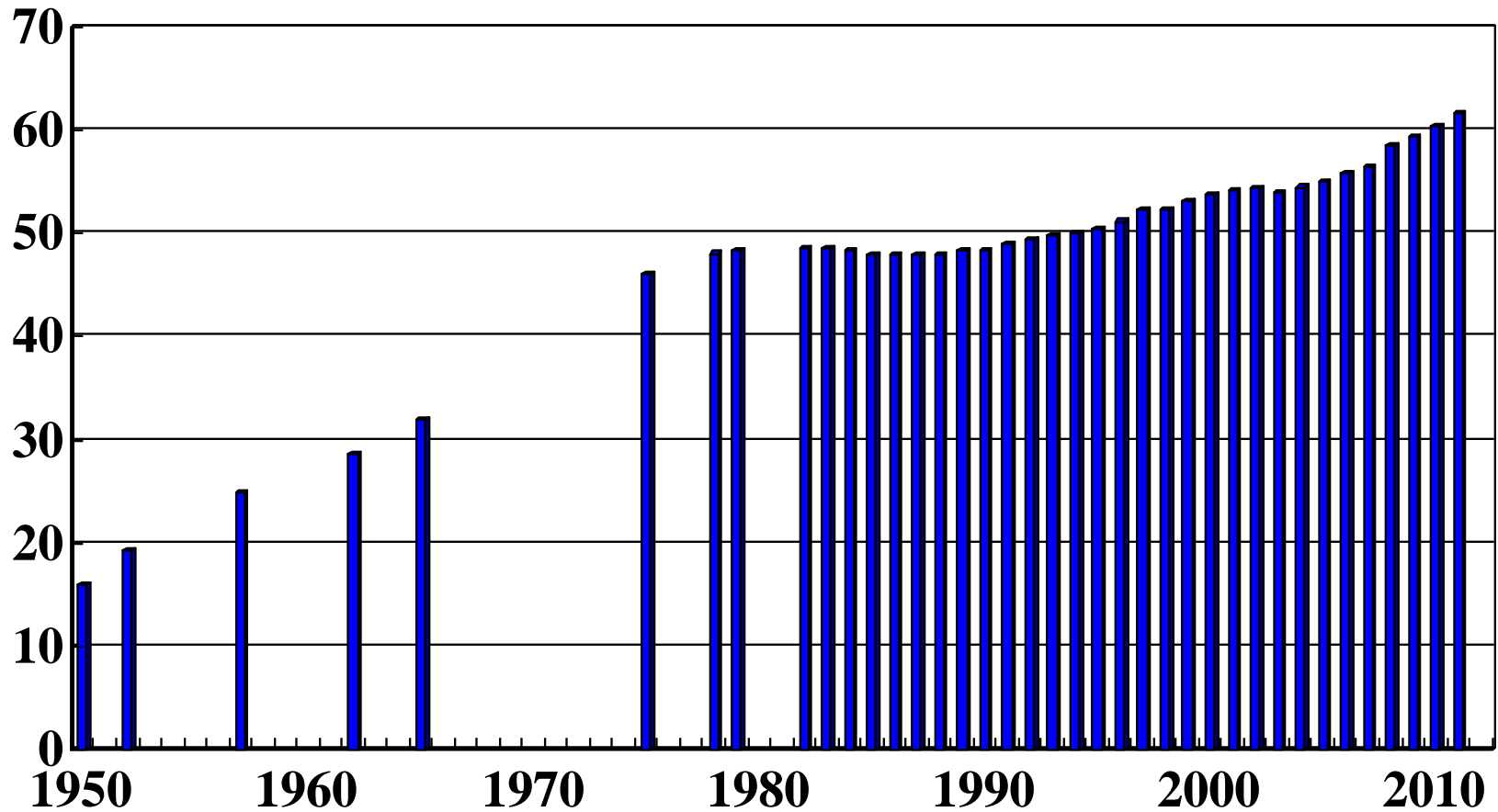
# Prospects of food security and trade in the future

- **Major challenges and policy responses:**
  - Demand
    - Income growth; Urbanization
  - **Production:**
    - **Land:**
      - Red line (120 million ha)
      - Quality
    - **Water scarcity**
    - **Technology**
    - **Small farm**
    - ...

# Expansion of irrigated land in China

*Million ha*

About 50% of cultivated land



# Policy response: invest in water

- **In the past:** invested in water has been the largest component of public investment in agriculture
- **2011:**
  - Double investment in water conservancy: invest **4000** billion yuan (**630** billion US\$) in next 10 years;

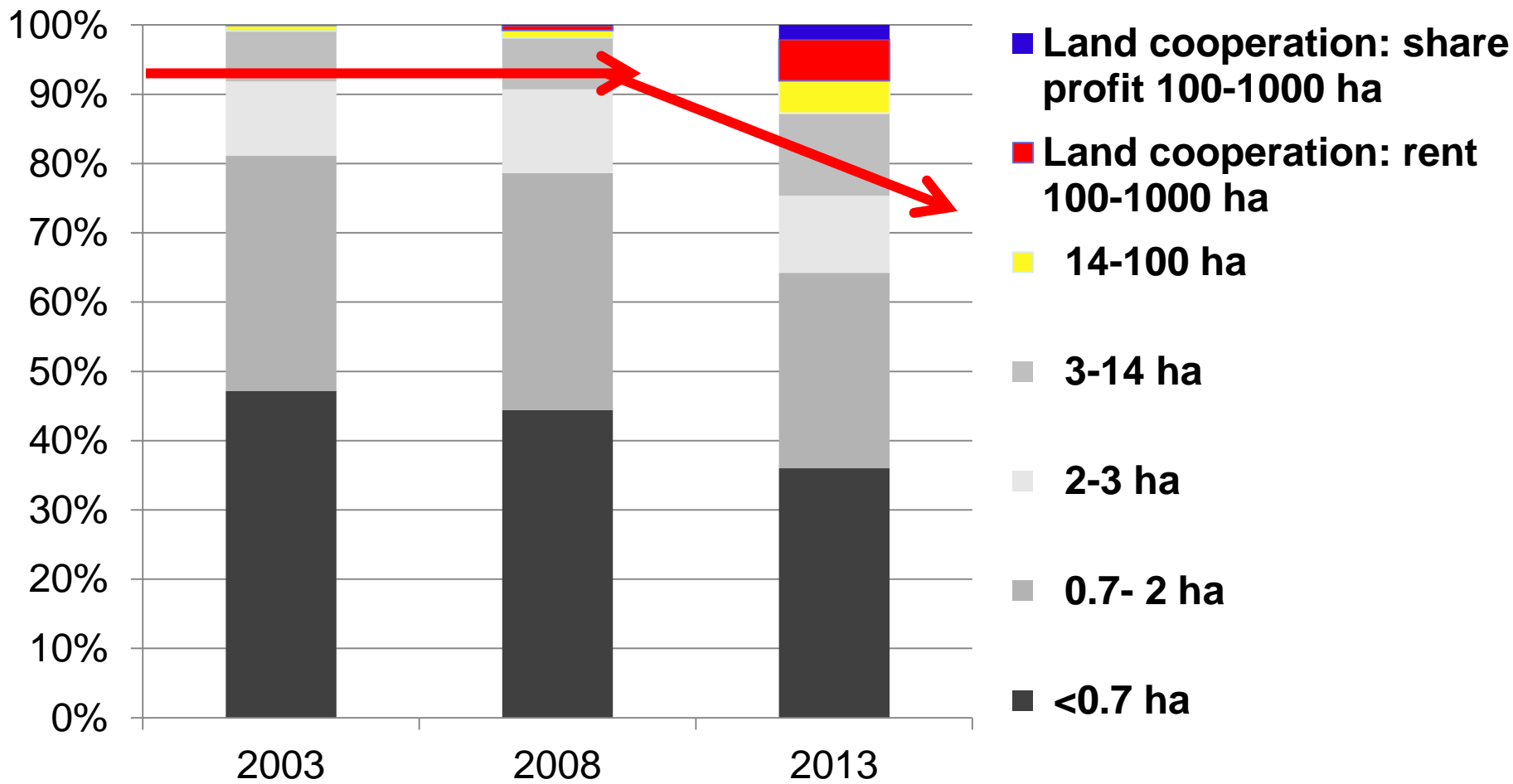


# **National Policy: “Promoting Agriculture by Applying Scientific and Technological Advances”**

- **Annual growth rate in agri. R&D (public):**
  - 2000-2010: 16% in real term
- **China’s #1 policy document in 2012:**
  - New political commitment to invest in R&D and reforming public R&D system
- **China’s #1 policy document in 2013:**
  - Modernizing agriculture: increase productivity through investment and changing farming operation mode (e.g., increasing operation size...)

# Rapid farming transformation in China: Based on CCAP's survey in Northeast and North China Plain

% of cultivated land

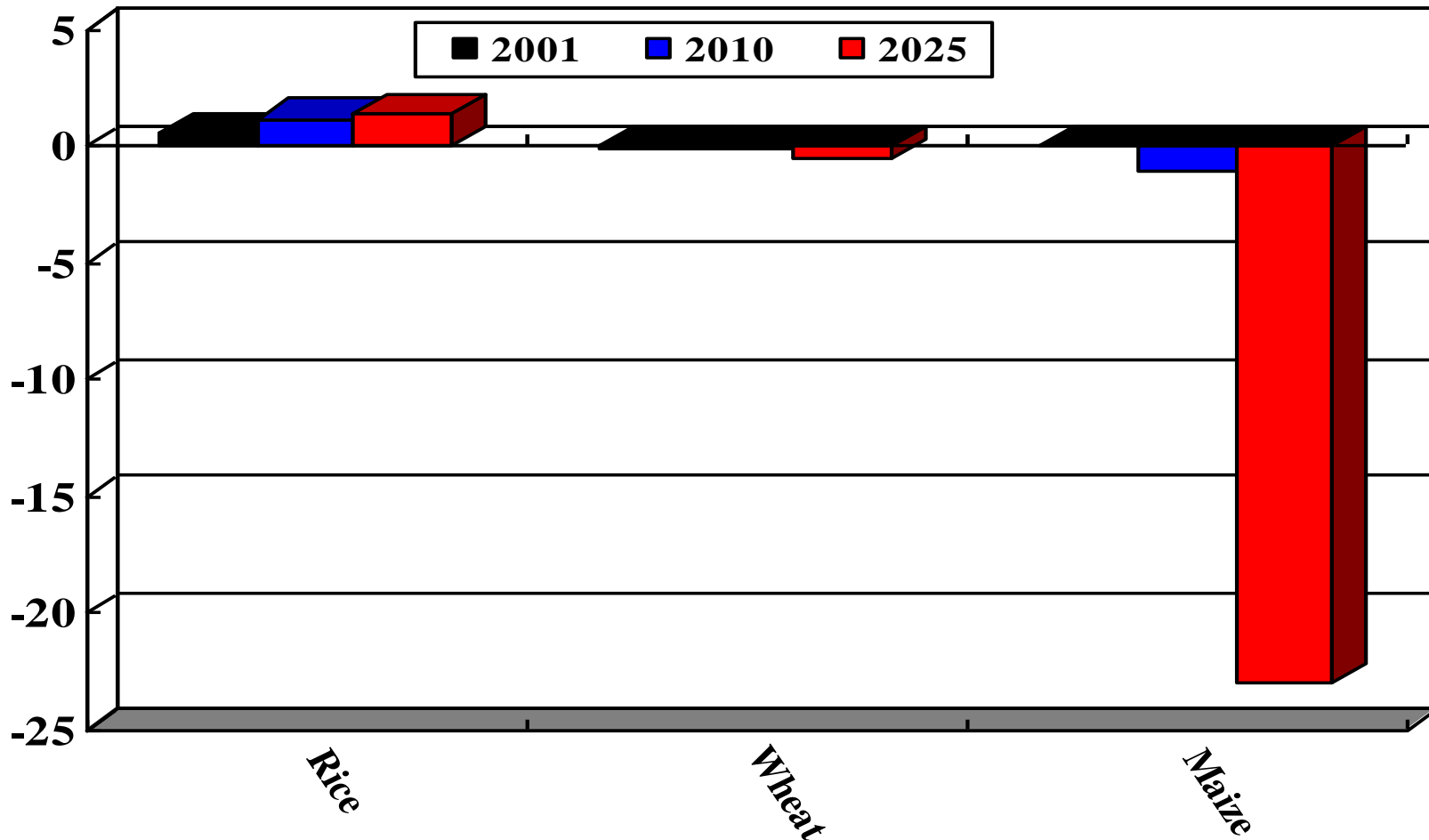


Source: CCAP, 2013

# Prospects of food security and trade in the future

- **Major challenges and policy responses:**
  - **Demand**
    - **Income growth; Urbanization**
  - **Production:**
    - **Land and water scarcity; Technology; small farm...**
- **Prospects of food supply, demand and trade**

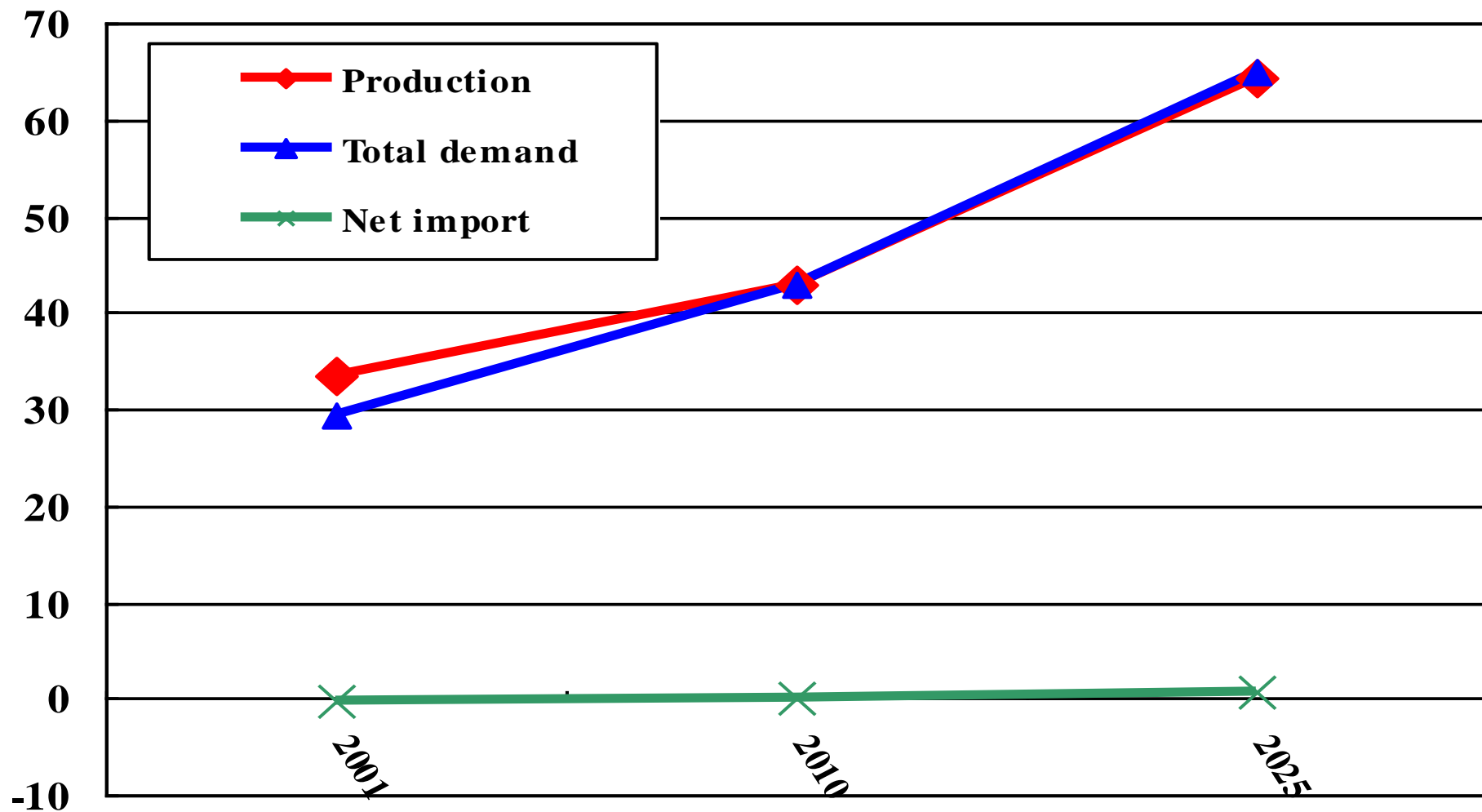
# China's net export of cereals (million tons) under baseline in 2001-2025



Source: Huang et al. (2013)

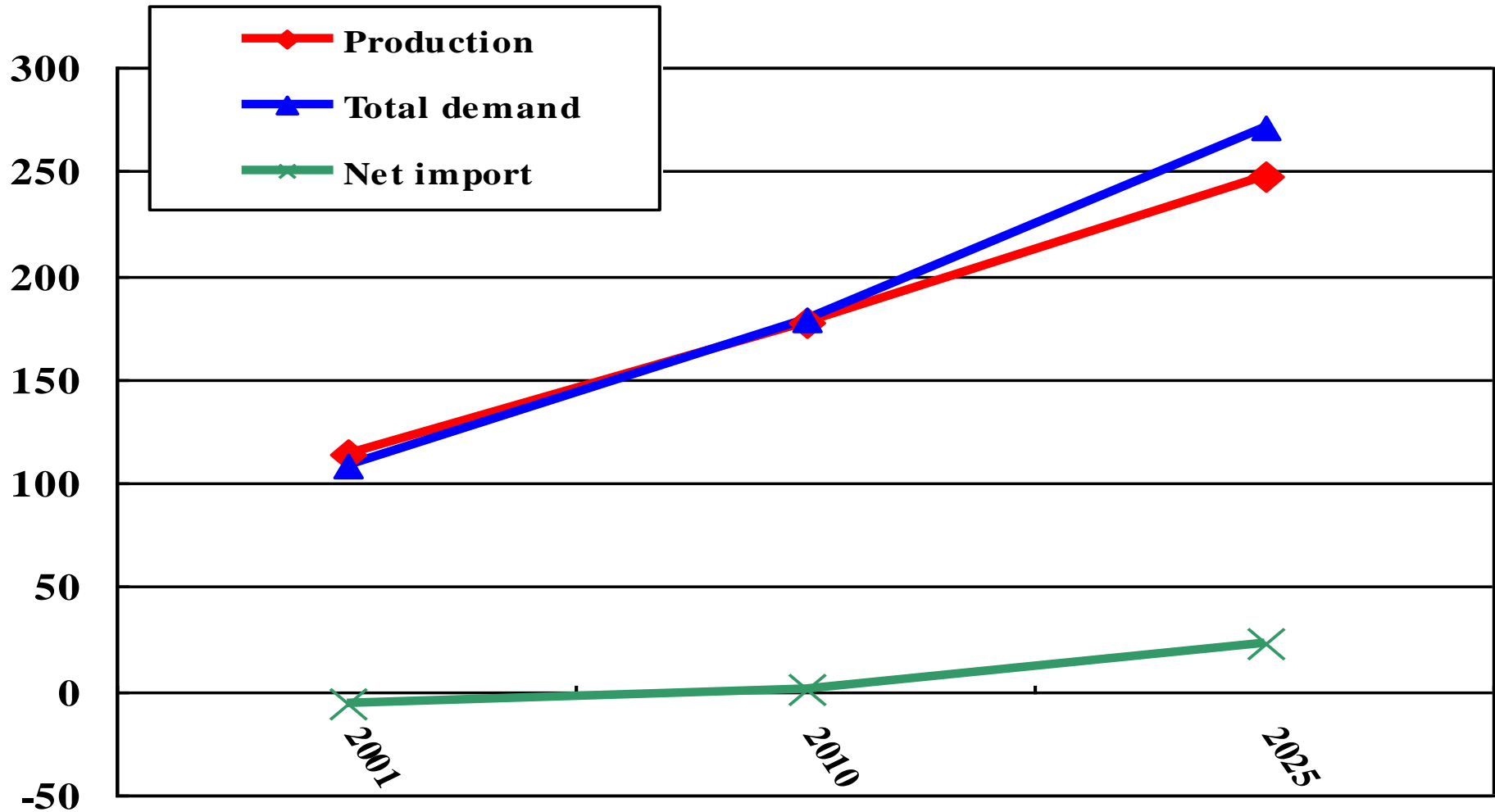
# Pork production, demand and net import in 2001-2025

(million tons)



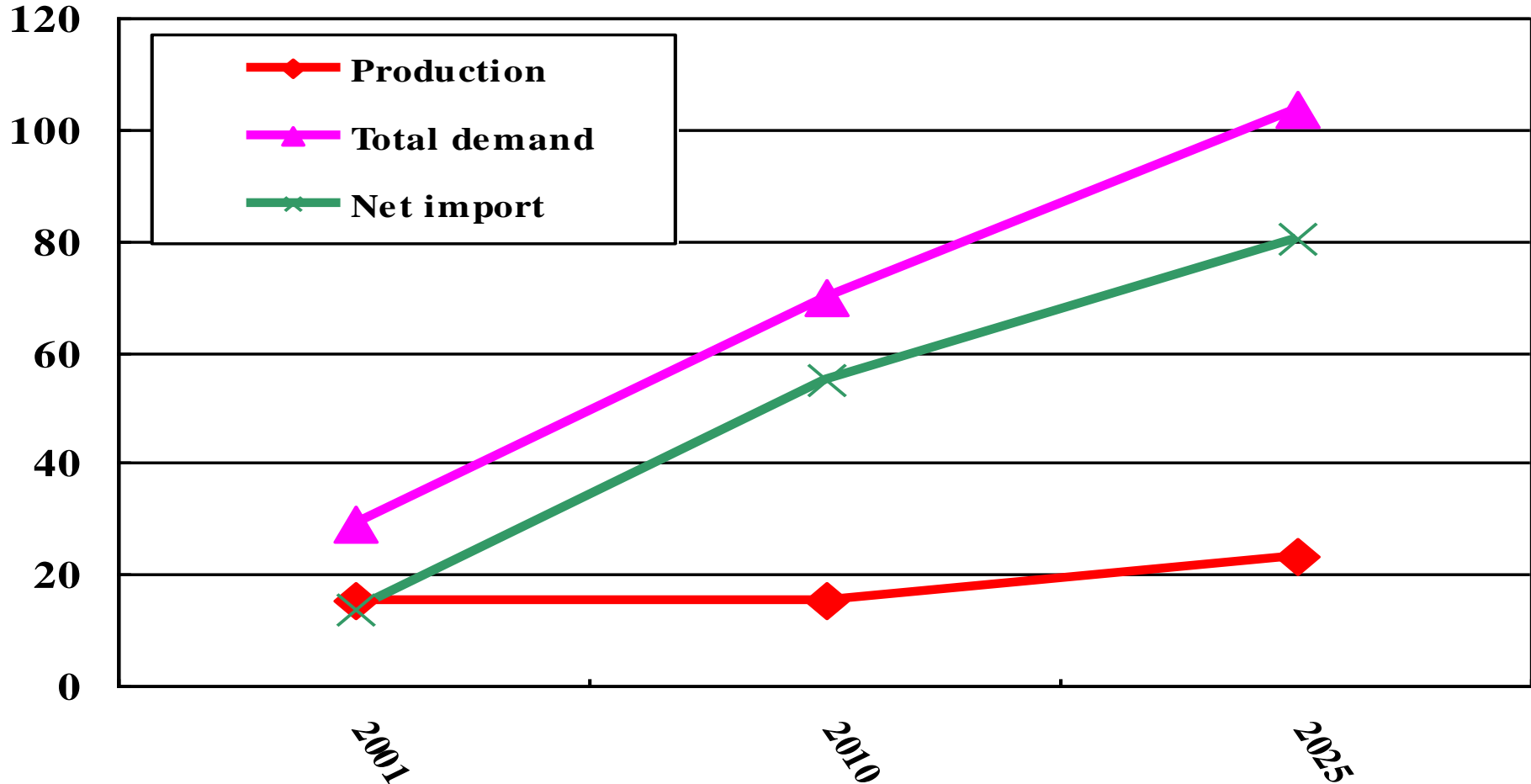
Source: Huang et al. (2013)

# Maize production, demand and net import in 2001-2025 (million tons)



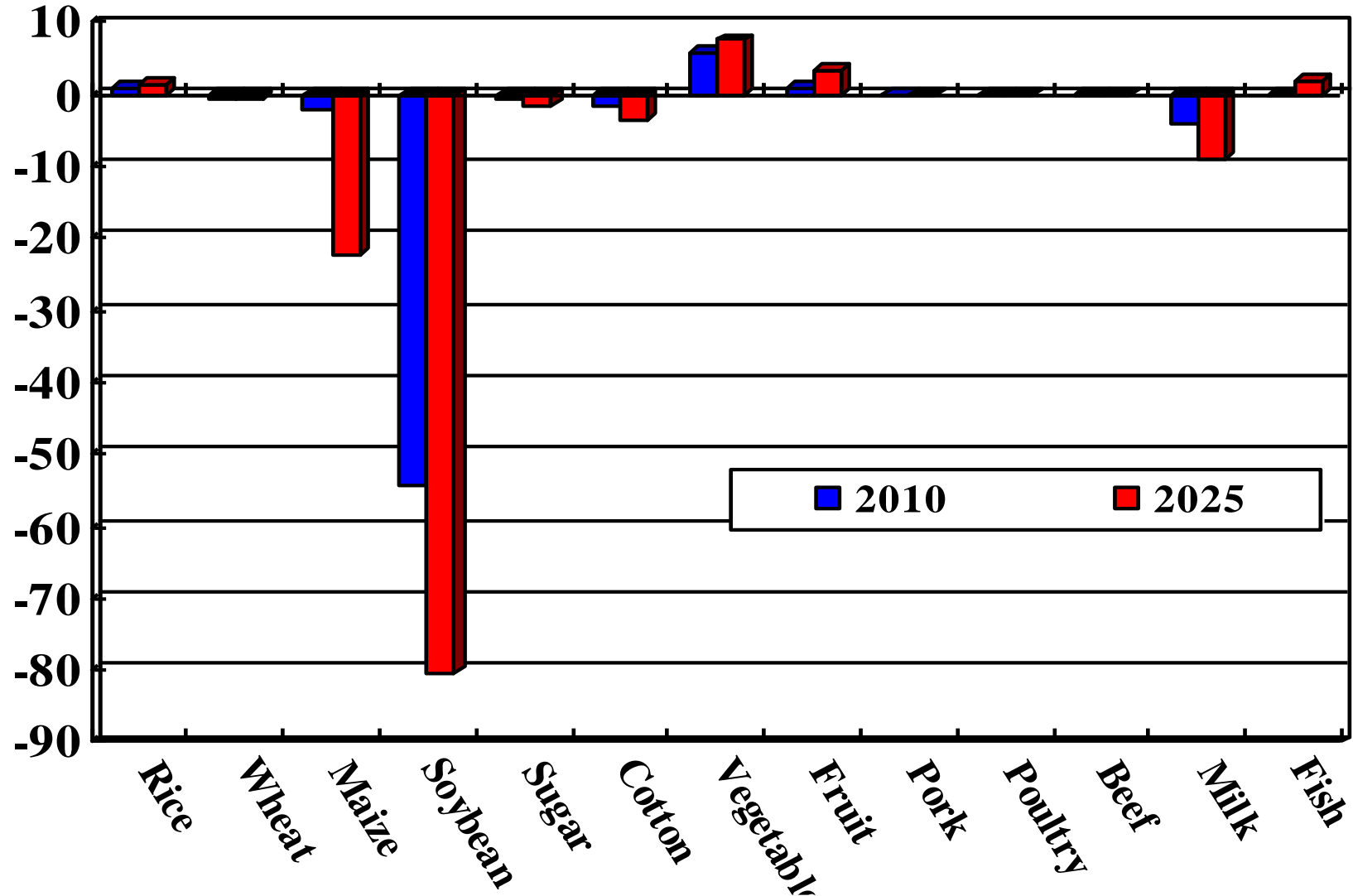
Source: Huang et al. (2013)

# Soybean production, food consumption, total demand and net import in 2001-2025 (million tons)



Source: Huang et al. (2013)

# China's net export of agriculture and food (million tons) under baseline in 2010-2025

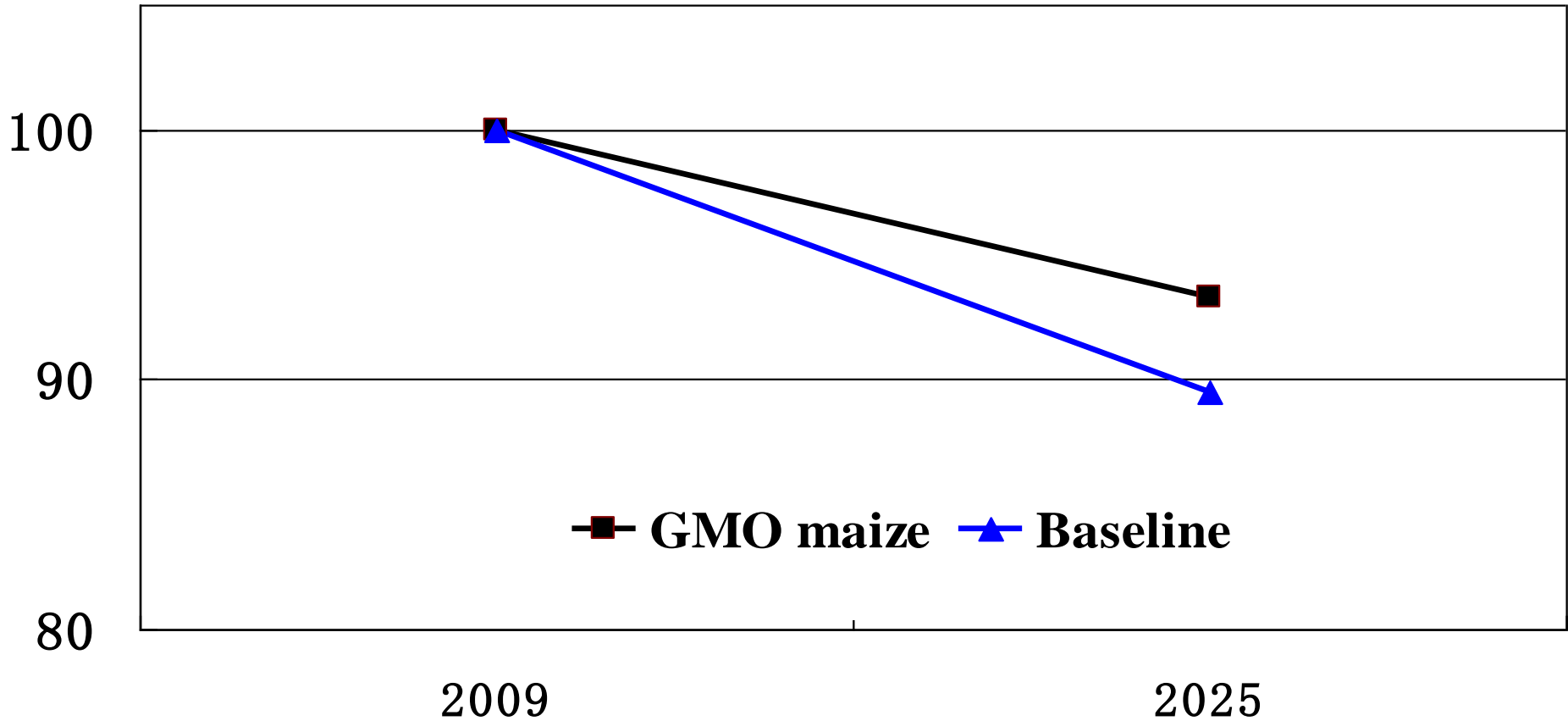


Source: Huang et al. (2013)



# Scenario: Impacts of biotech maize

## Maize self-sufficiency (%) in 2009 and 2025



# Concluding Remarks

**China's experience shows that incentives to farmers (land & market), technology and investment are crucial to agricultural growth and ensuring food security**

**However, given its resource constraints (e.g., land and water per capita) and rising demand, China is expected to increase its dependence on world agricultural market (maize, soybean, cotton, sugar, dairy, etc.)**

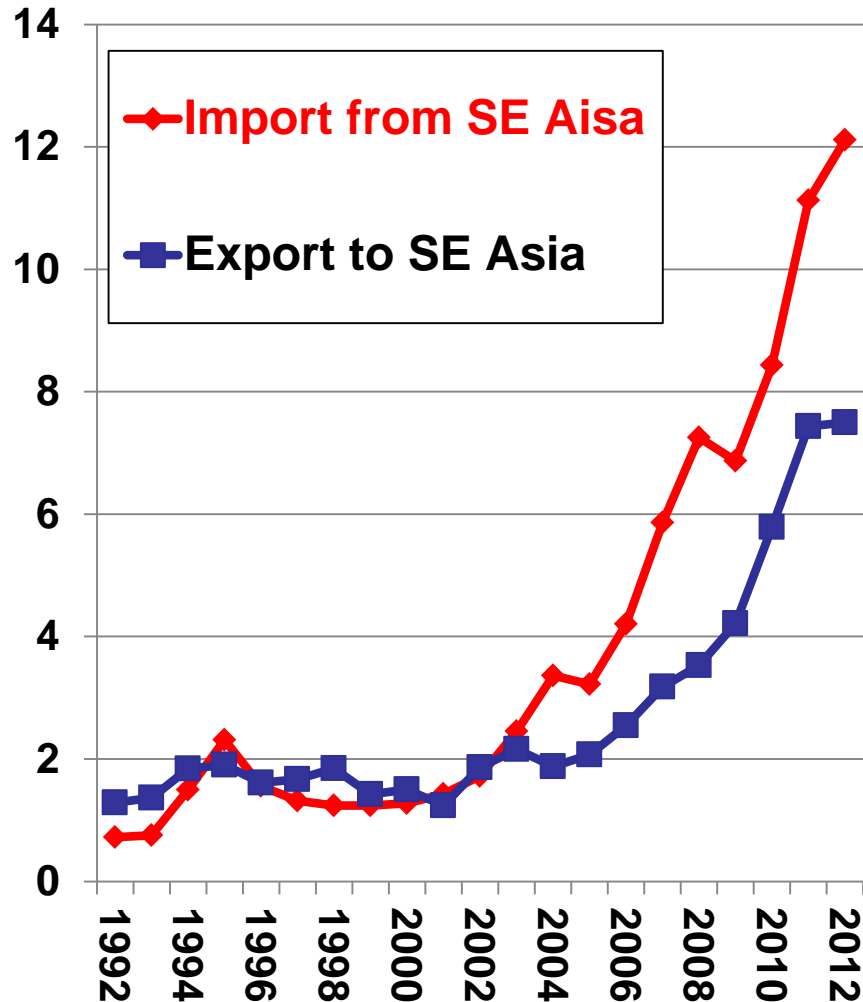
# Concluding Remarks

## The implications to Asia and the ROW:

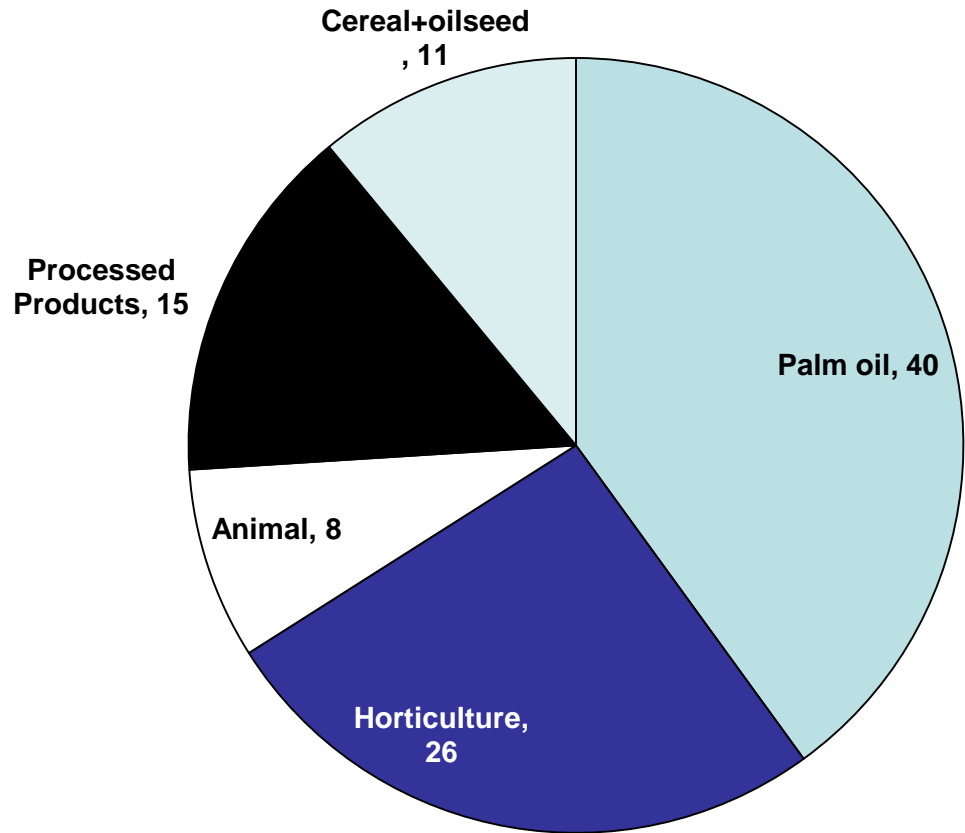
- **Achieving China's rice/wheat self-sufficiency will contribute to Asian and global food security**
- **China's growing demand for other foods will be good for exporters, but will not have much of a negative impact on other food importers**
  - Soybean and maize imports: well within the capacity of China's existing trade partners in North and South America
- **Asia, particular the SE Asia, can gain more from China's rise in demand for palm oils and tropic crops/products**

# Agri. Trade: China vs SE Asia

(billion US\$, in 2000 price)

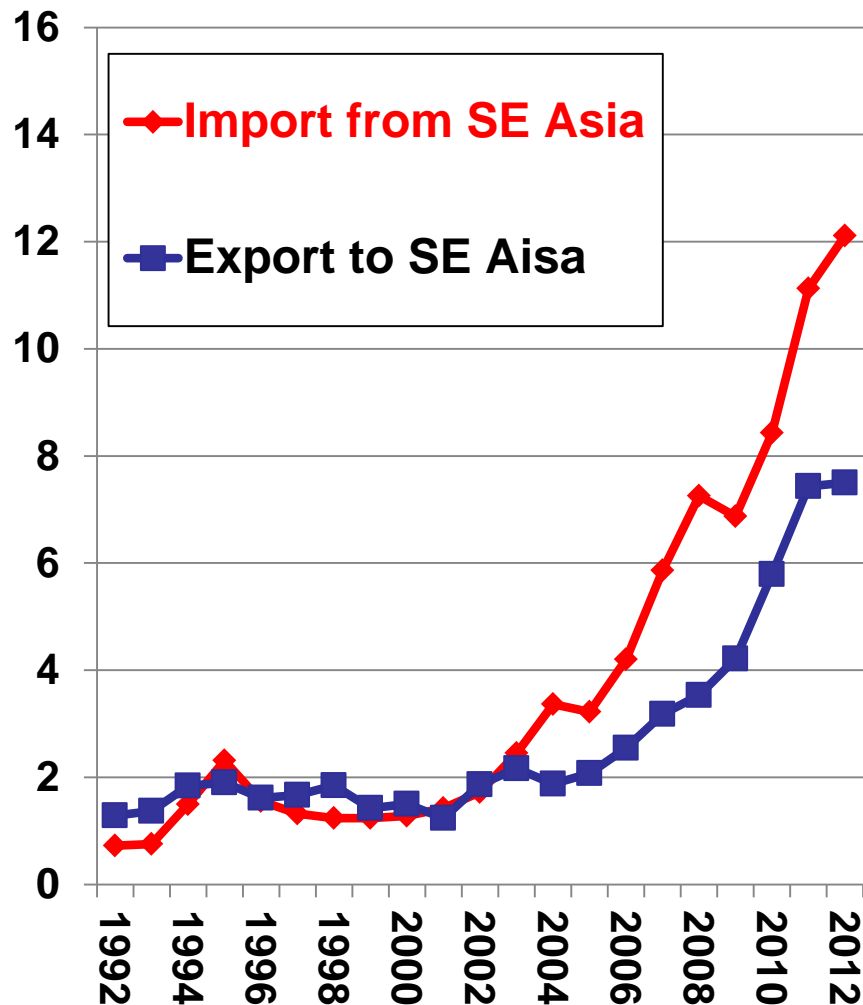


# Product shares of imports from SE Asia in 2012



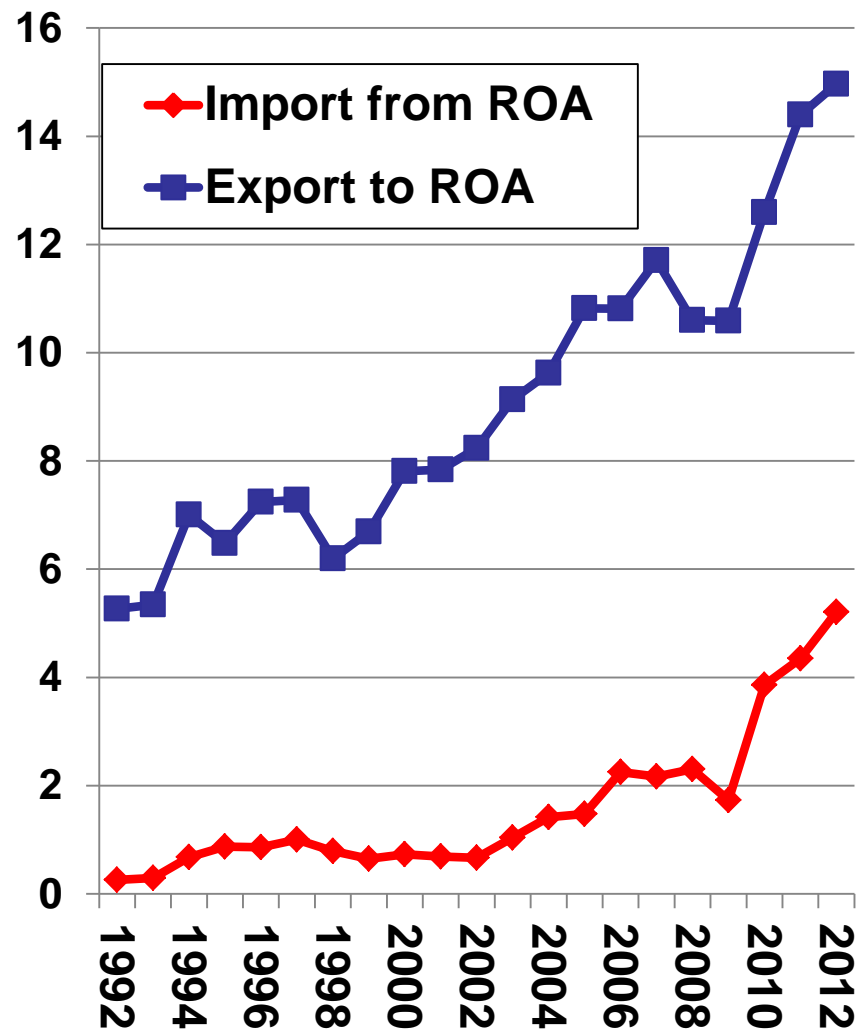
# Agricultural Trade: China vs SE Asia

(billion US\$, in 2000 price)



# Agricultural trade: China and the rest of Asia

(million US\$, in 2000 price)



**Thanks!**