

Structural Changes in Thailand's Agricultural sector

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Lecture 11

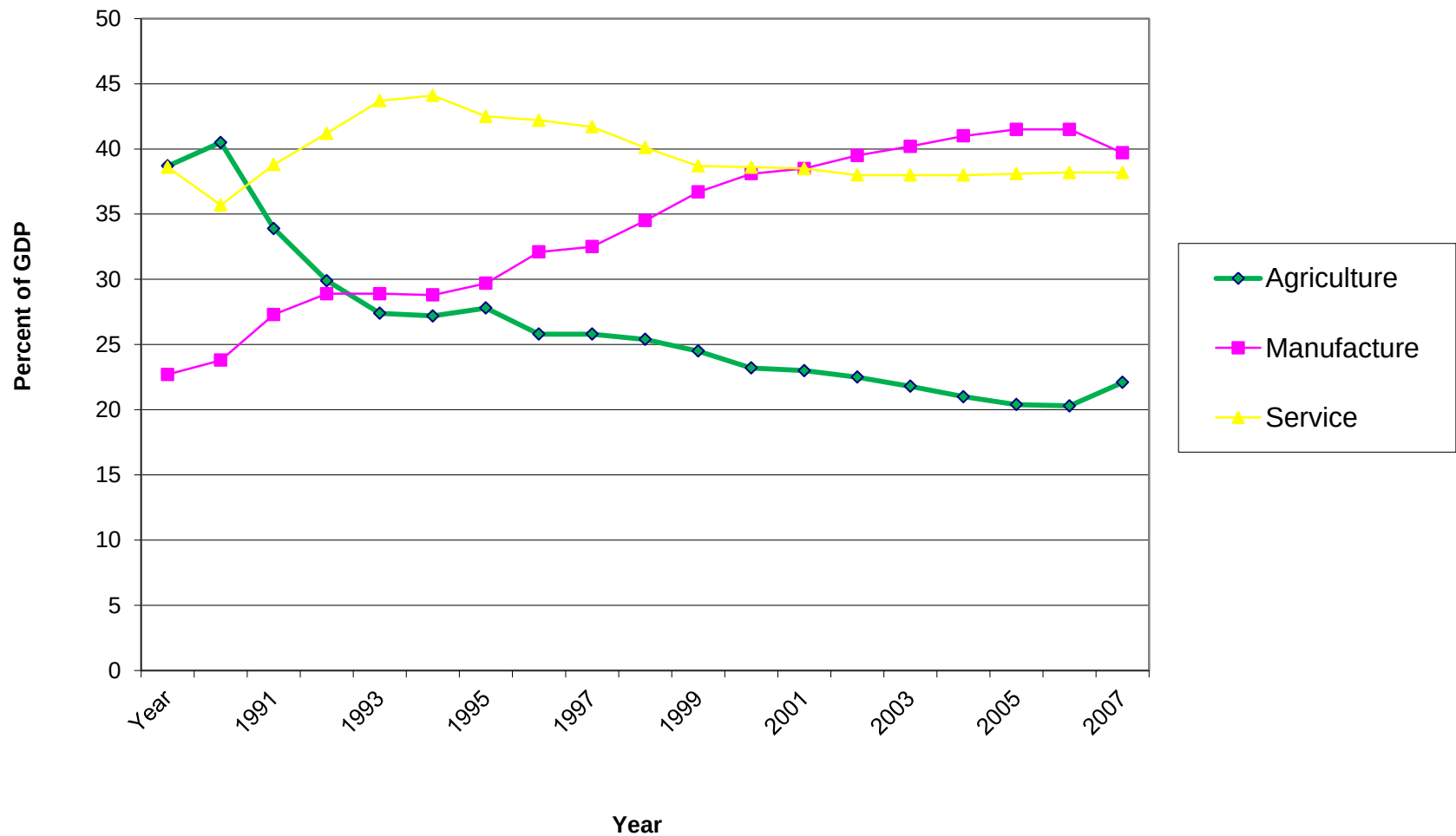
Main themes

- Changing structure in output, employment, and exports
- Pessimistic view
- Agricultural productivity
- Research and development expenditure

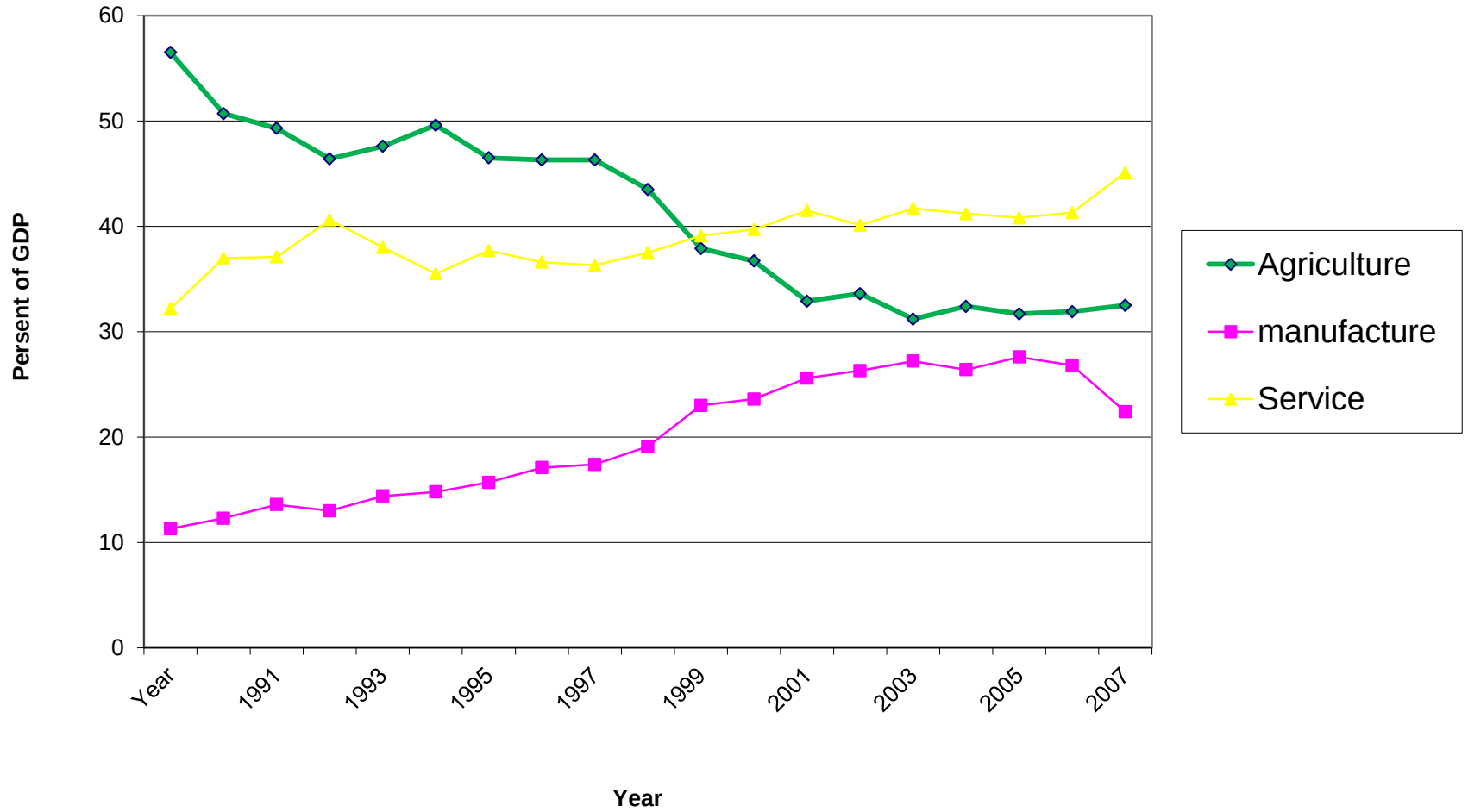
Stylized facts of Economic Development

- **Shares of agriculture in GDP and agricultural exports in total exports have been declining continuously over the past four decades.**
- **Agricultural export share declined from the average of 54.3 percent during the period 1979-1981 to 24 percent during the period 1989-91.**
- **By 2002, agricultural exports declined further to 12.2 percent of total exports.**
- **Until recently, the terms of trade of between agriculture and manufacture had been generally unfavorable to farmers.**
- **What does the cross-over point tell us?**

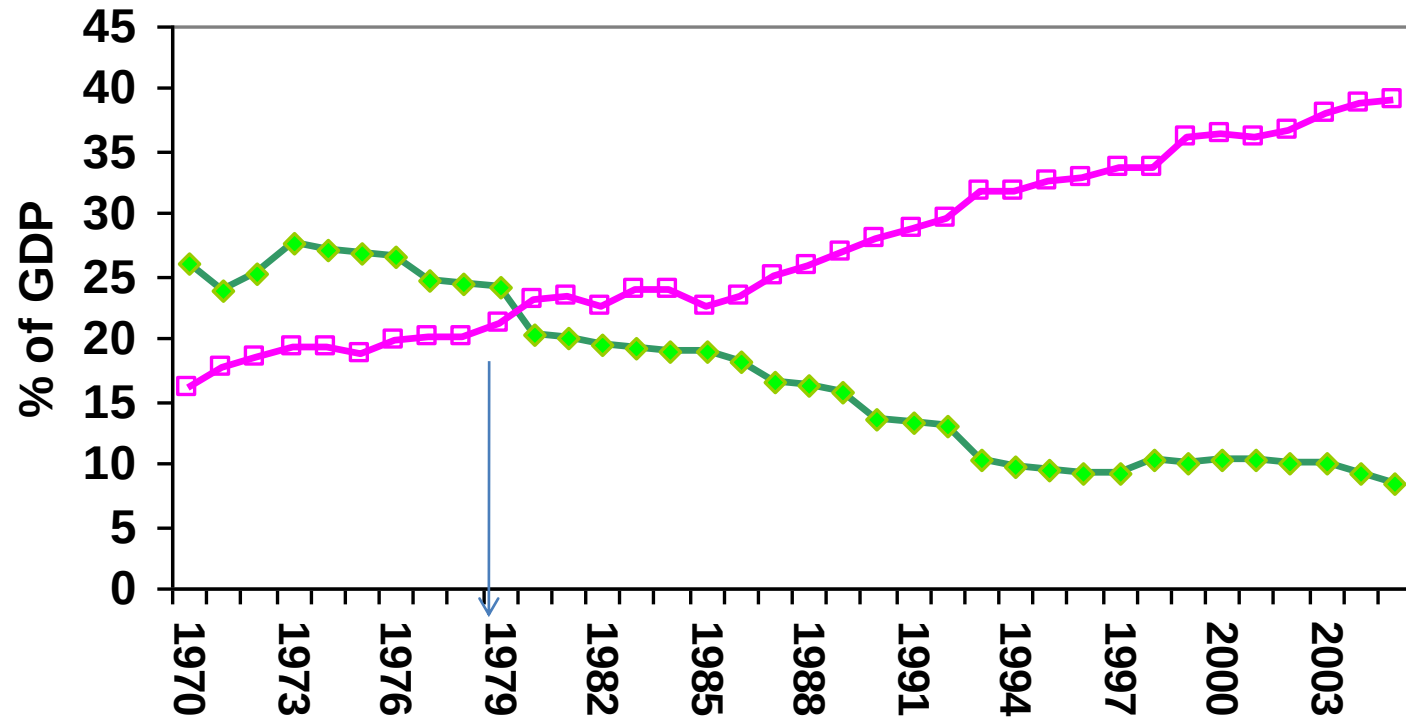
Viet Nam: Changing output structure



Cambodia



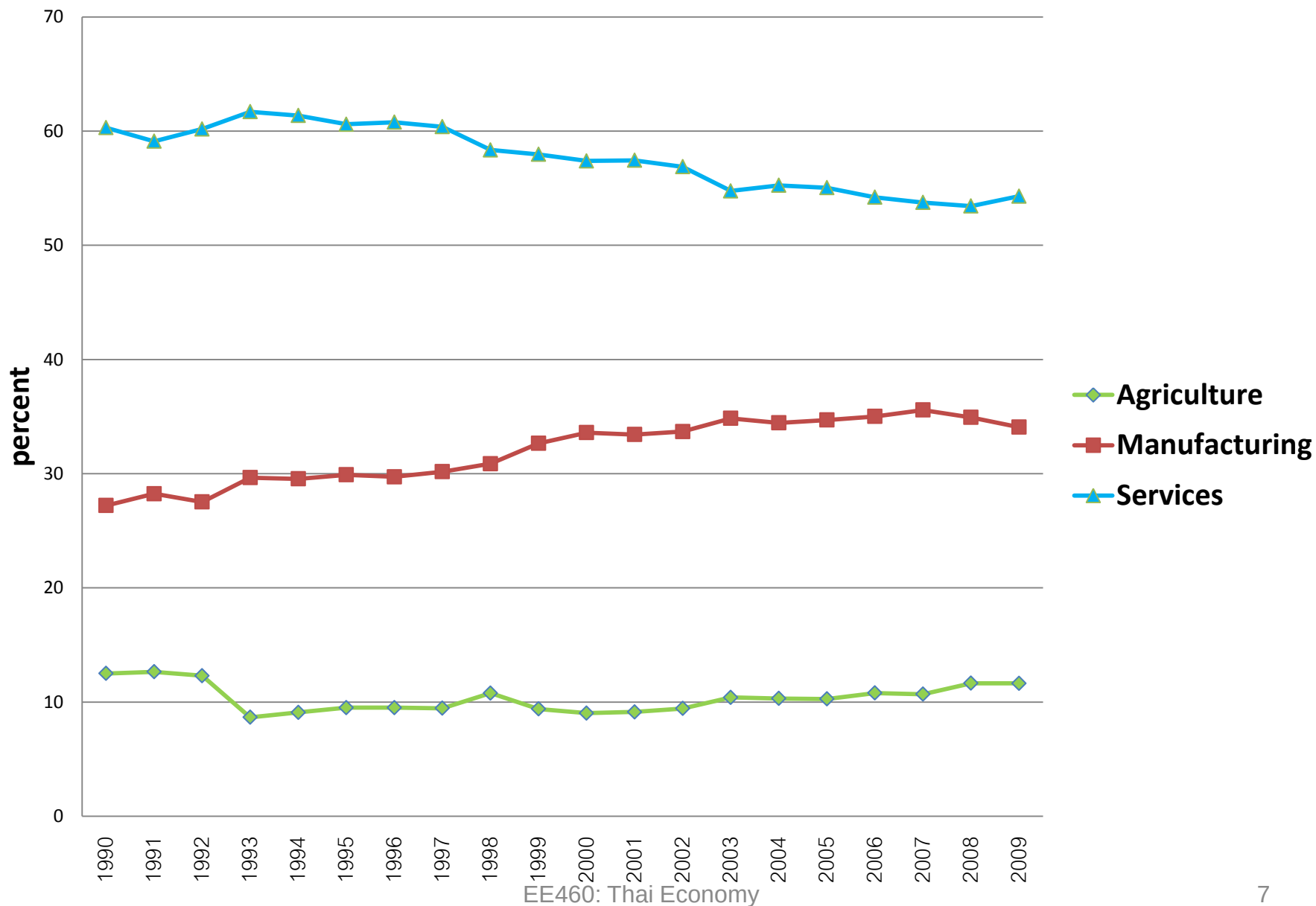
Changing Output Structure



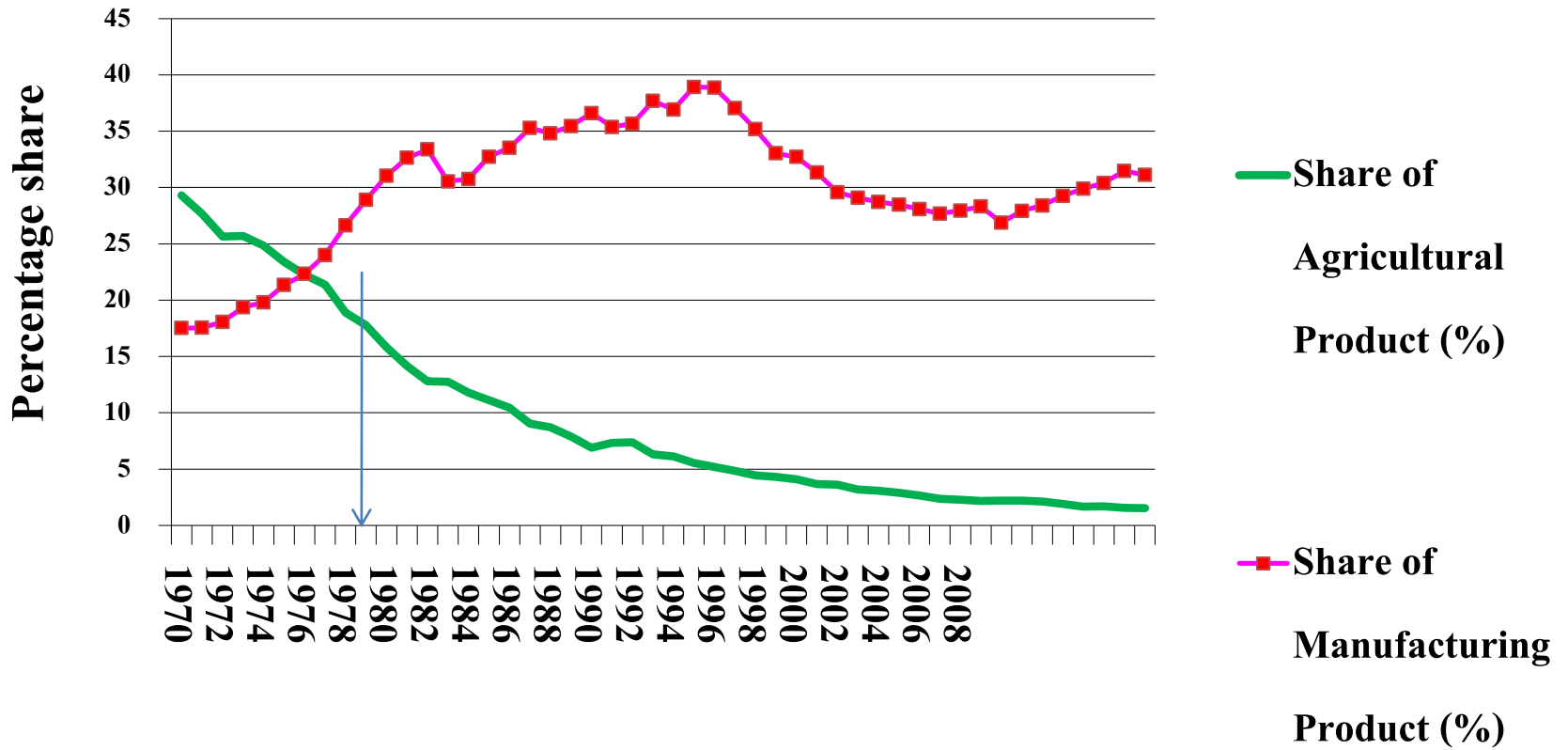
Source: Bank of Thailand, Quaterly Report

—◆— Agriculture —□— Manufacture

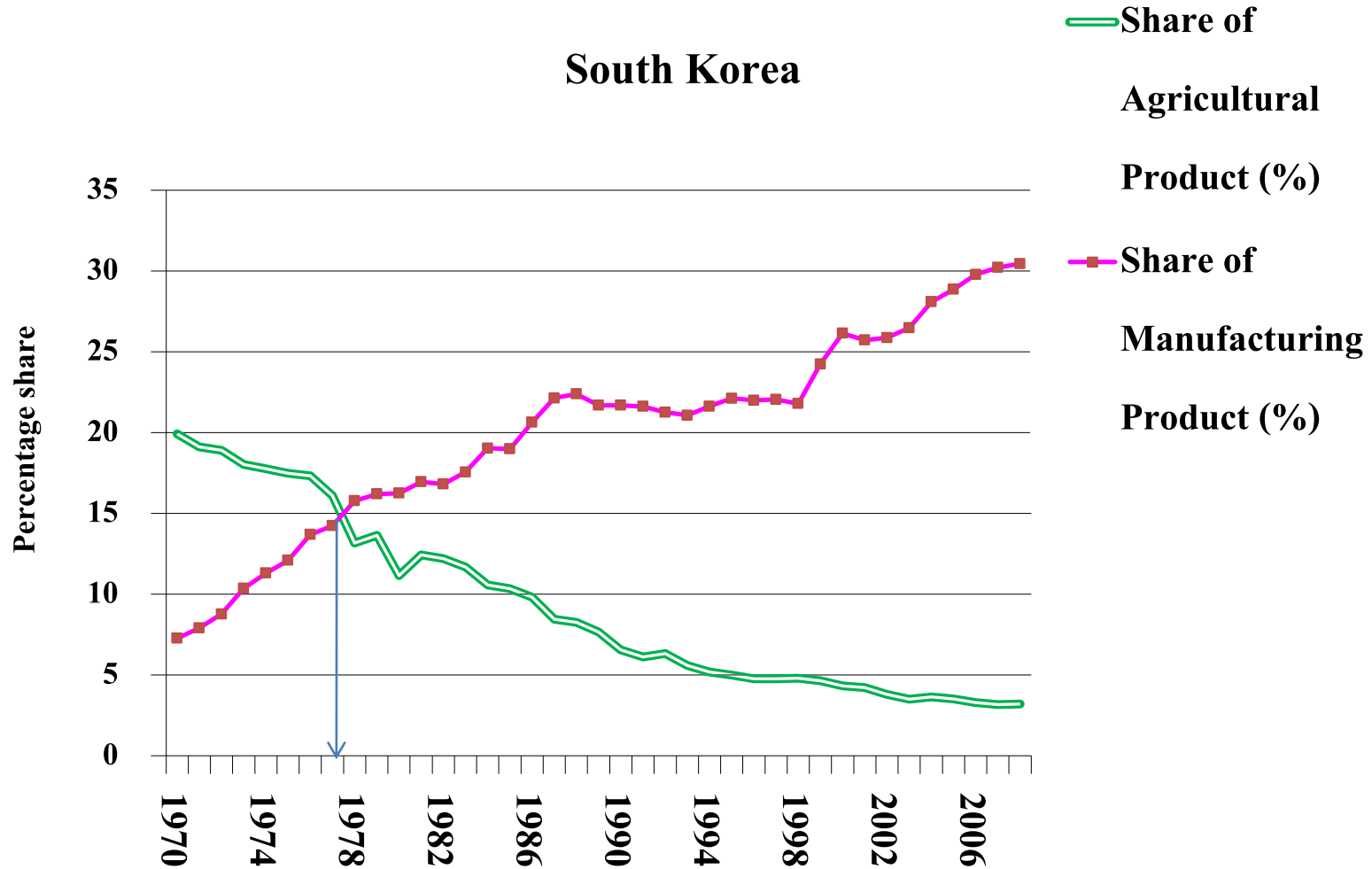
Output structure



Taiwan

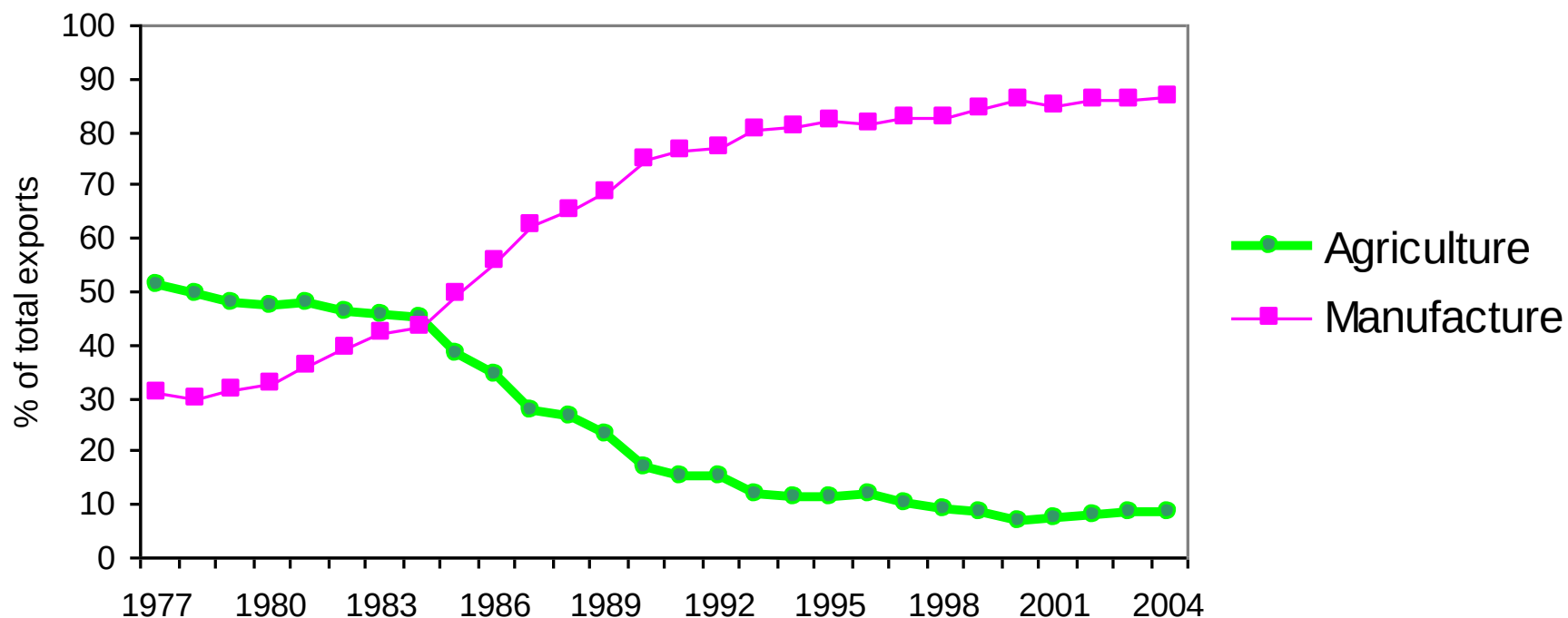


South Korea



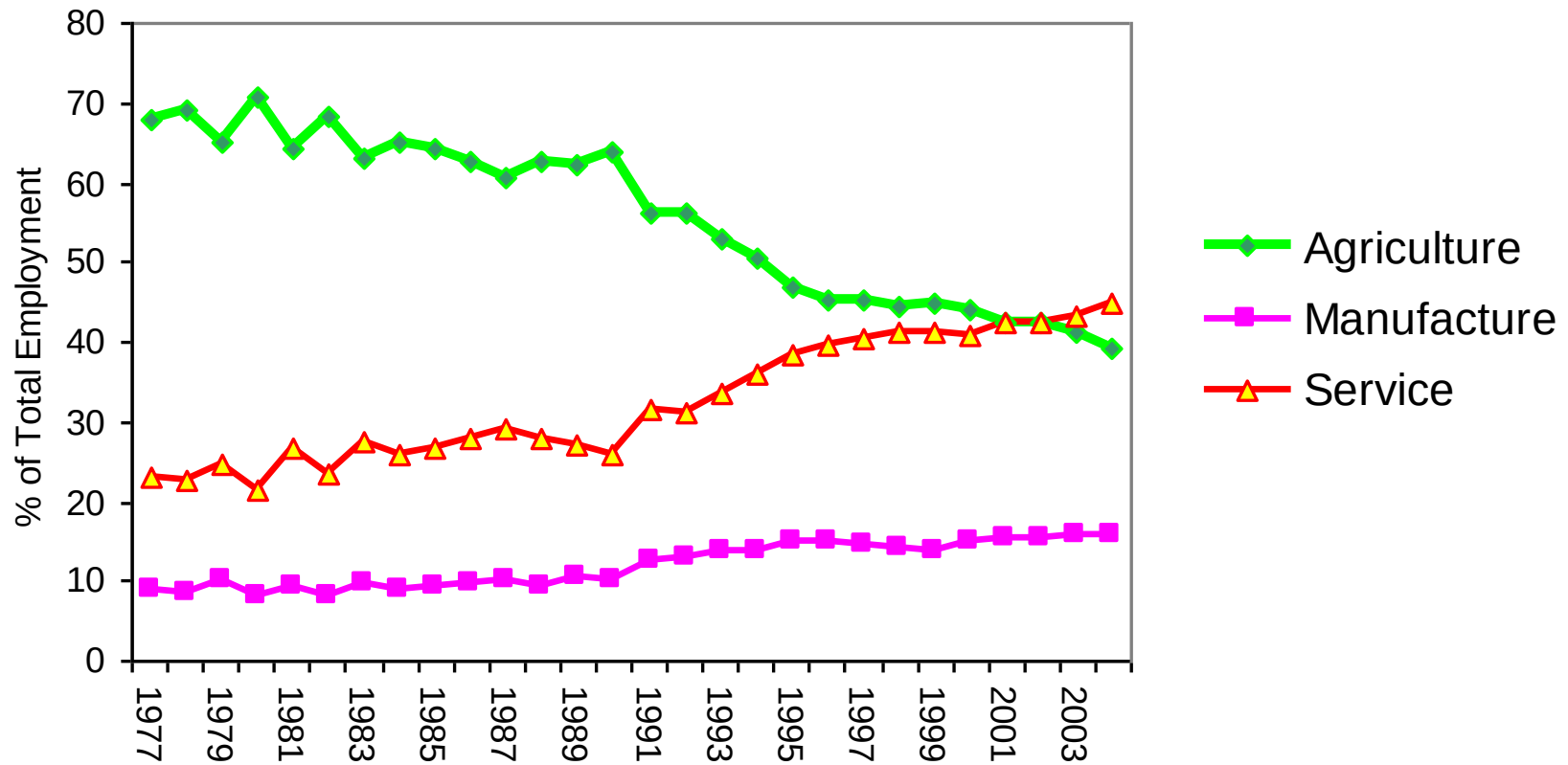
Structure of Thai exports

Declining importance of agricultural exports



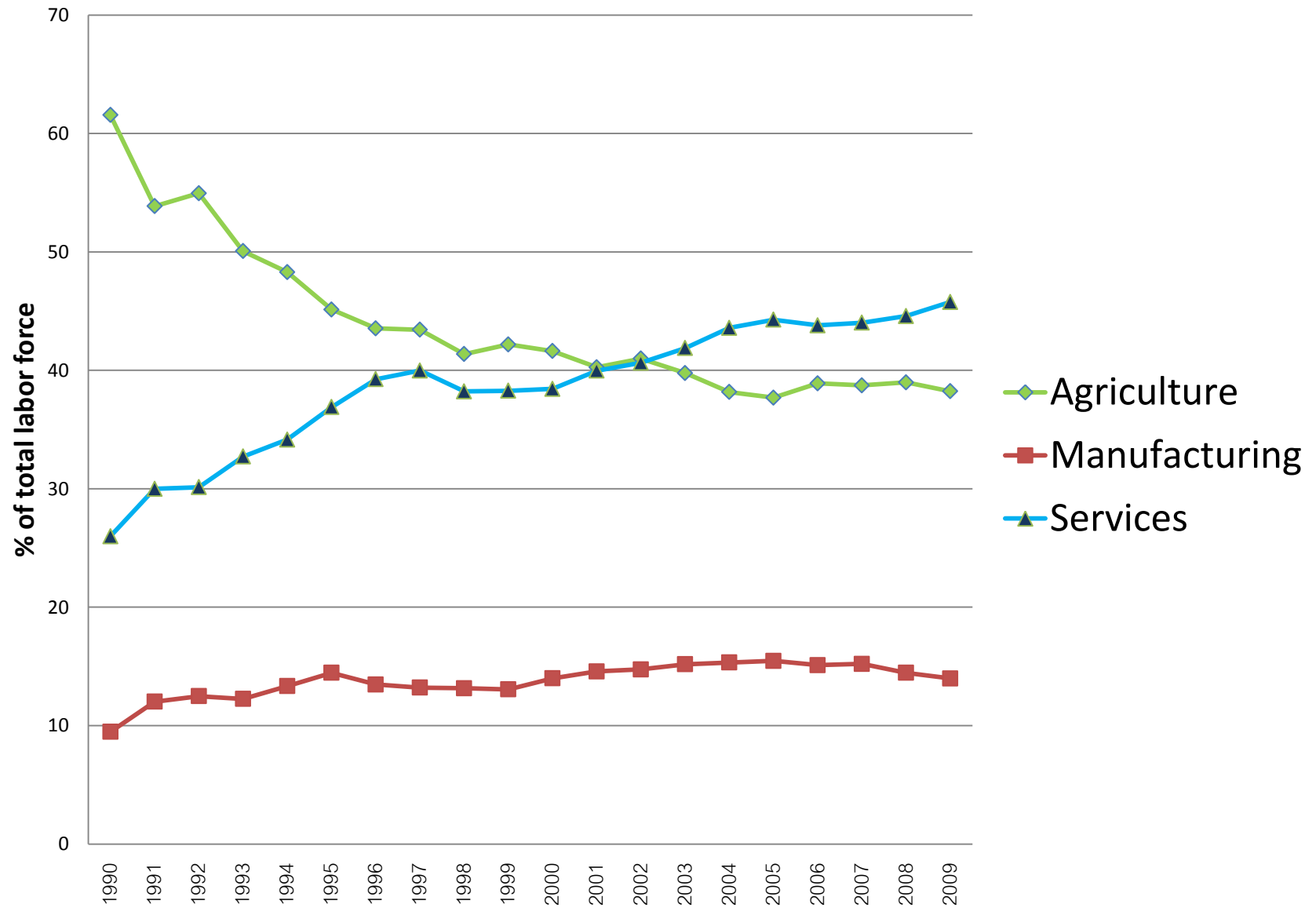
Source: Bank of Thailand

Changing Employment Structure



Source: Bank of Thailand

Employment share



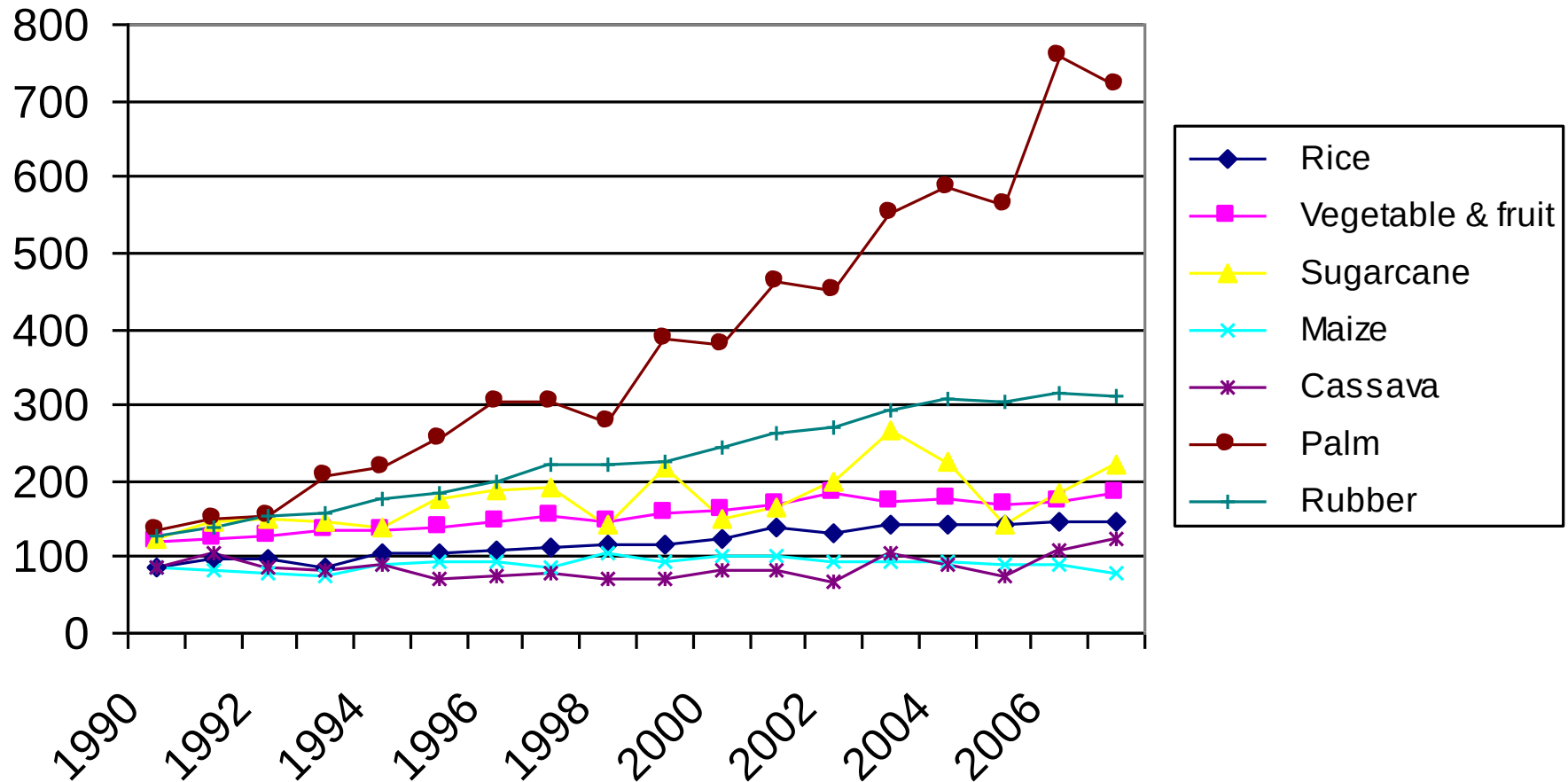
A dismal view

- **“Thailand would lose comparative advantage in agriculture as manufacturing has increasingly become more important than agriculture”.**
- **“Due to the shortage of labor and water during the dry season, with the disappearance of land in the 1980s, the future of Thai agriculture would look bleak”.**

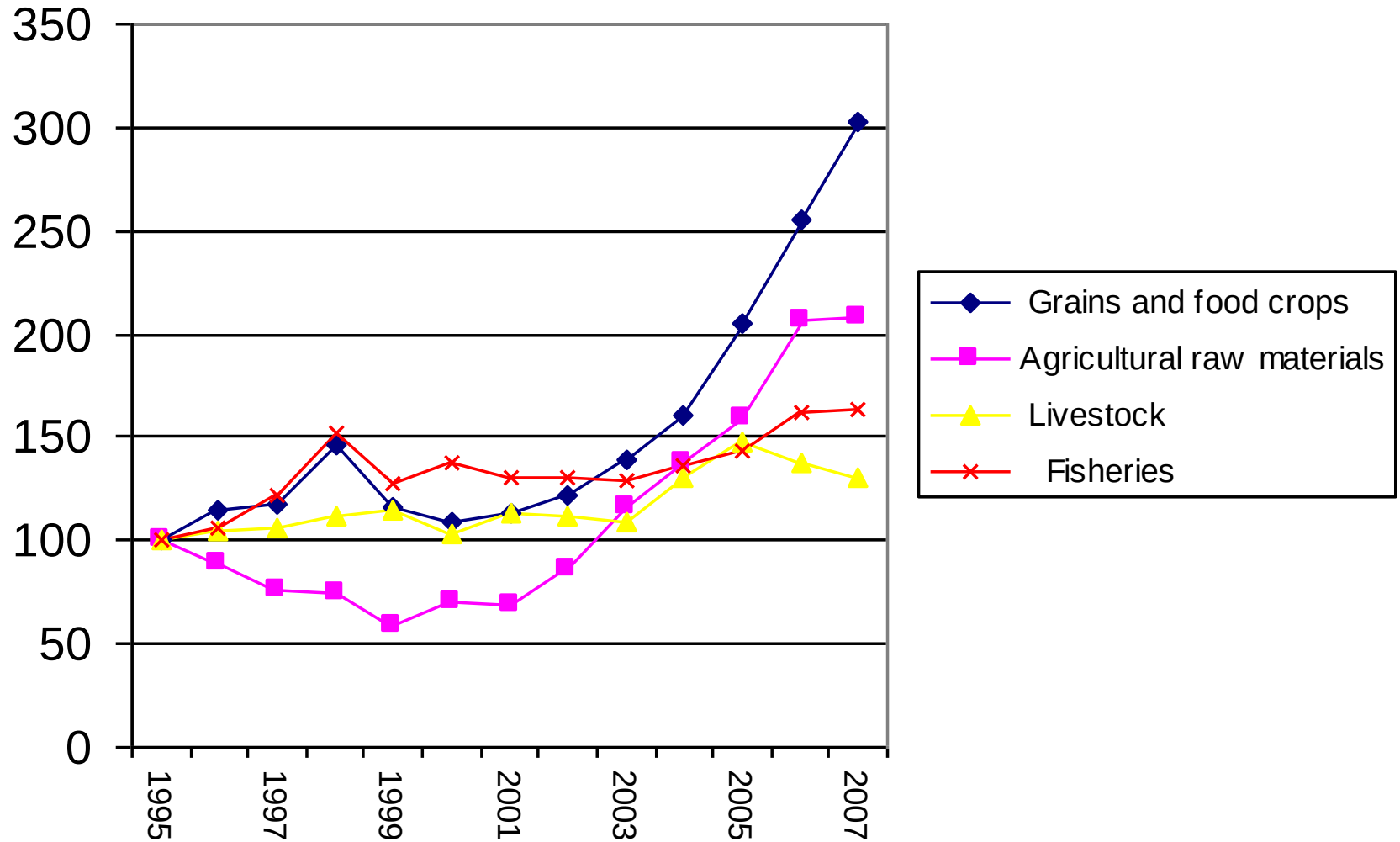
Blame the Dutch disease

- The boom in the non-agricultural sector led to higher wage rates in urban areas.
- As a result of migration, the lack of labor ***intensified farm mechanization***, which in turn diminished employment opportunities in agriculture.
- Wage pressure and declining agricultural prices squeezed farm profits, discouraging investment and further reducing agricultural growth.

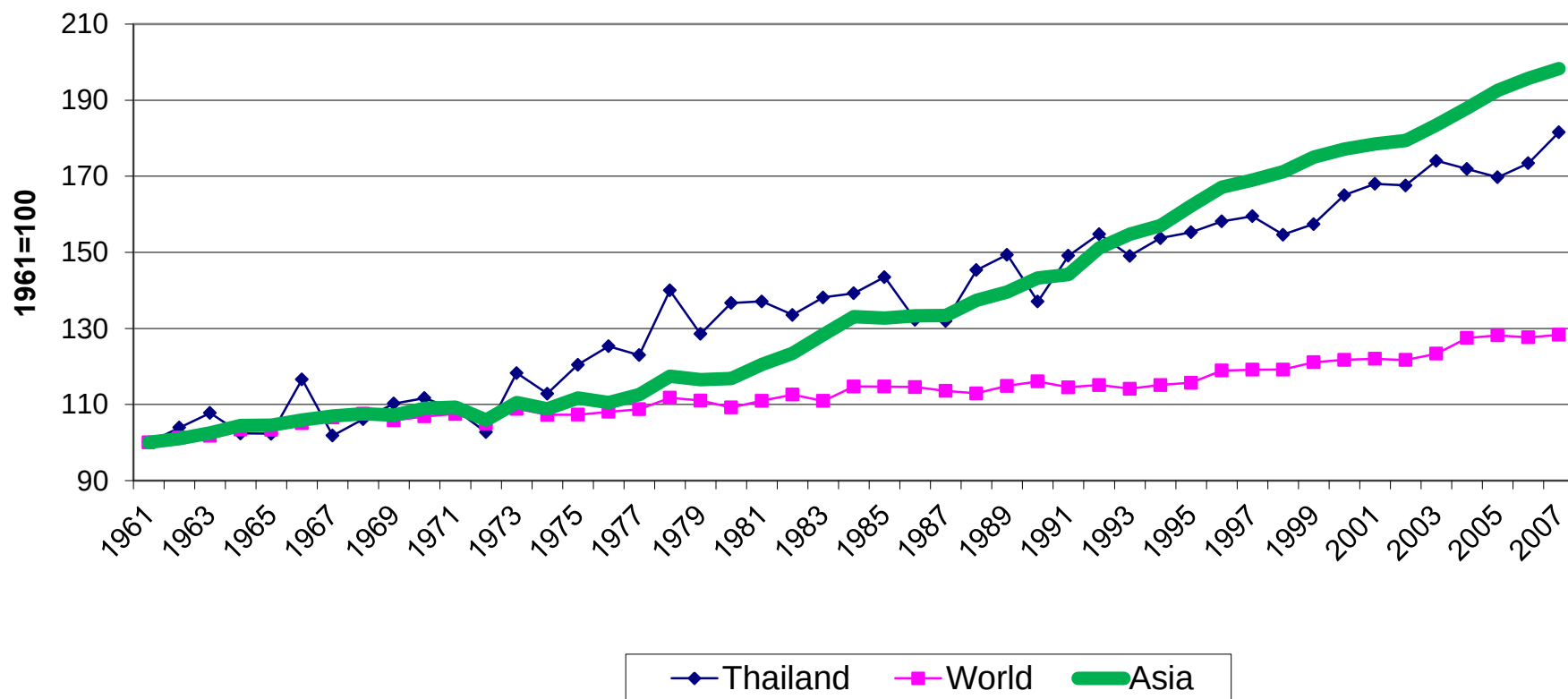
Index of Crop Production (1988=100)



Farm Price Index



Agricultural Production per Capita Index



Thai agriculture over the last 40 years

- Per capita agricultural output in Thailand increased **faster** than the world average and industrialized countries.
- *The rapid improvement has become more pronounced since 1990s.*
- But Thailand still lags behind other countries in Asia, possibly due to the explosive growth of Chinese agriculture since 1970.
- There are still very large productivity gaps, though declining, between Thailand and developed countries.

Per capita agricultural output

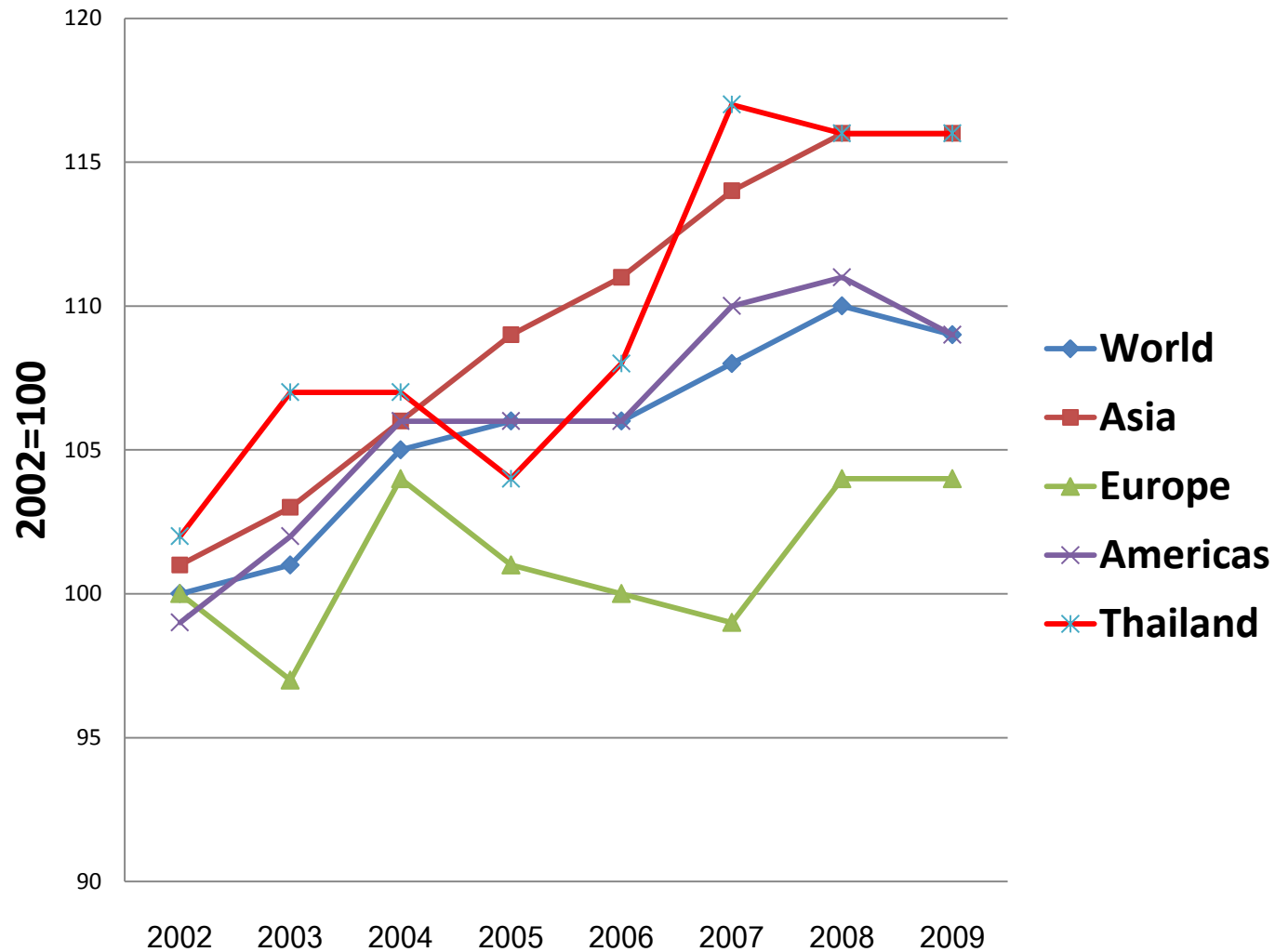
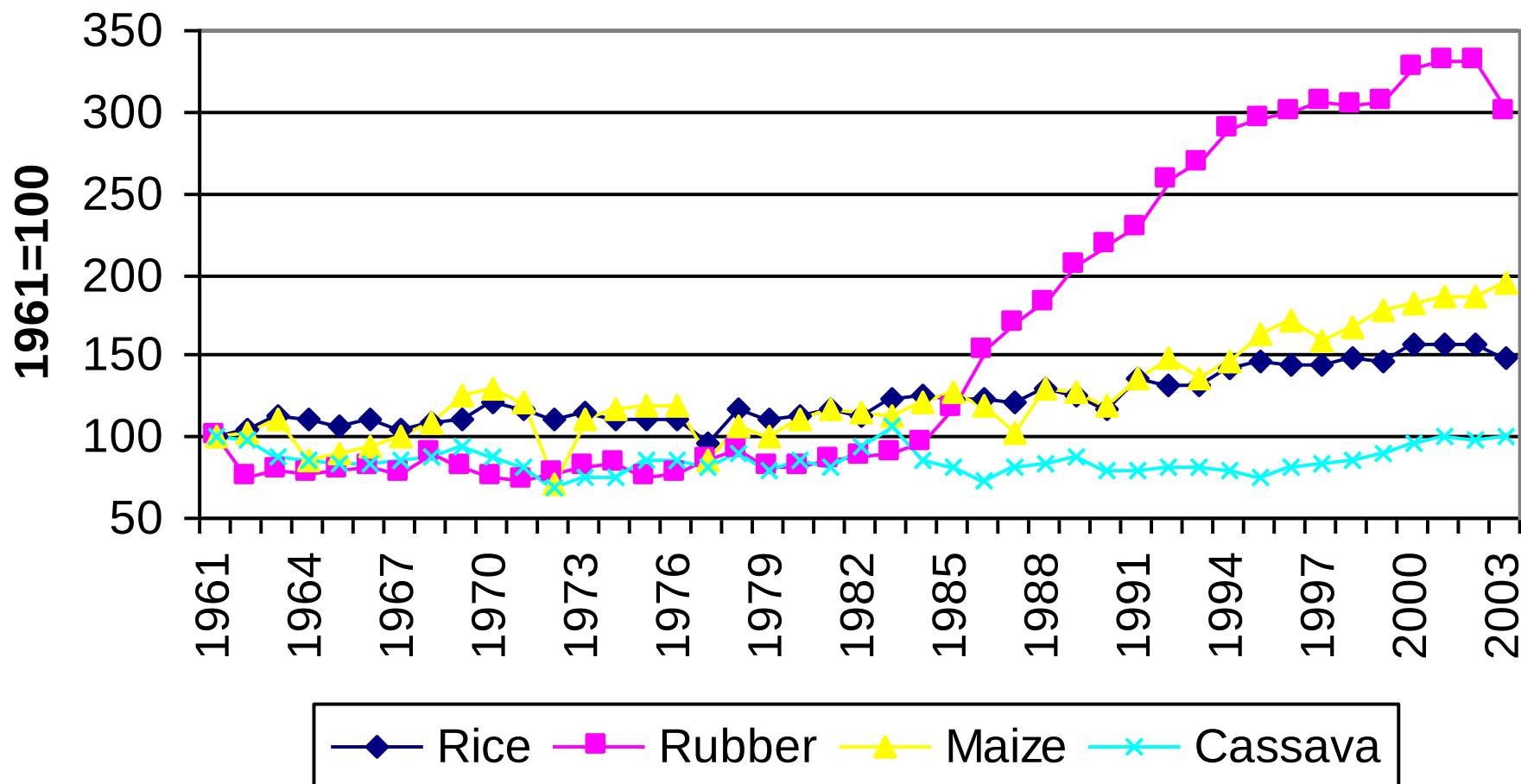


Figure 2: Index of major crop yields



Yields of major crops

- A remarkable productivity surge in rubber after 1985.
- There were some productivity gain in maize and rice, but those increased yields were relatively small.
- For cassava, yields remained relatively low and did not show any sign of improvement from the level in 1960s.

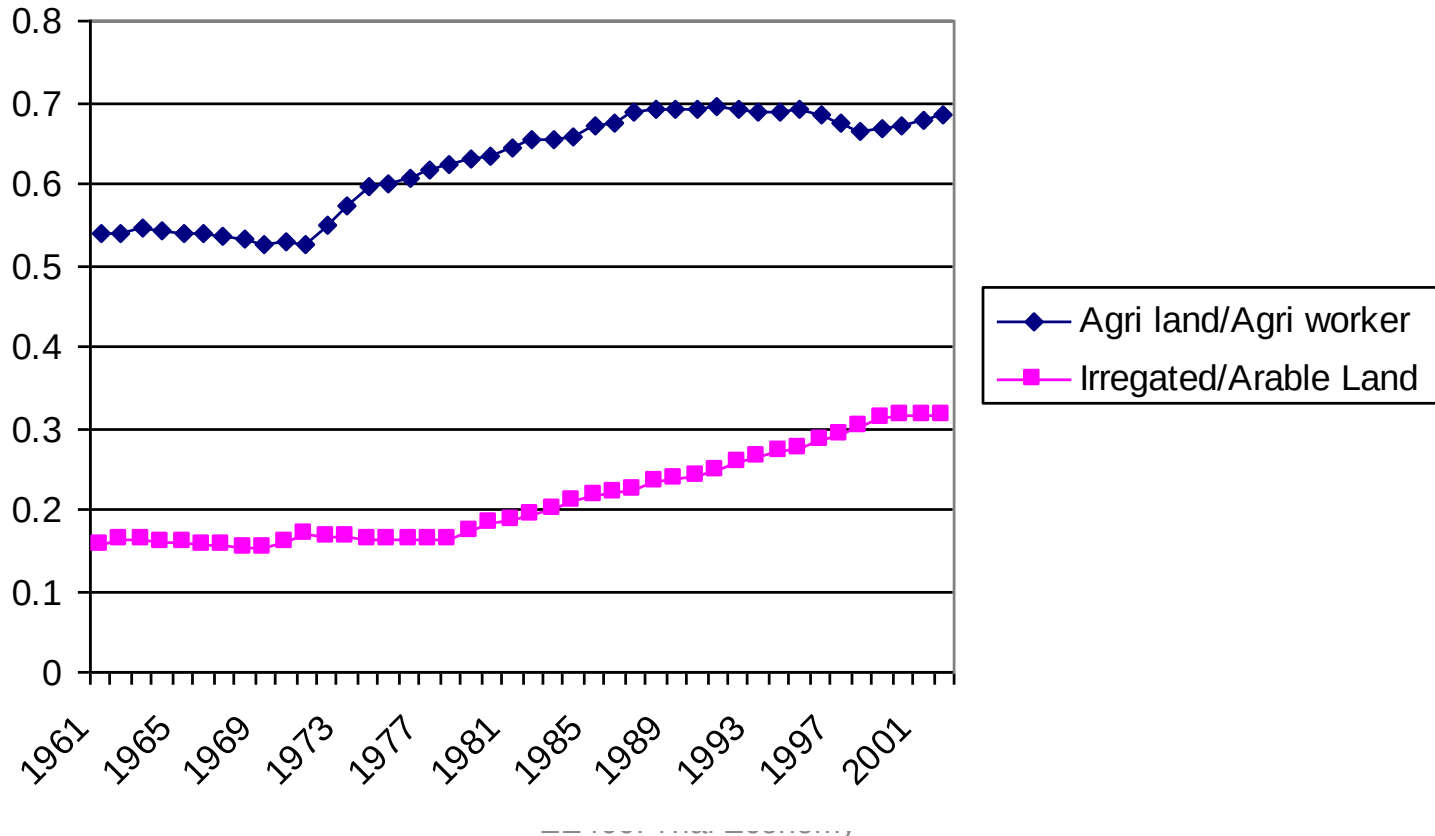
Why did farm productivity increase in rice and maize?

- Farm mechanization, fertilizer, and irrigation are responsible for such improvement.
- Large declines in imports of agricultural machinery can be attributed to large currency depreciations and expansion of domestic production of farm machinery.
- How would the continued strengthening baht exchange rate help or hurt Thai farmers?

Land-man ratio

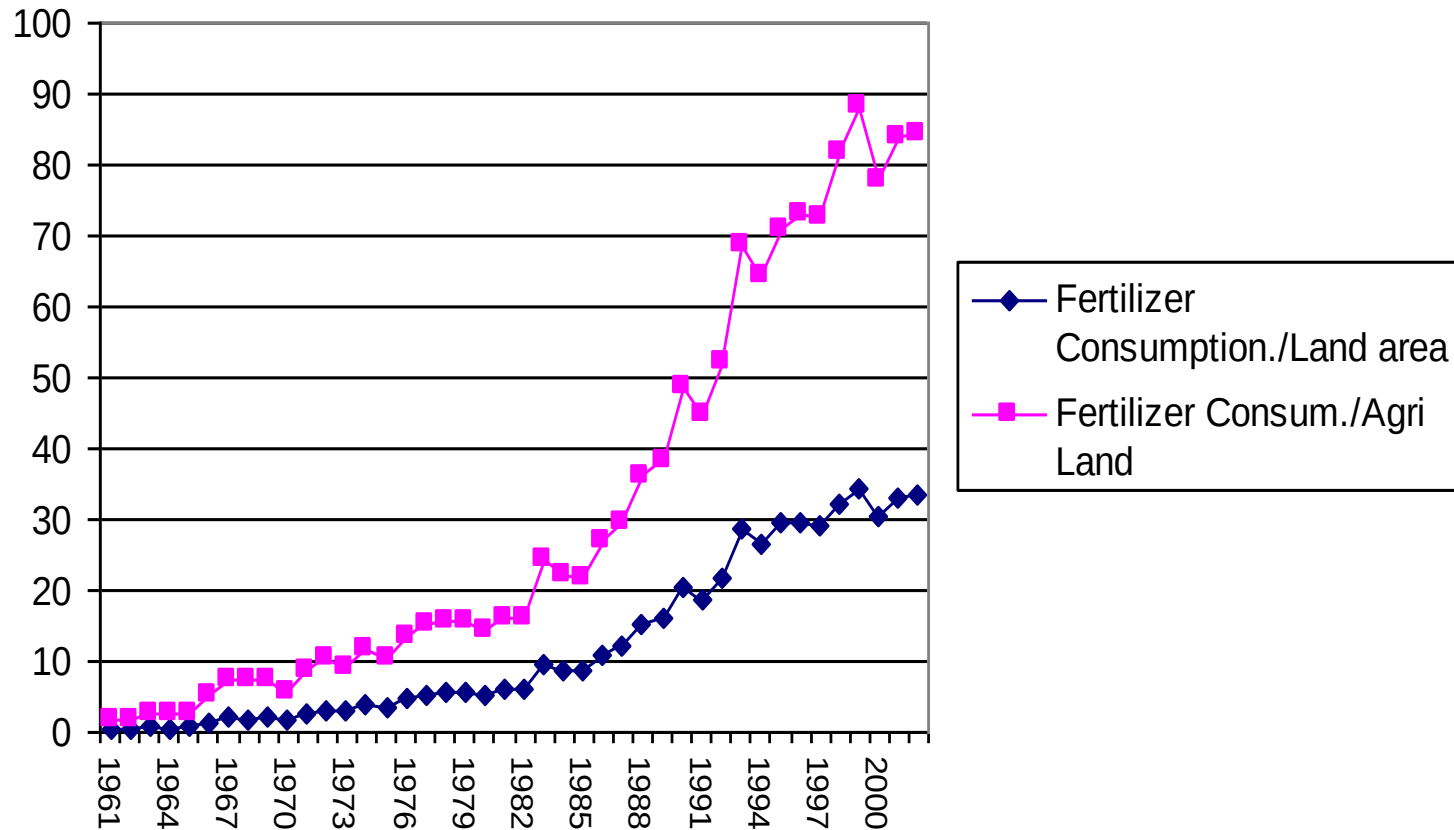
Rain-fed vs. irrigated land

Factor intensity in agriculture



Organic farming?

Fertilizer Consumption per land
(Mt/1000 Ha)



Factor Intensities

- Continued increases in factor intensities of farm input factors, which are complement to improvement in irrigation (e.g., water pumps, threshing machine, two-wheeled and four-wheeled tractors).
- The irrigated area as a percentage of arable land increased from 15 percent in 1960 to more than 30 percent in 2000.
- Improved High-Yielding Varieties (HYV) of rice also resulted in yield improvement.
- Irrigation made it possible for these input factors become complement to each other.

**Table 1: Factor Intensity in Agriculture
(percentage change)**

	1961-72	1973-85	1986-2002	1961-2002
Arable Land/Worker	0.98	1.04	0.83	0.87
Fertilizer/Land	7.07	2.35	3.40	62.32
Irrigated/Arable Land	1.07	1.31	1.42	2.00
Imported Machine/Worker	2.59	2.29	2.76	16.30

Source: calculation made from FAOSTAT

Martin and Mitra (2001)

Agriculture vs. manufacturing productivity growth

- Employing panel data from 50 countries over the period 1967-92, Martin and Mitra found that productivity growth has been **higher** for *agriculture* than manufacturing sector in both industrial and developing countries.
- The shift away from agriculture in developing countries has been driven by **higher productivity growth in agriculture**.
- “Rapid accumulation of **human capital** contributed to a strong shift out of agricultural activities and into export-oriented manufacturing industry in East Asian economies.”

- **Although human capital accumulation in Thailand has increased rapidly in the last decade, physical capital accumulation increased at a much faster pace.**
- **Foreign direct investment and capital inflows concentrated in the manufacturing and services sectors; thereby substantially raising capital-labor ratios in both sectors.**

Thus productivity increase in manufacture was *higher* than the increase in the agricultural sector--in particular prior to the financial crisis.

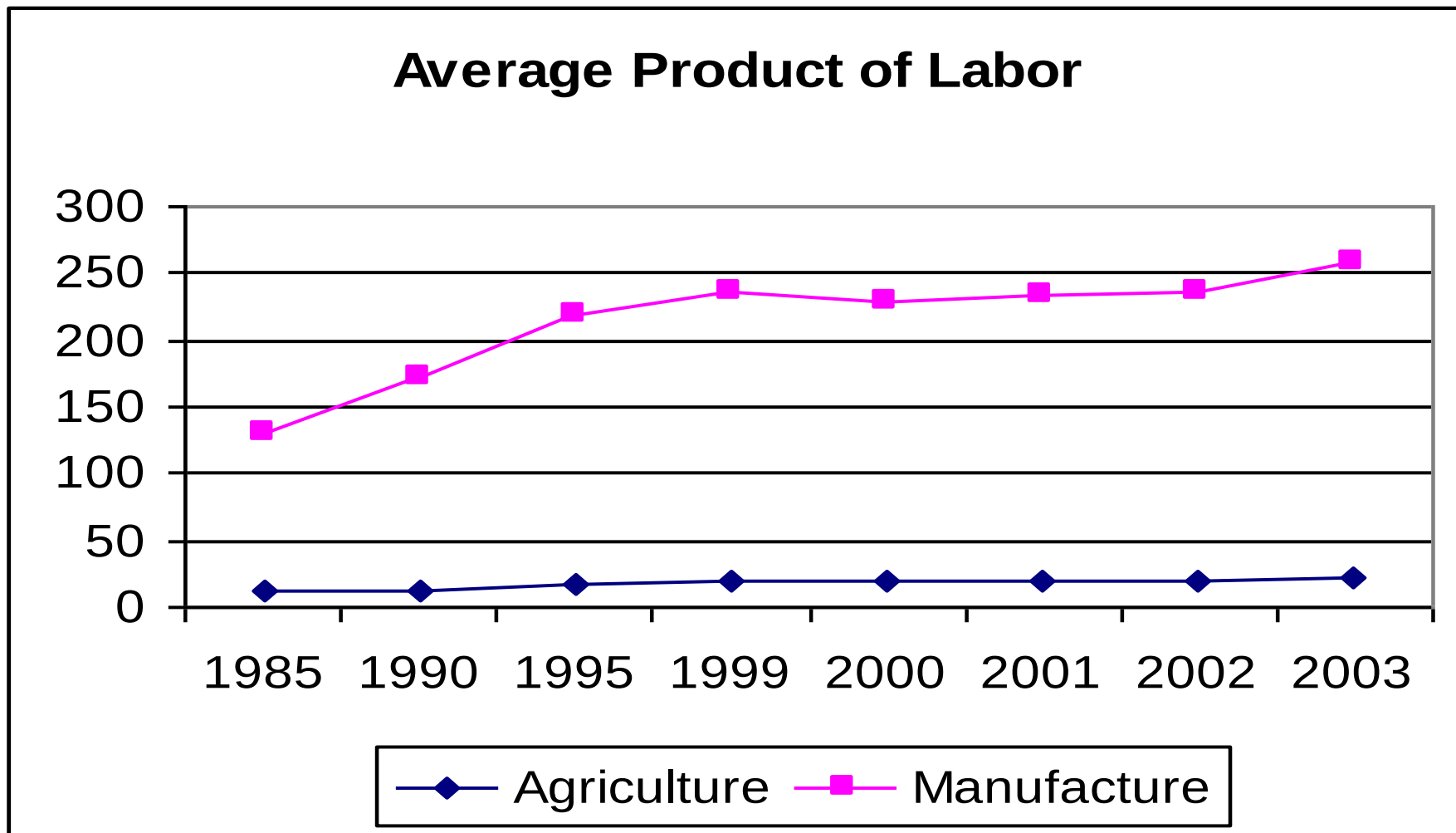
In general for both LDCs and developed countries

$$(MP_L)^a > (MP_L)^m$$

But in the case of Thailand

$$(MP_L)^a < (MP_L)^m$$

Average product=output/labor



Why has the majority of labor force remained in agriculture?

- From 1985 to 2003, the ratio of output per worker in manufacturing sector increased by **eightfold**, while the same ratio in the agricultural sector increased less than twofold.
- **Productivity gap** between the two sectors remains as large as before if not widening.
- High capital-labor ratio in the manufacturing sector implies **limited capacity** to generate employment.
- The shift out of the agricultural sector has been ***painfully slow***.

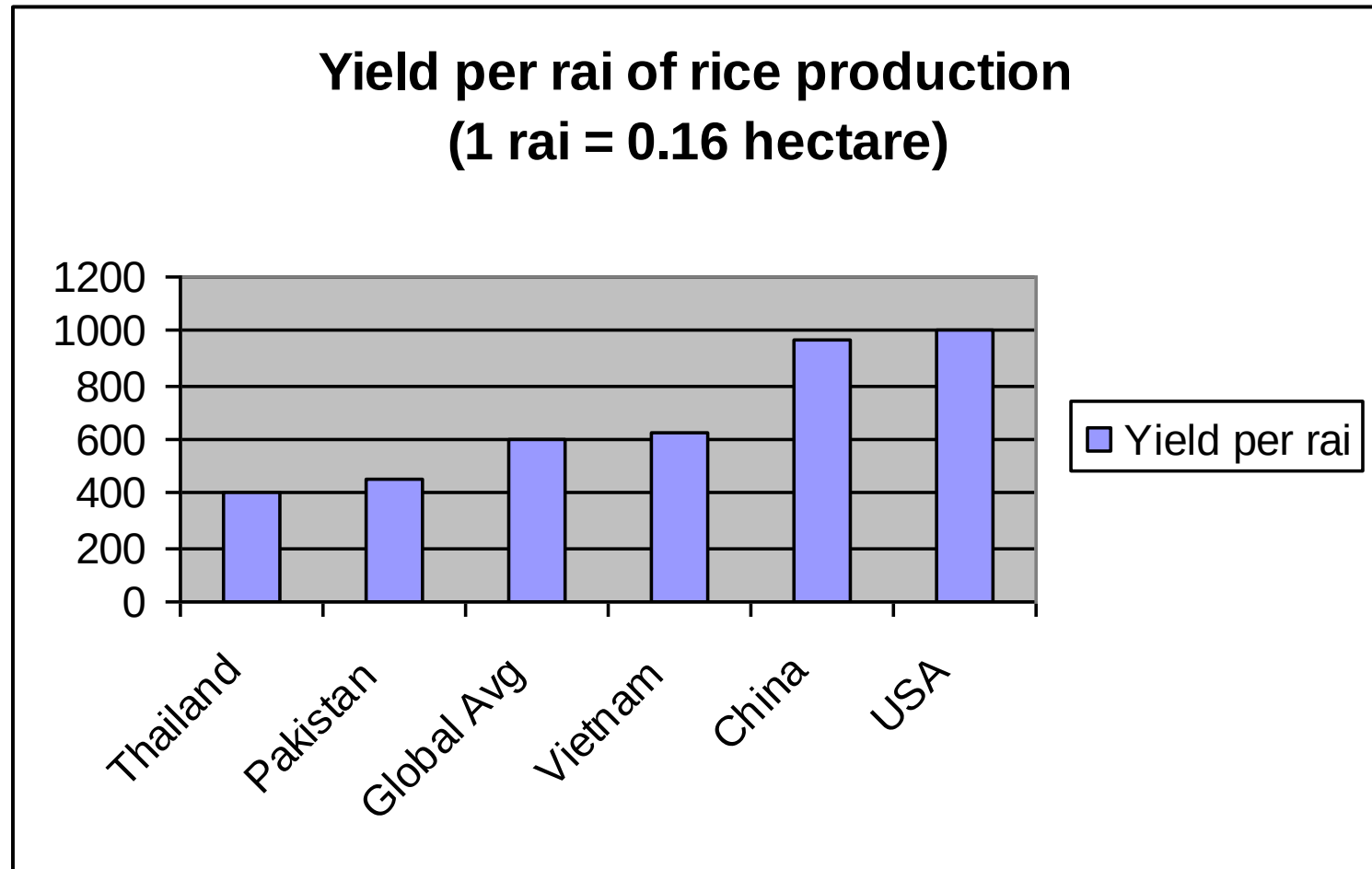
In the case of Thailand

$$\left(\frac{K}{L}\right)^a < \left(\frac{K}{L}\right)^m$$

Heterogeneous production function

- According to Johnson (1991), American agriculture has a capital-labor ratio that is **six** times the ratio in manufacturing.
- Agriculture in developed countries are **more** capital intensive than developing countries.
- What happens when Thai agricultural labors are deprived of vital inputs: water, fertilizer, machinery, and irrigated land?
- Output per land (yield per rai), and output per farmer is very low.

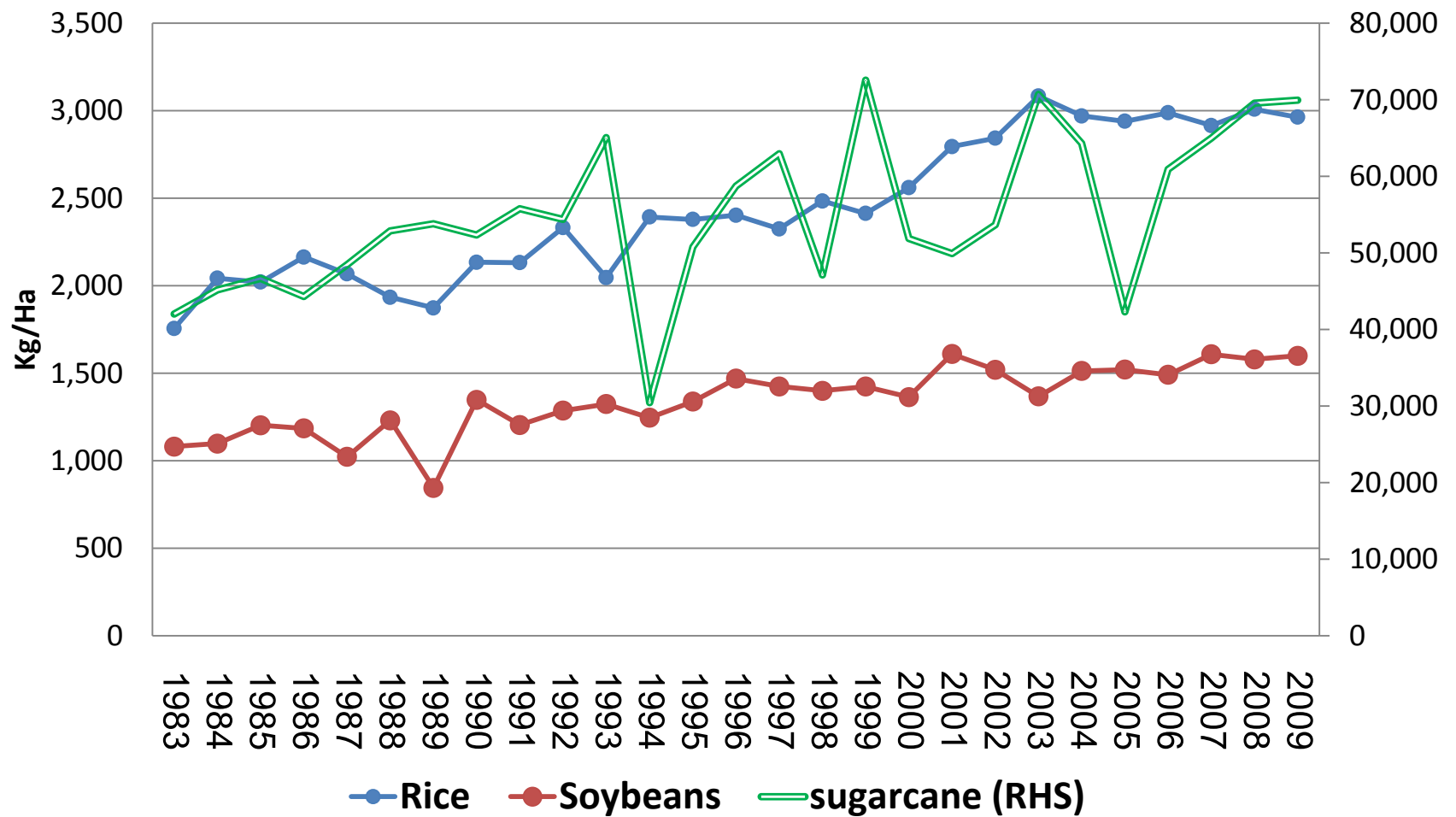
Explain why Thailand has the lowest yield in rice production but managed to be number one rice exporter in the world.



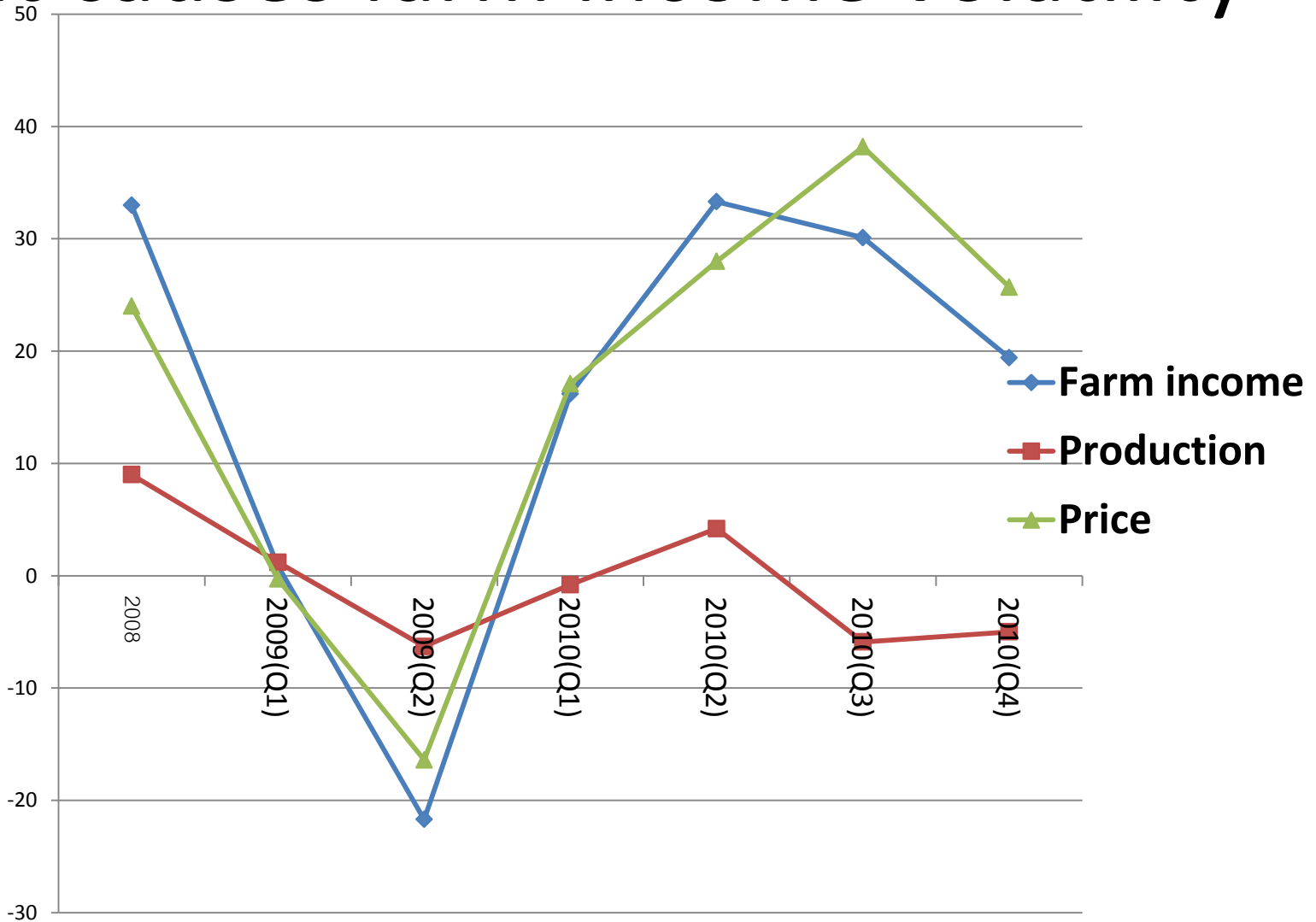
Super rice

- The new Chinese rice breed yields 1,000 kg per rai (0.16 hectare).
- China's *super rice* breed yields 2,000 kg per rai.
- Thai farmers harvest only 400kg per rai.
- “*Pathum Thani 1*” one of the best cross-breeds yields only 500kg per rai.
- Since investment in new breeds leads to falling price, which might spark protests, the government was reluctant to invest in rice growing.

Farm productivity



What causes farm income volatility



R&D Expenditure

- According to the Institute for Management Development's global competitiveness rankings, countries with high competitiveness will, on average, spend around **1.04** per cent of gross domestic product on R&D.
- Currently, Thailand's R&D spending is only **0.21** per cent of GDP.

R&D Expenditure

- The number of R&D personnel is 6.76 people for every 10,000 in the general population, and the ratio of R&D expenditure between the government and private sectors is 60:40.
- The country's total R&D spending should reach 1 per cent of GDP and the number of researchers should be 10 for 10,000 in the general population before the end of 2015, as a short-term measure.
- This time frame is in line with the end of the 11th Economic and Social Development Plan in 2016.

Shortages of researchers and scientists

- The government should be more aggressive in providing incentives. It should set up mega-projects for private-sector R&D as national targets, as well as providing facilities such as pilot plants and testing facilities.
- The number of researchers and scientists is also a key factor.
- There are currently only **40,000** people engaged in research in Thailand. Plans aim to raise that number to 60,000 by the end of 2015.
- Currently, only 25 per cent of students graduating each year are science graduates, of whom 75 per cent are in social sciences.