Structural Changes in Thailand's Agriculture

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Lecture 10

A new normal growth path

- GDP growth in 2013 declined to 2.9% from 6.5% in the previous year.
- Investment and exported contracted by 1.9% and 0.2 % respectively.
- What has gone wrong in Thailand?
- In 2014, GDP grew only 0.6 %.

Unstable growth path

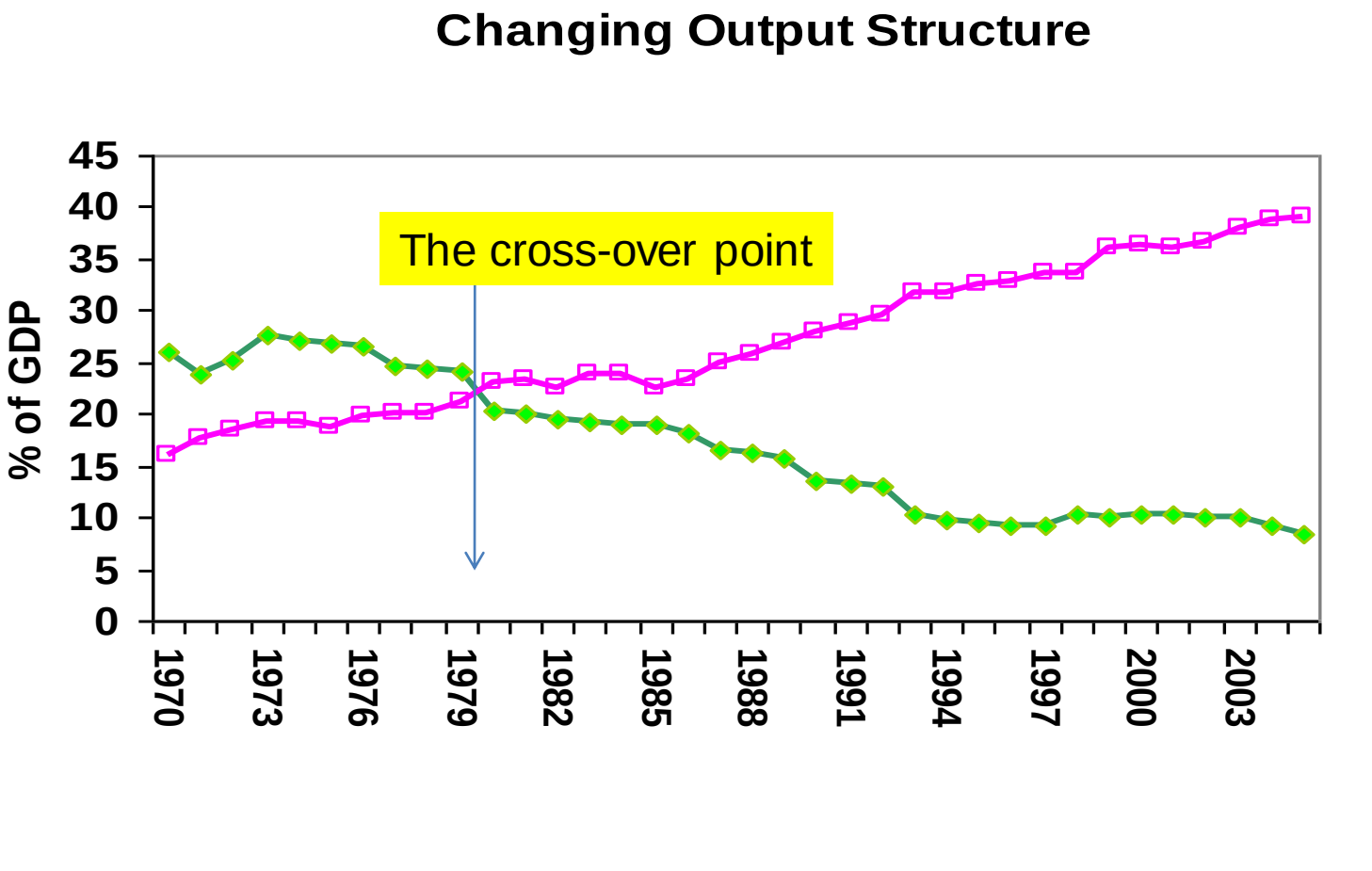
Main themes

- Changing structure: output, employment, and exports
- A pessimistic view
- Agricultural productivity
- Long-term declining price trends and volatility

Stylized facts of Economic Development

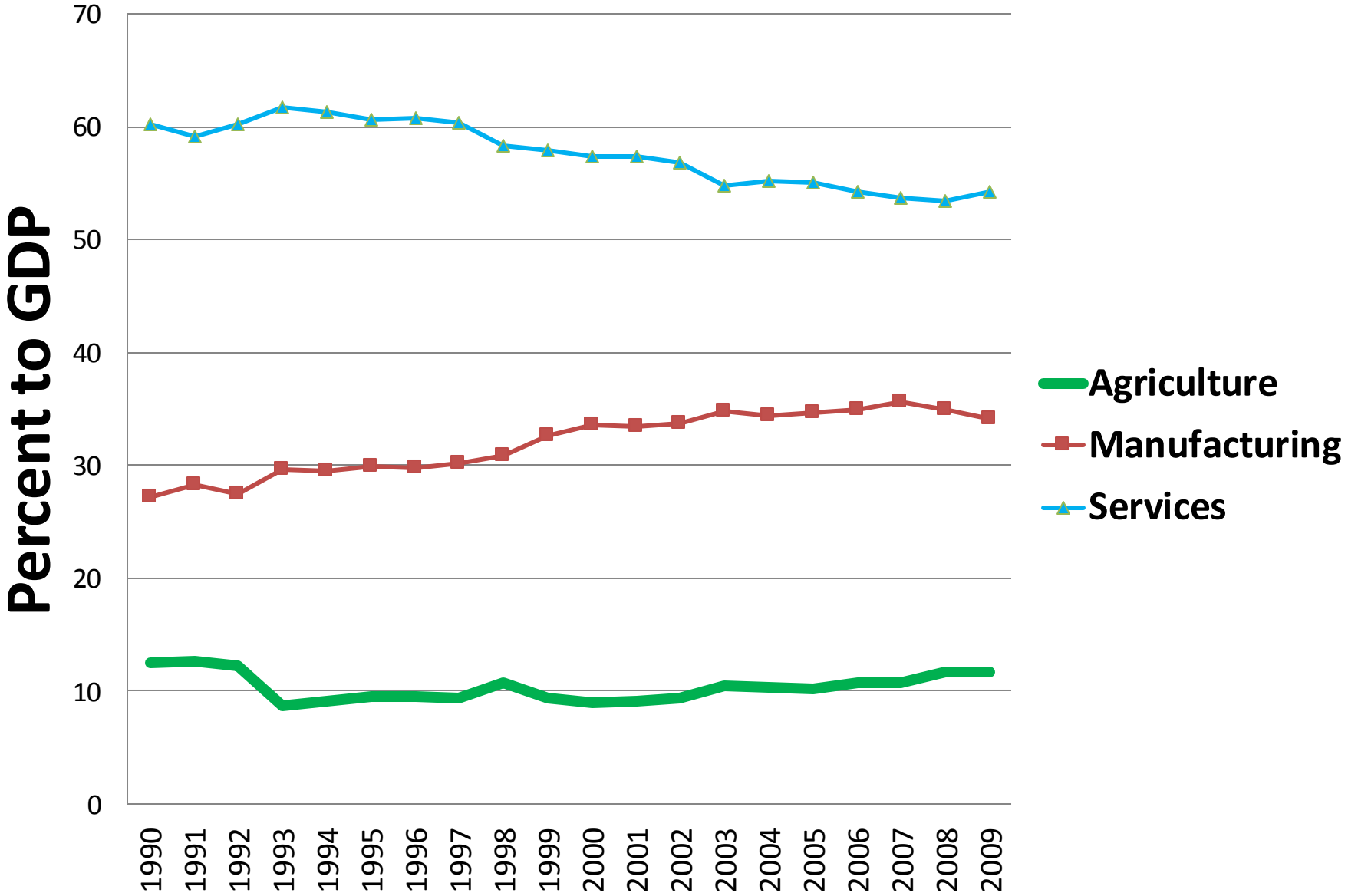
- **Shares of agriculture in GDP and agricultural exports in total exports have been declining continuously over the past four decades.**
- **Agricultural export share declined from the average of 54.3 percent during the period 1979-1981 to 24 percent during the period 1989-91.**
- **By 2002, agricultural 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.**

1. Thailand's output structure



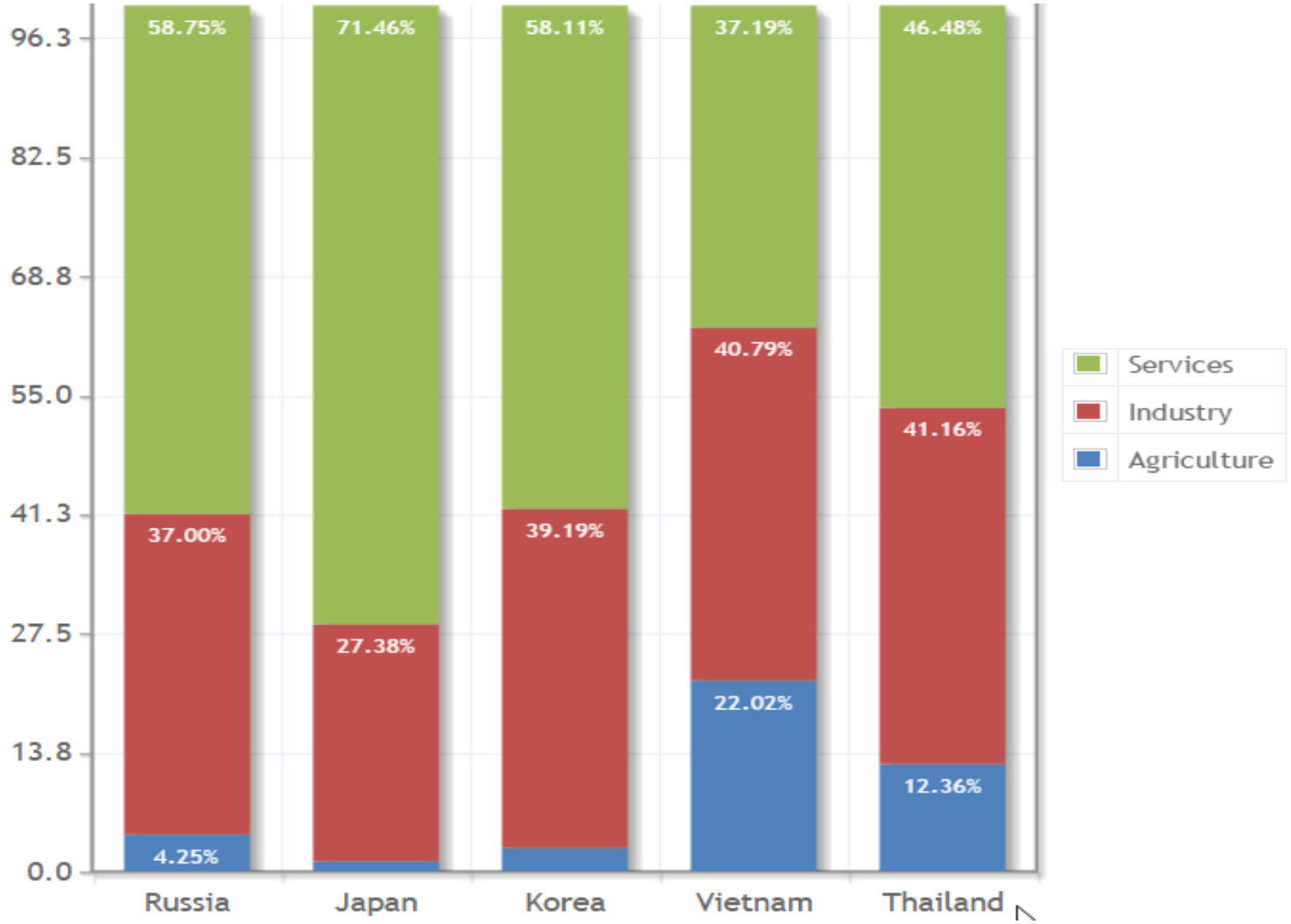
Source: Bank of Thailand, Quaterly Report

Output structure: 1990-2009

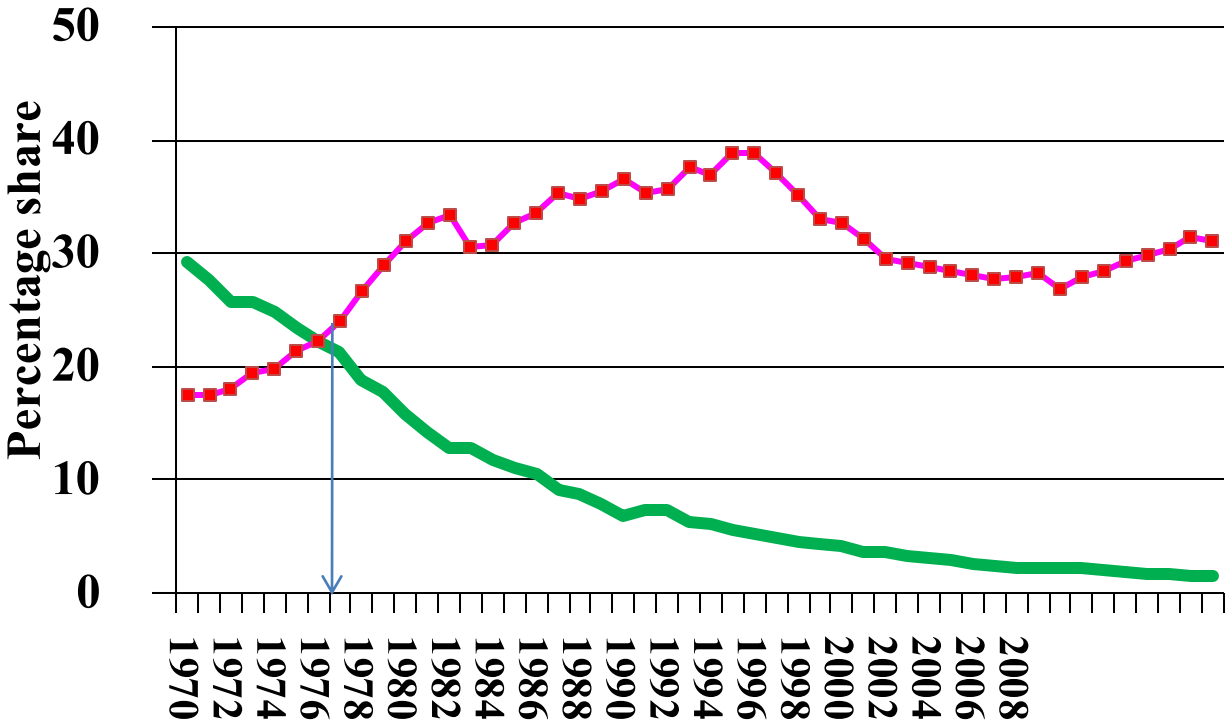


GDP Composition by Sector

in search of creative economy
and looking forward to digital economy

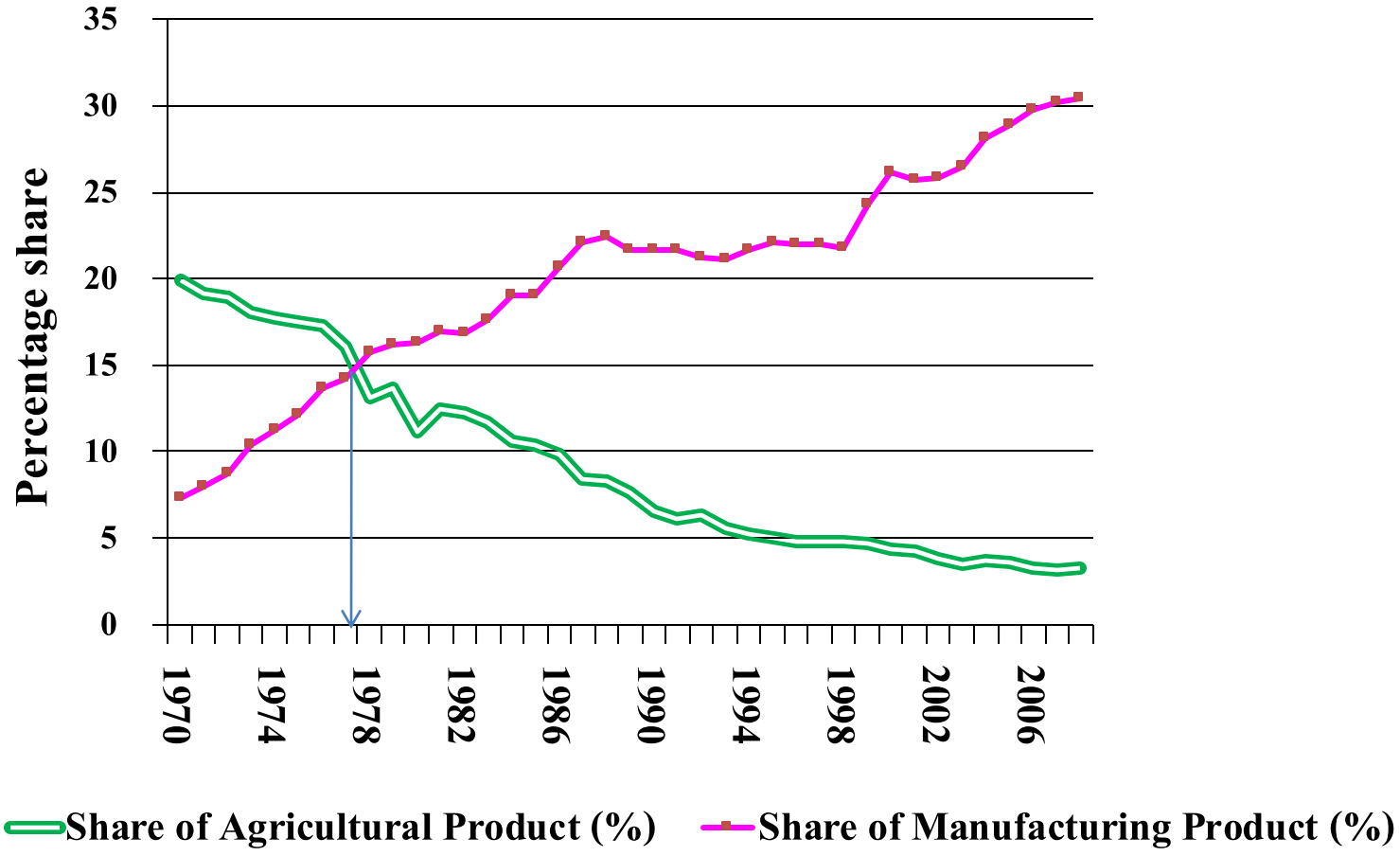


Taiwan

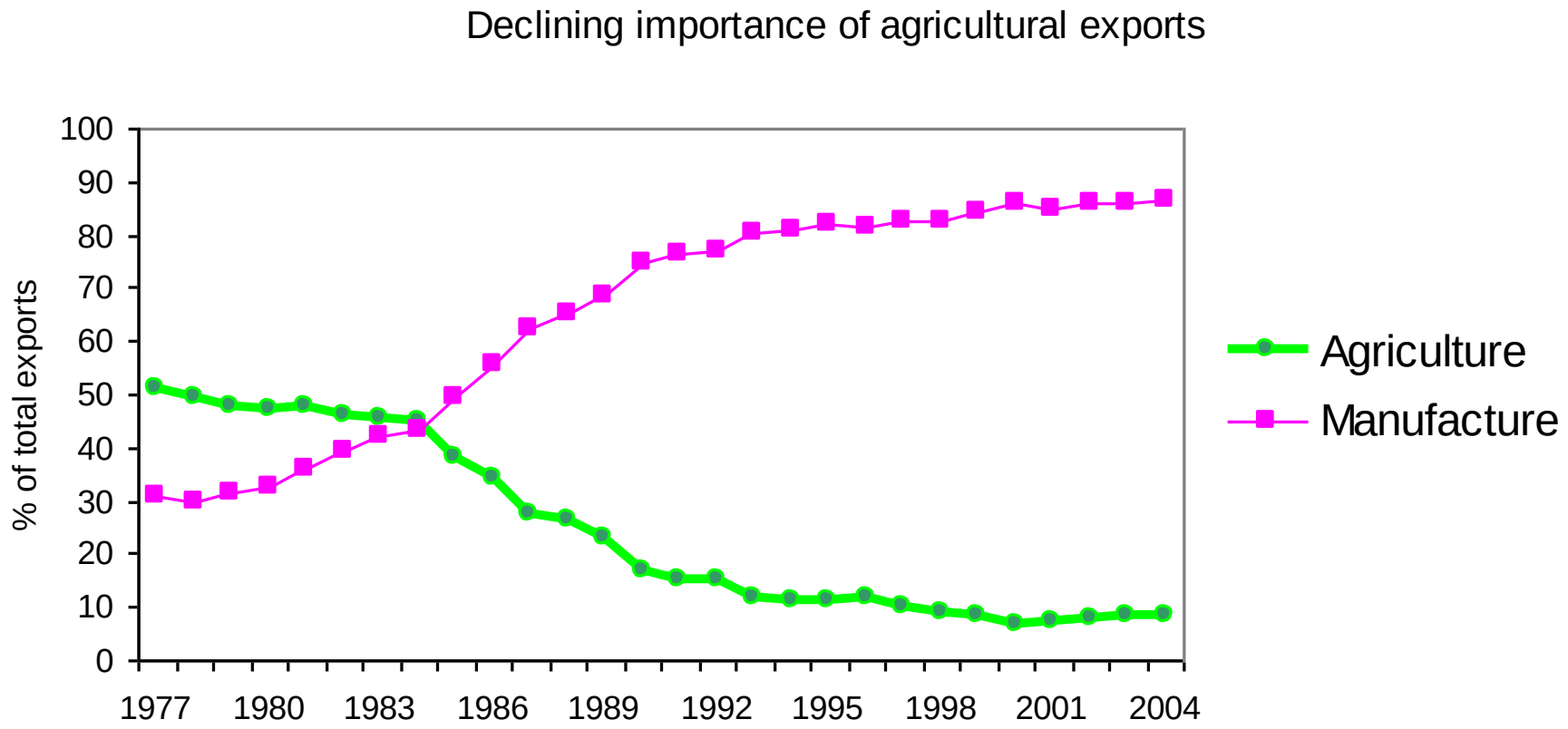


The cross-over point was experienced earlier in the four Asian Tigers

South Korea

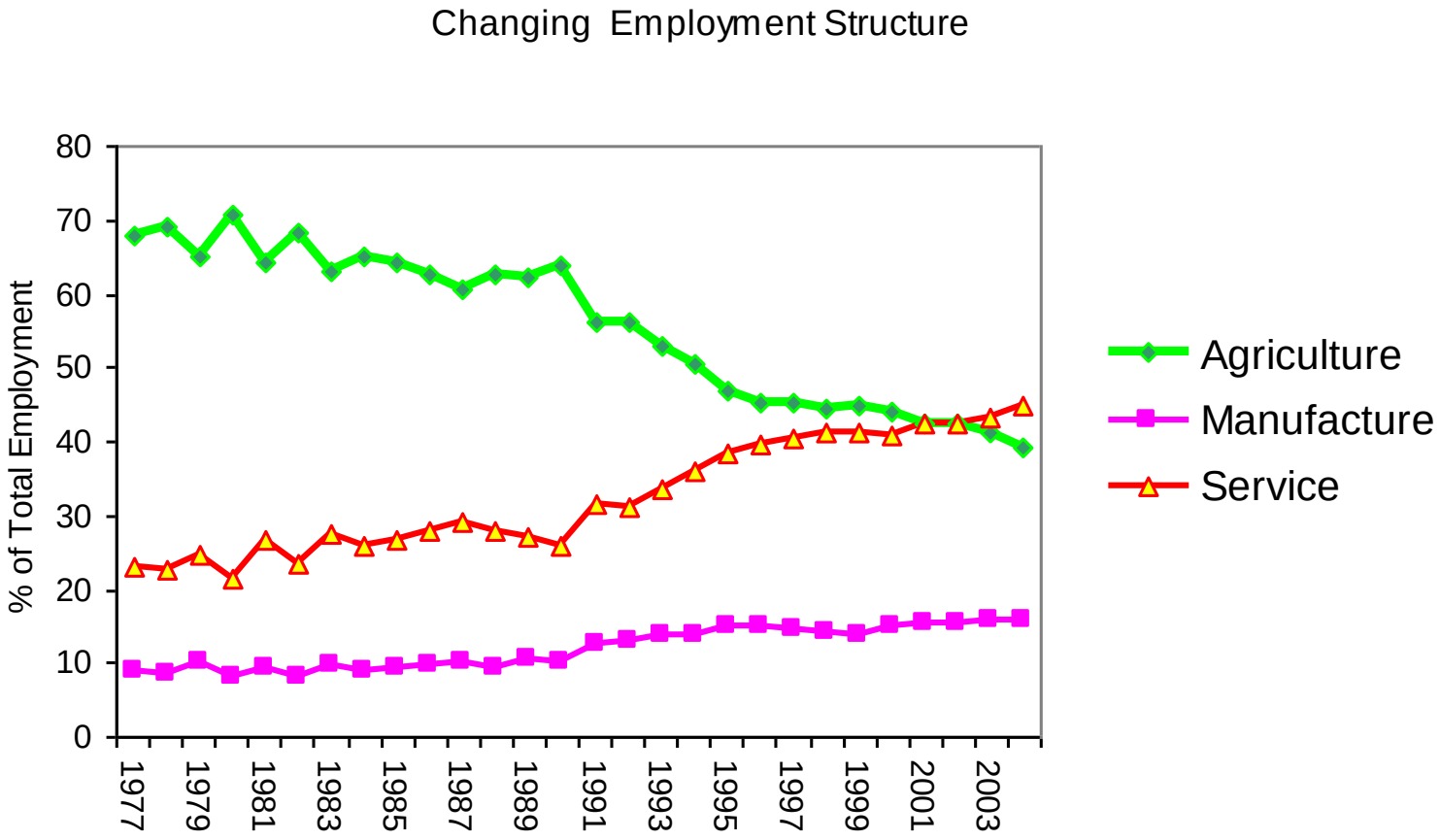

Percentage share
35
30
25
20
15
10
5
0
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
Share of Agricultural Product (%)
Share of Manufacturing Product (%)

2. Structure of Thailand's exports



Source: Bank of Thailand

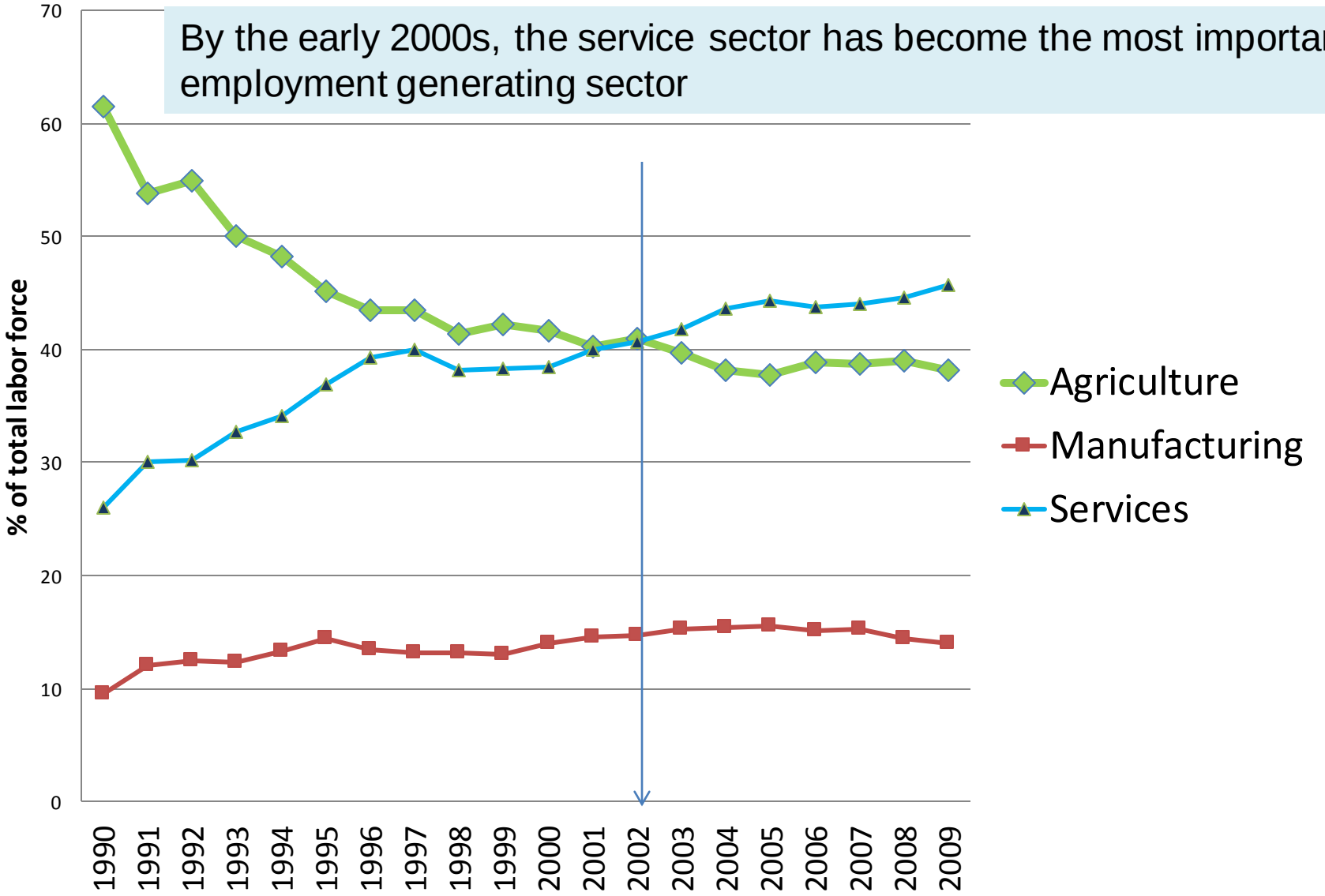
3. Employment Structure



Source: Bank of Thailand

Thailand's Employment structure: 1990-2009

By the early 2000s, the service sector has become the most important employment generating sector



A dismal view

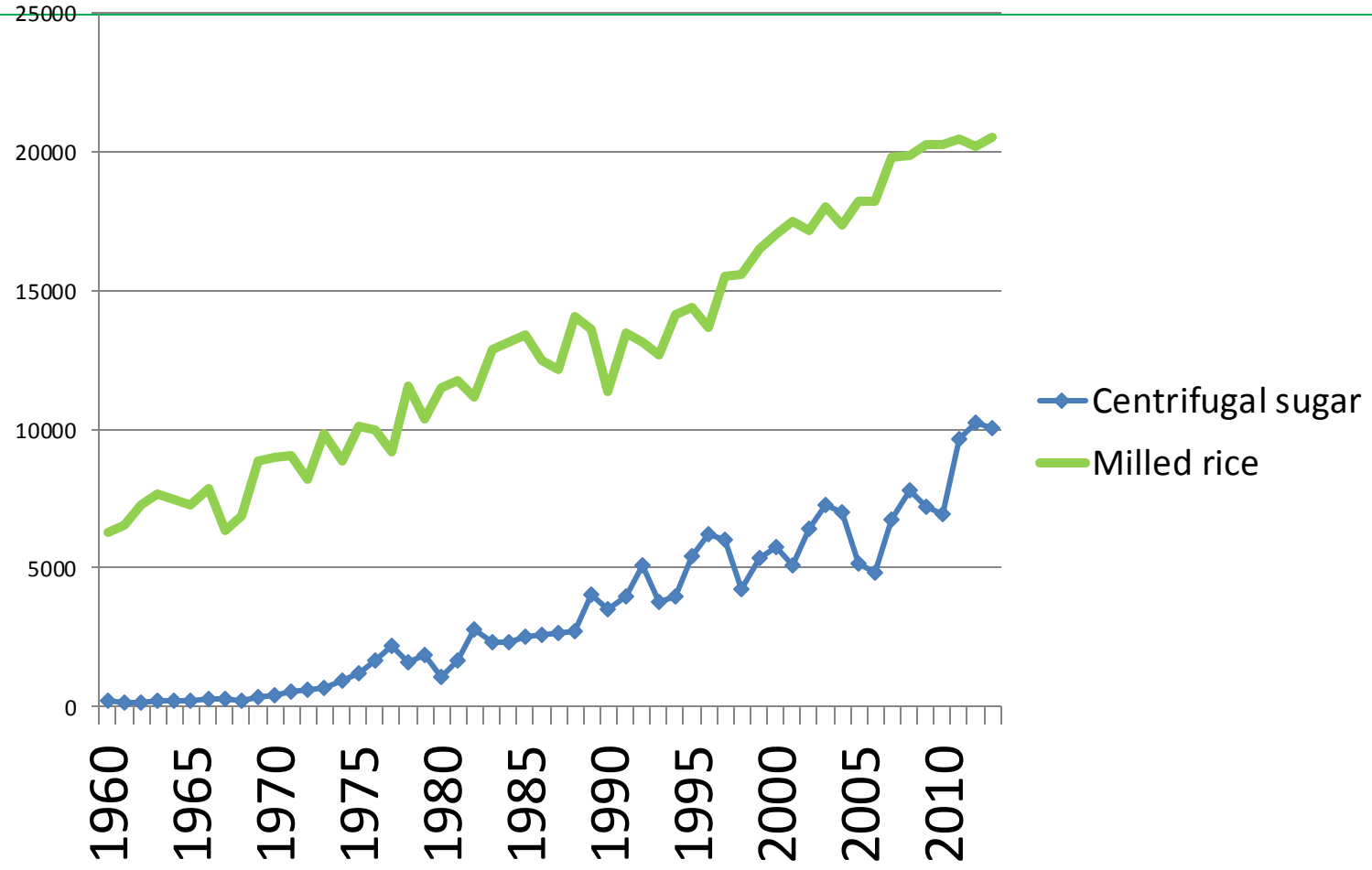
- **“Thailand would lose comparative advantage in agriculture as manufacturing has increasingly become more important than agriculture”.**
- **“Due to the shortage of labor and water during the dry season, with the disappearance of land in the 1980s, the future of Thai agriculture would look bleak”.**
- **Ammar Siamwalla (1996) “Thai Agriculture: From engine of growth to sunset status”**
- **Source: TDRI Quarterly Review Vol. 11, no.4**

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.

Thailand's rice and sugar production

(1000 MT)



Top 15 rice growers

Milled Rice Production by Country in 1000 MT

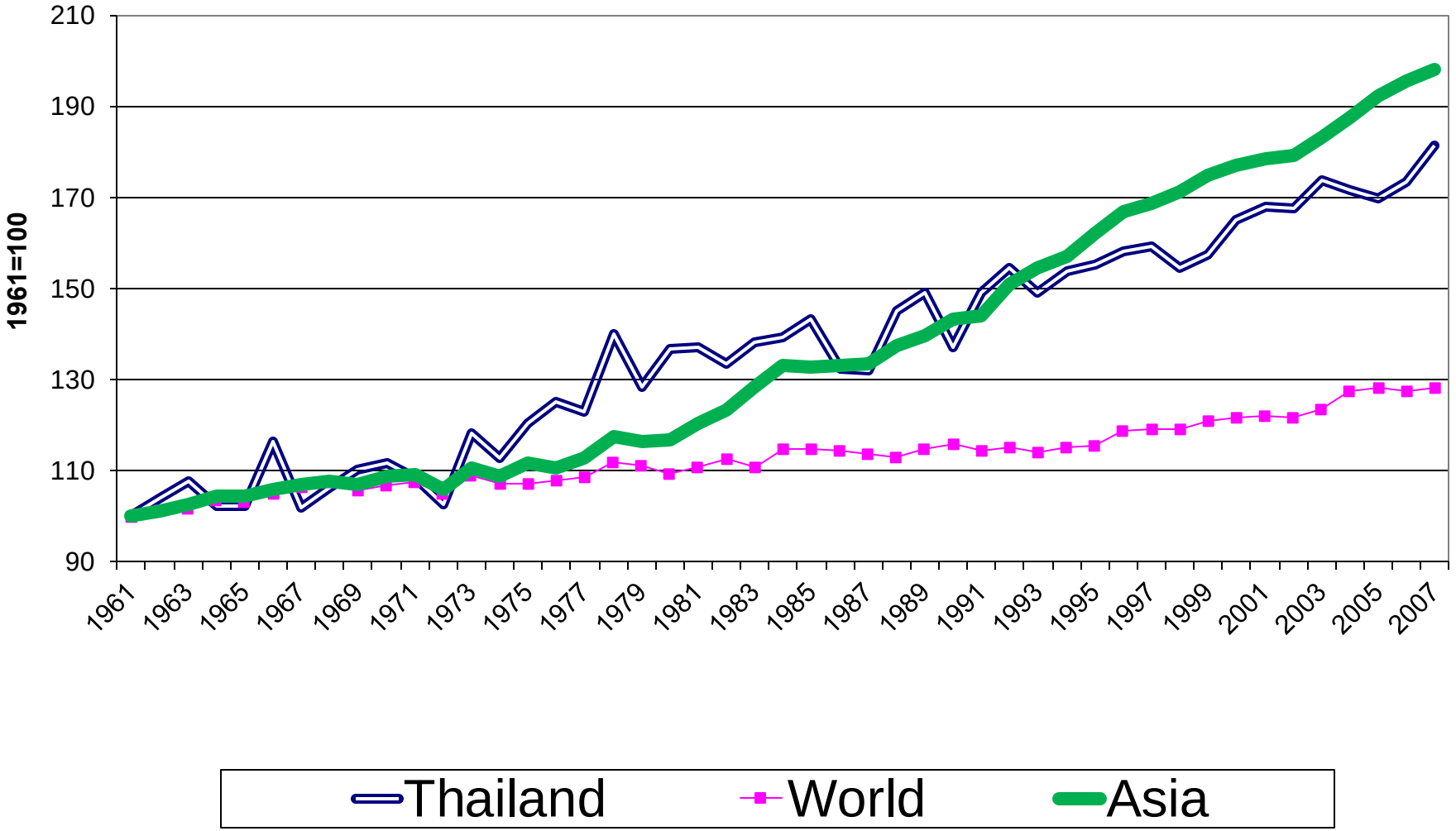
Switch to: Growth Rate Map

Rank	Country	Production (1000 MT)
1	China	144,000.00
2	India	102,000.00
3	Indonesia	37,000.00
4	Bangladesh	34,600.00
5	Viet Nam	28,200.00
6	Thailand	20,500.00
7	Philippines	12,200.00
8	Myanmar	12,150.00
9	Brazil	8,350.00
10	Japan	7,700.00
11	United States	7,069.00
12	Pakistan	6,500.00
13	Cambodia	4,900.00
14	Egypt	4,500.00
15	Korea, Republic Of	4,180.00

Palm Oil Production

Rank	Country	Production (1000 MT)
1	Indonesia	33,500.00
2	Malaysia	21,250.00
3	Thailand	2,250.00
4	Colombia	1,070.00
5	Nigeria	930.00
6	Papua New Guinea	630.00
7	Ecuador	575.00
8	Honduras	440.00
9	Côte D'ivoire	400.00
10	Guatemala	355.00
11	Brazil	340.00
12	Costa Rica	270.00
13	Cameroon	270.00

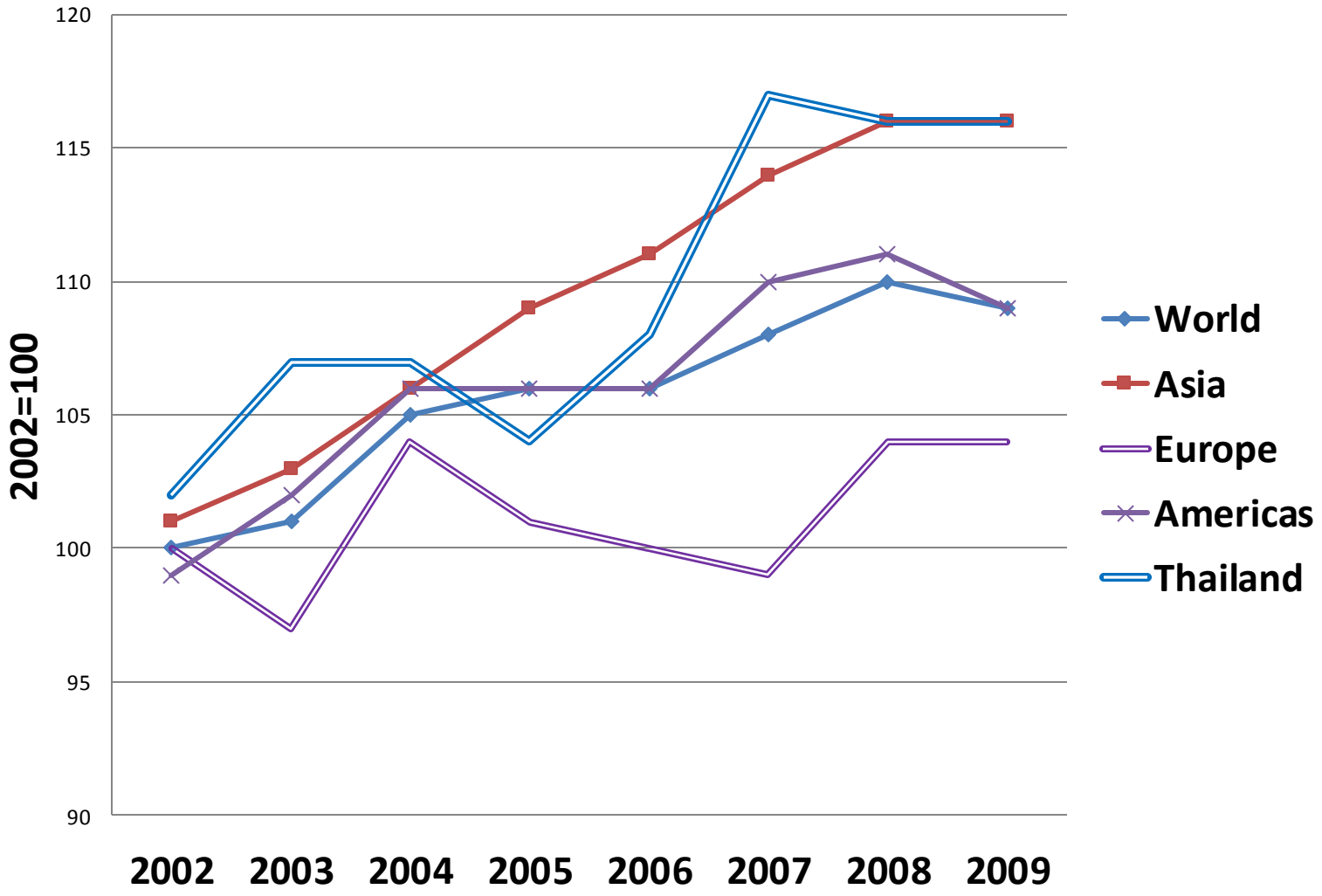
Agricultural Production per Capita Index



Thai agriculture over the last 50 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



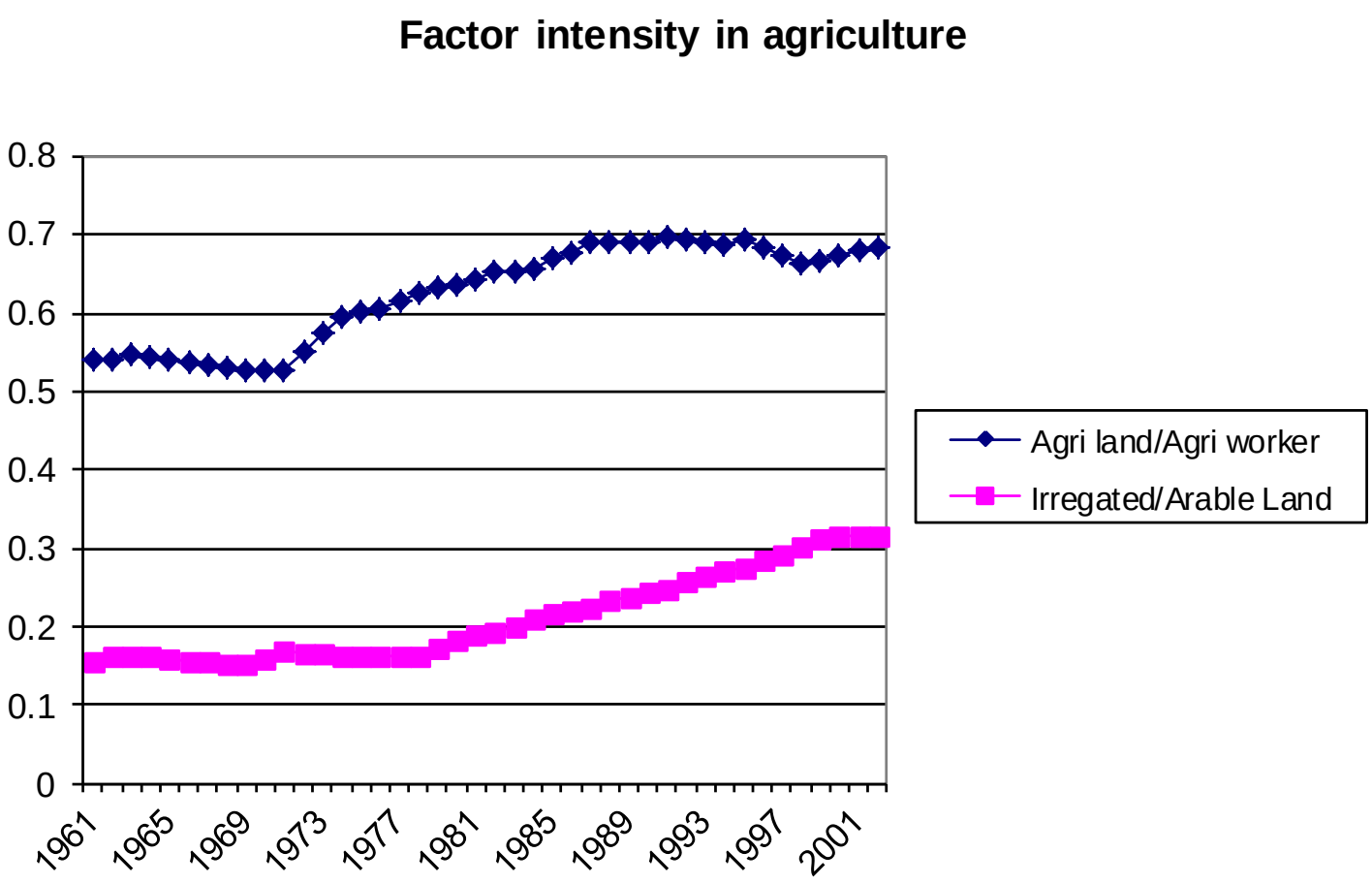
Yields of major crops

- A remarkable productivity surge in rubber production 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 in1960s.

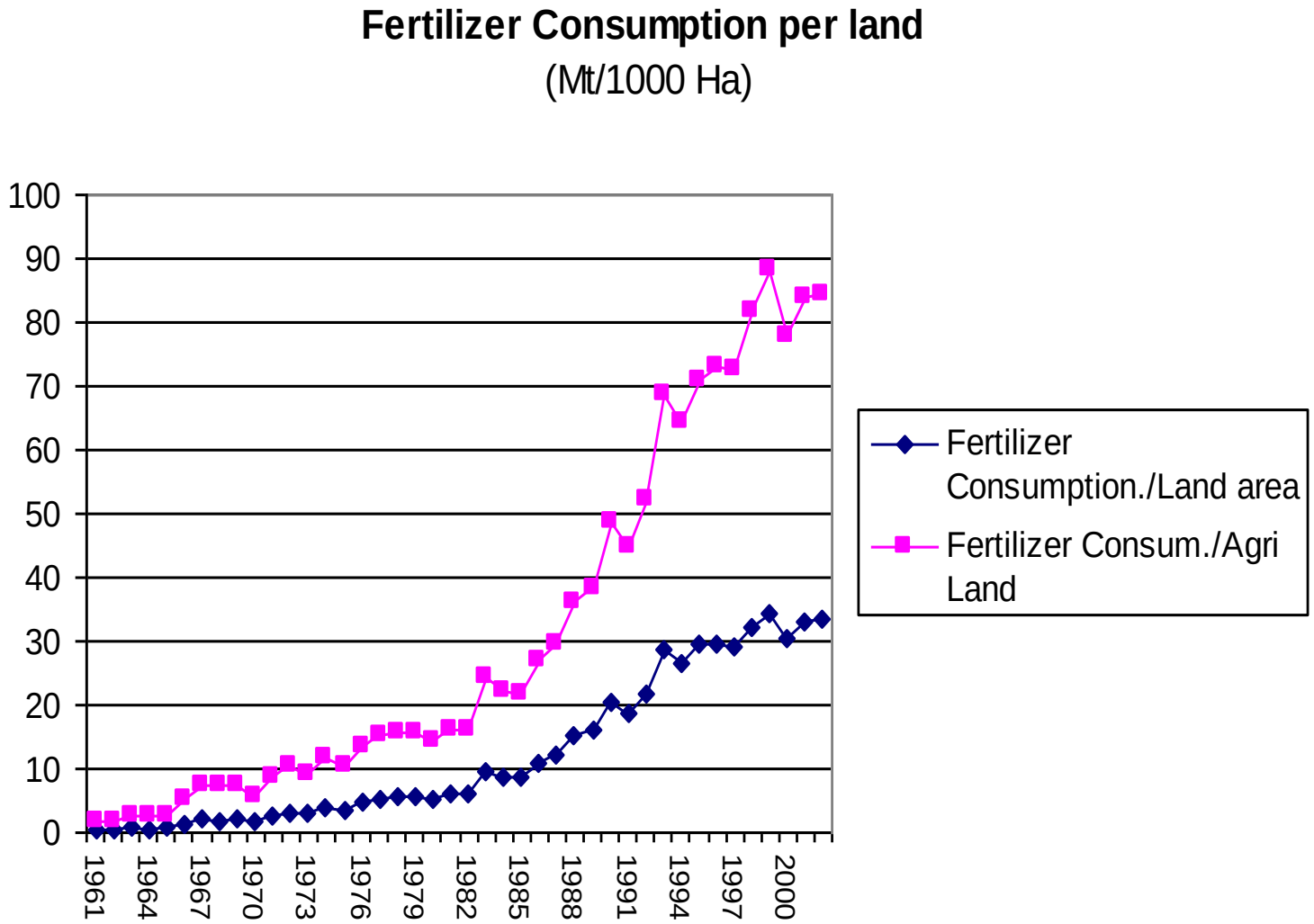
Why did rice farm productivity increase?

- 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 strong baht exchange rate help or hurt Thai farmers?*

Land-labor ratio
Rain-fed vs. irrigated land



High time for organic farming



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: 1961- 2002

(percentage change)

Arable Land/labor	0.8
Fertilizer/Land	62.3
Irrigated/Arable Land	2.0
Imported machine/labor	16.3

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.**

Martin and Mitra (2001)

Agriculture vs. manufacturing productivity growth

- **"Rapid accumulation of human capital contributed to a strong shift out of agricultural activities and into export-oriented manufacturing industry in East Asian economies."**

FDI and Productivity

- **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.**
- **FDI in agricultural sector has been insignificant, if any.**

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

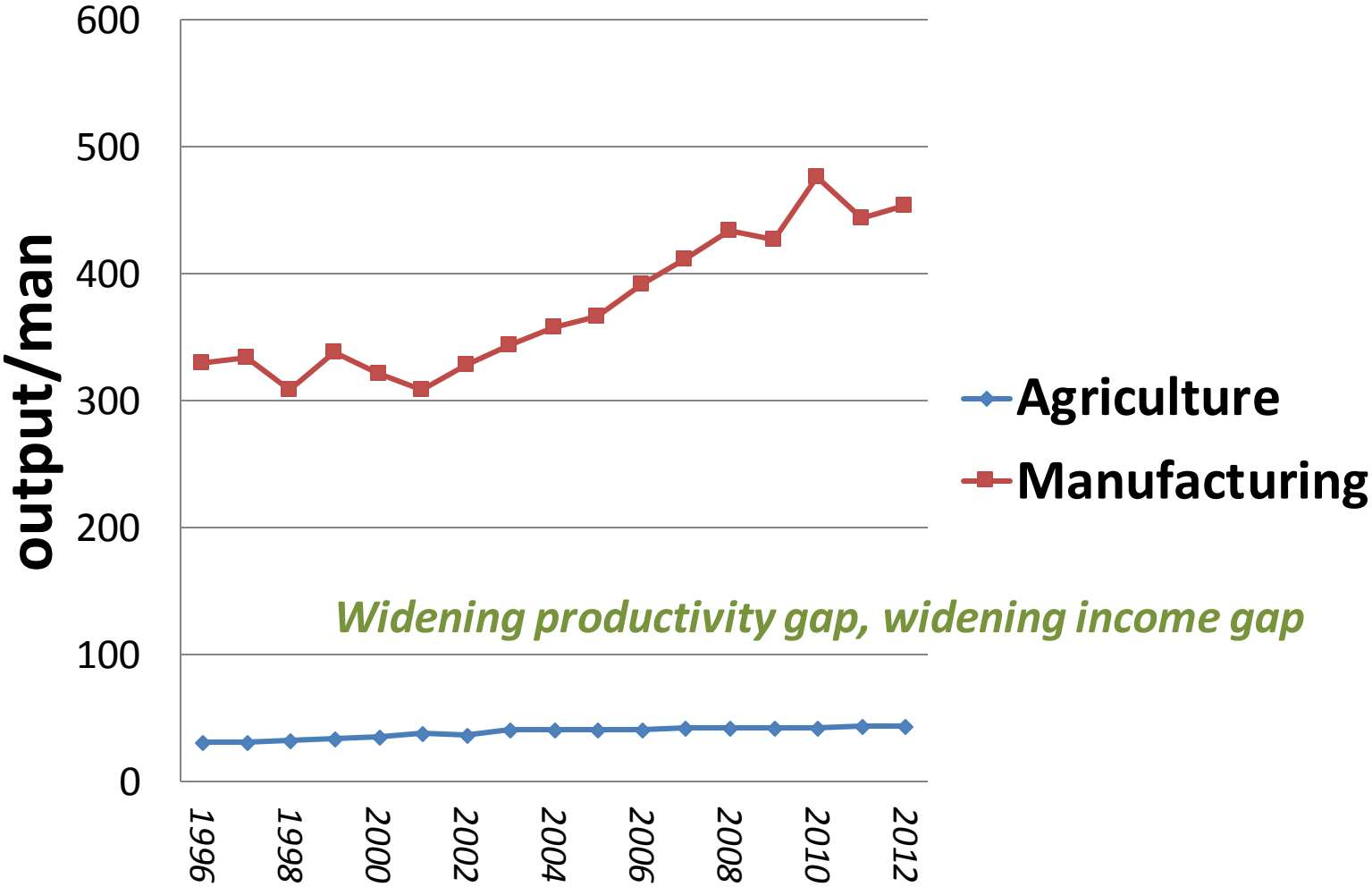
$$\left(MP_L\right)^a > \left(MP_L\right)^m$$

But in the case of Thailand

$$\left(MP_L\right)^a < \left(MP_L\right)^m$$

Average Product of Thai Labor

AP_L = Output/Labor



Median Age in Various Countries

- Philippines 23
- India 25
- China 35
- Japan 45
- Thailand 34
- **Average age of farmers**
- USA 58
- Japan 66

Declining demand for farm labors in the US

- In 1935, the number of farms in the United States peaked at 6.8 million as the population edged over 127 million citizens. As the number of farmers has declined, the demand for agricultural products has increased.
- This increased demand has been met (and exceeded) with the aid of large-scale mechanization (the use of large, productive pieces of farm equipment), improved crop varieties, commercial fertilizers, and pesticides.
- The need for human labor has also declined as evidenced by the increase in agricultural labor efficiency over the past century – from 27.5 acres/worker in 1890 to 740 acres/worker in 1990 (or 26.9 % every year)
- *From 1961 to 2002, land/worker increased by just 0.8%*

The graying of American farm population

- As the U.S. farm population has dwindled, the average age of farmers continues to rise.
- In fact, about sixty percent of the farmers in this country are 55 years old or older (Bureau of Labor Statistics).
- The average age of a principal operator of a farm has increased from 54 years old in 1997 to 57 years old in 2007.
- The percentage of principle farm operators 65 years or older has increased almost 10 percent since 1969.
- The graying of the farm population has led to concerns about the long-term health of family farms as an American institution.
- This graying farm labors also experienced in Japan and Thailand.

Why has the majority of Thailand's 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*.

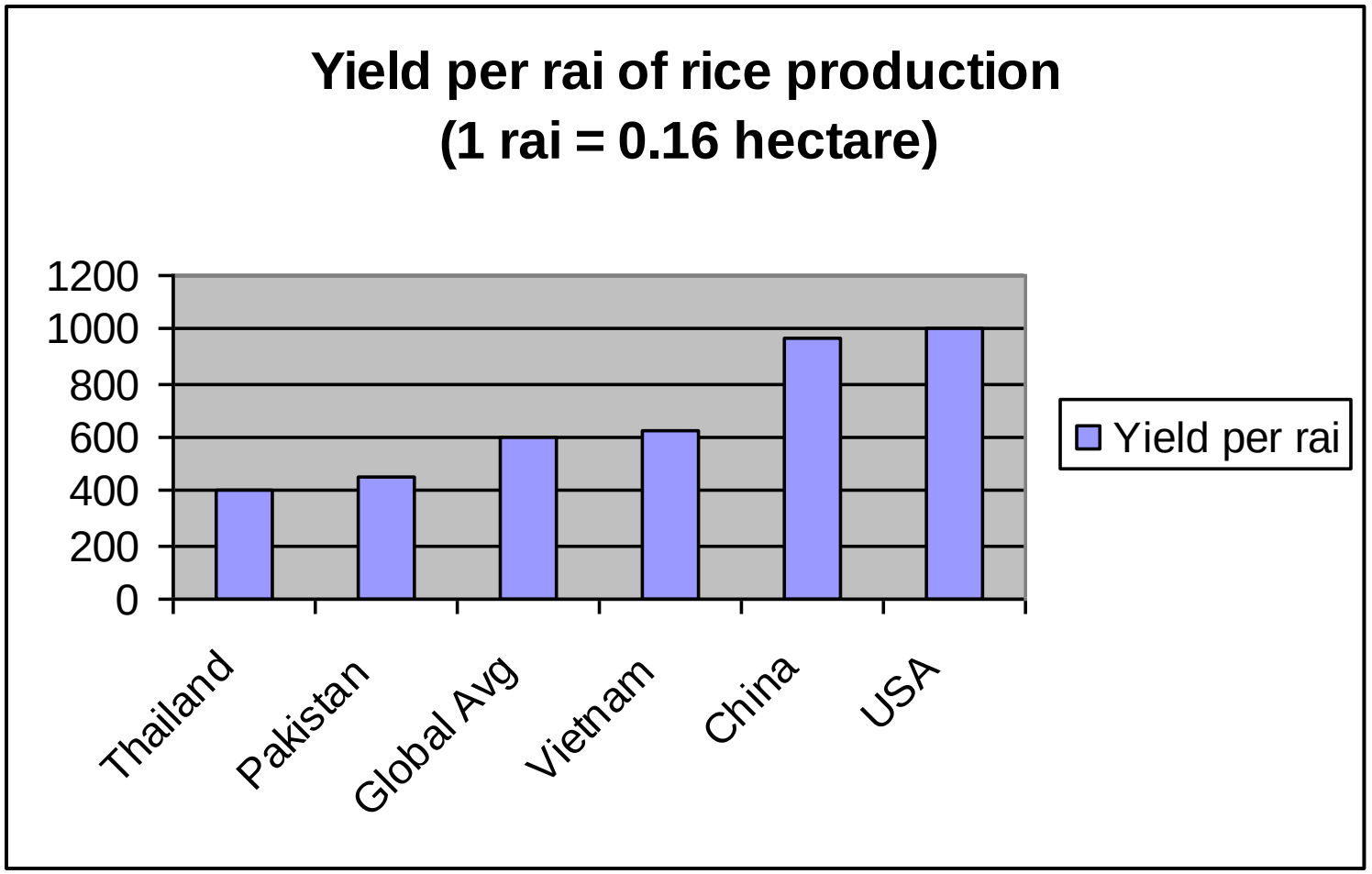
In the case of Thailand

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

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.

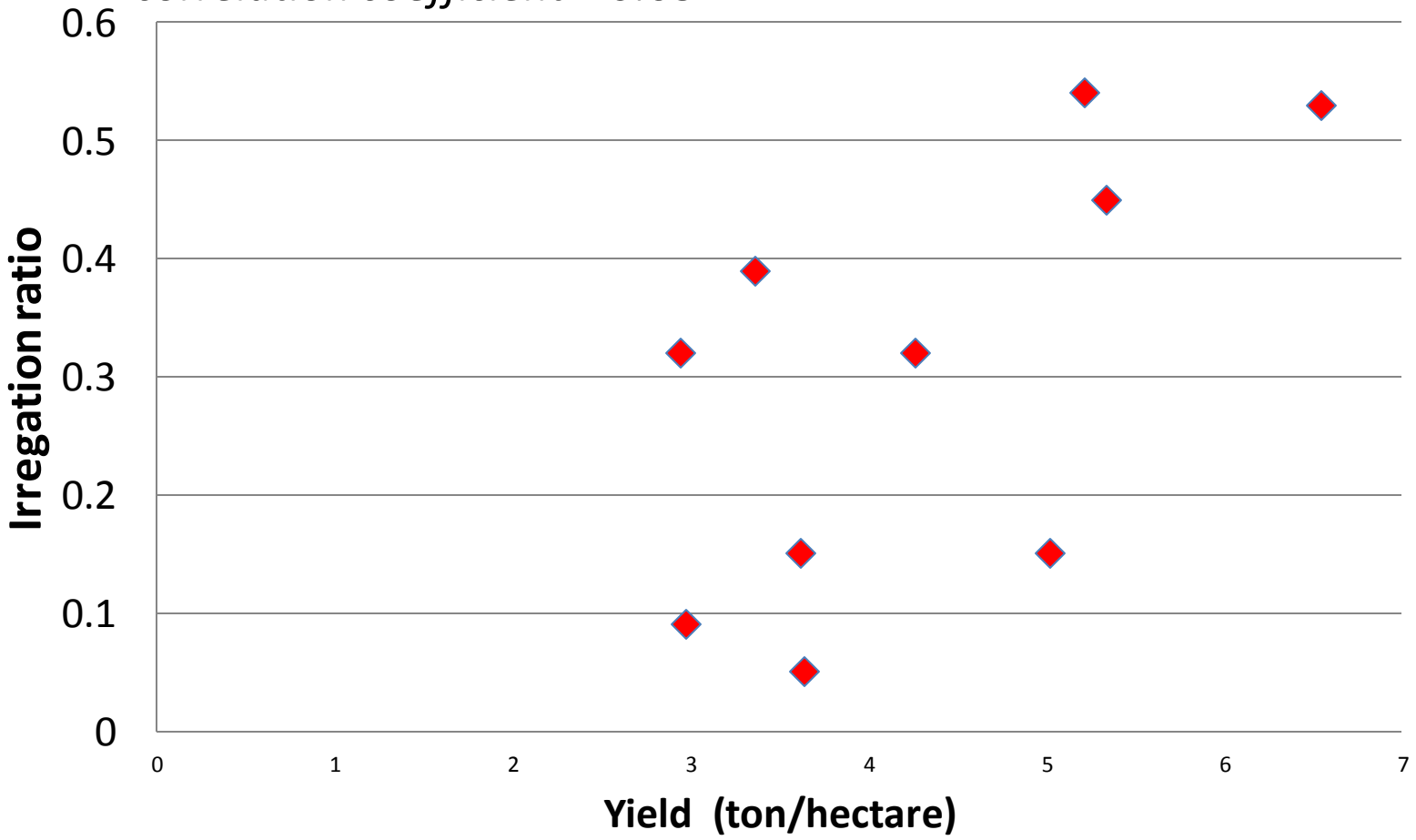
Explain why Thailand has the lowest yield in rice production but managed to be number one rice exporter in the world.



	Yield(ton/hectare)	Irrigation ratio
Myanmar	3.64	0.05
Cambodia	2.97	0.09
Indonesia	5.02	0.15
Philippines	3.62	0.15
South Korea	4.26	0.32
Thailand	2.94	0.32
India	3.36	0.39
Vietnam	5.34	0.45
China	6.55	0.53
Japan	5.21	0.54

Rice yeild and irregation: International Comparision

correlation coefficient = 0.63



China's 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.

China Famine: 1956-1961

Presently, Chia is still a net importer of rice

China's objective is to reduce grain dependency

LIFE

Conclusion

- Public investment in irrigation is required to reduce the number of rain-fed farming.
- Productivity of irrigated farm is higher by water supply which is required by new high yielding varieties.
- Different rice farming technology implies different production function and capital-labor ratio, which is rising as farmers are ageing.