# Structural Changes in Thailand's Agricultural sector

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Lecture 10

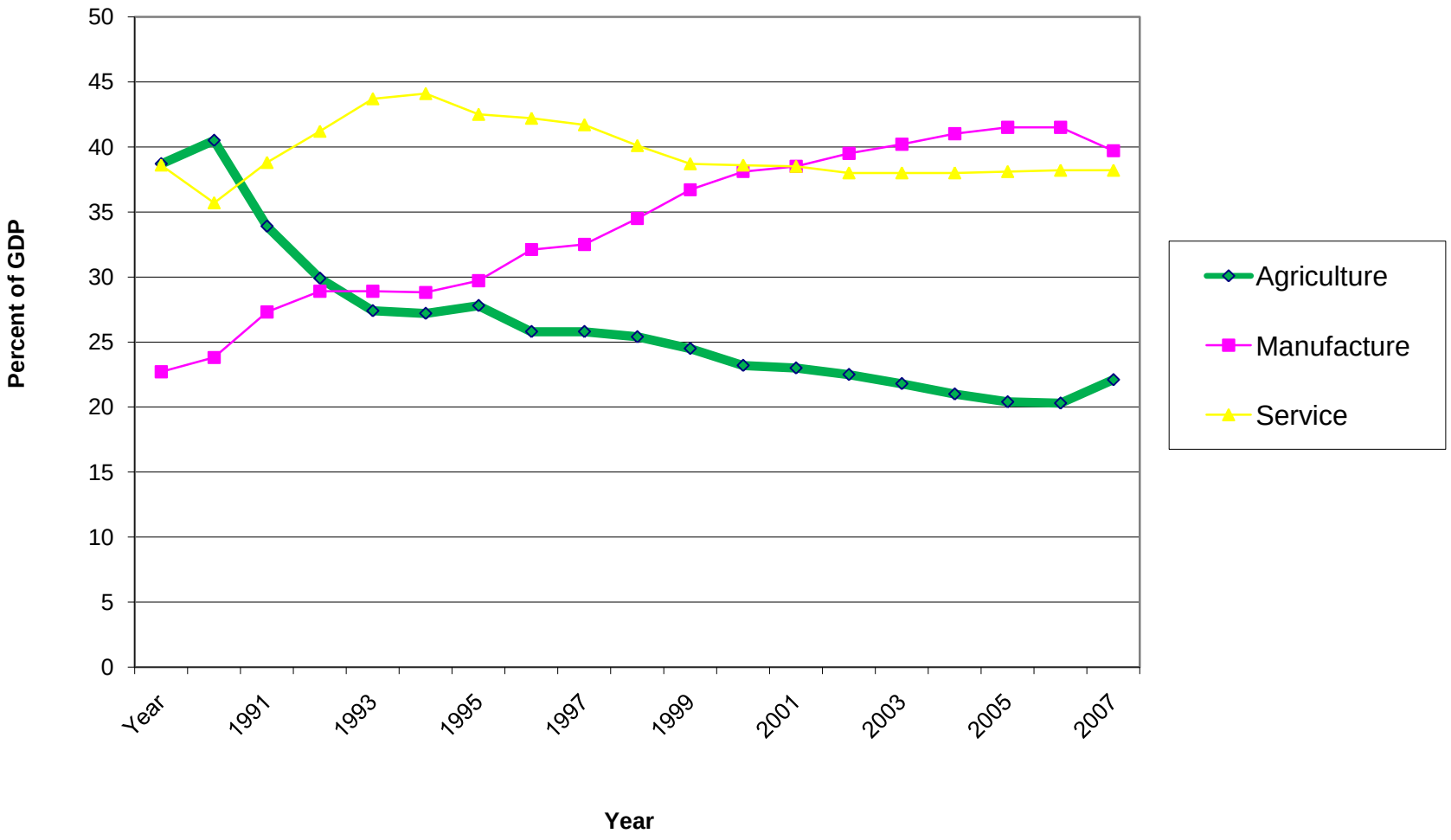
# Main themes

- Changing structure:
  output, employment, and exports
- A pessimistic view
- Agricultural productivity

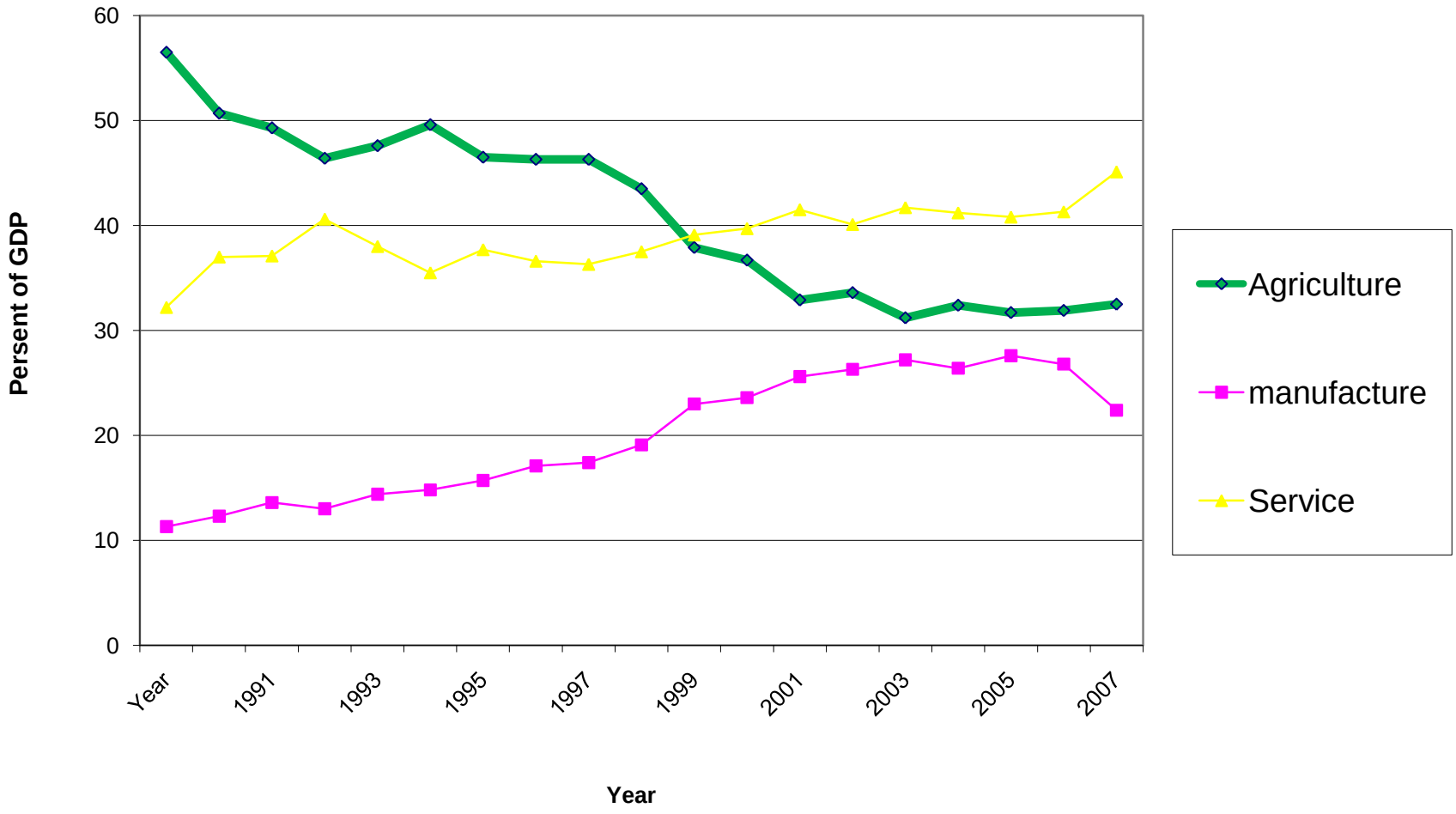
# Stylized facts of Economic Development

- **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?**

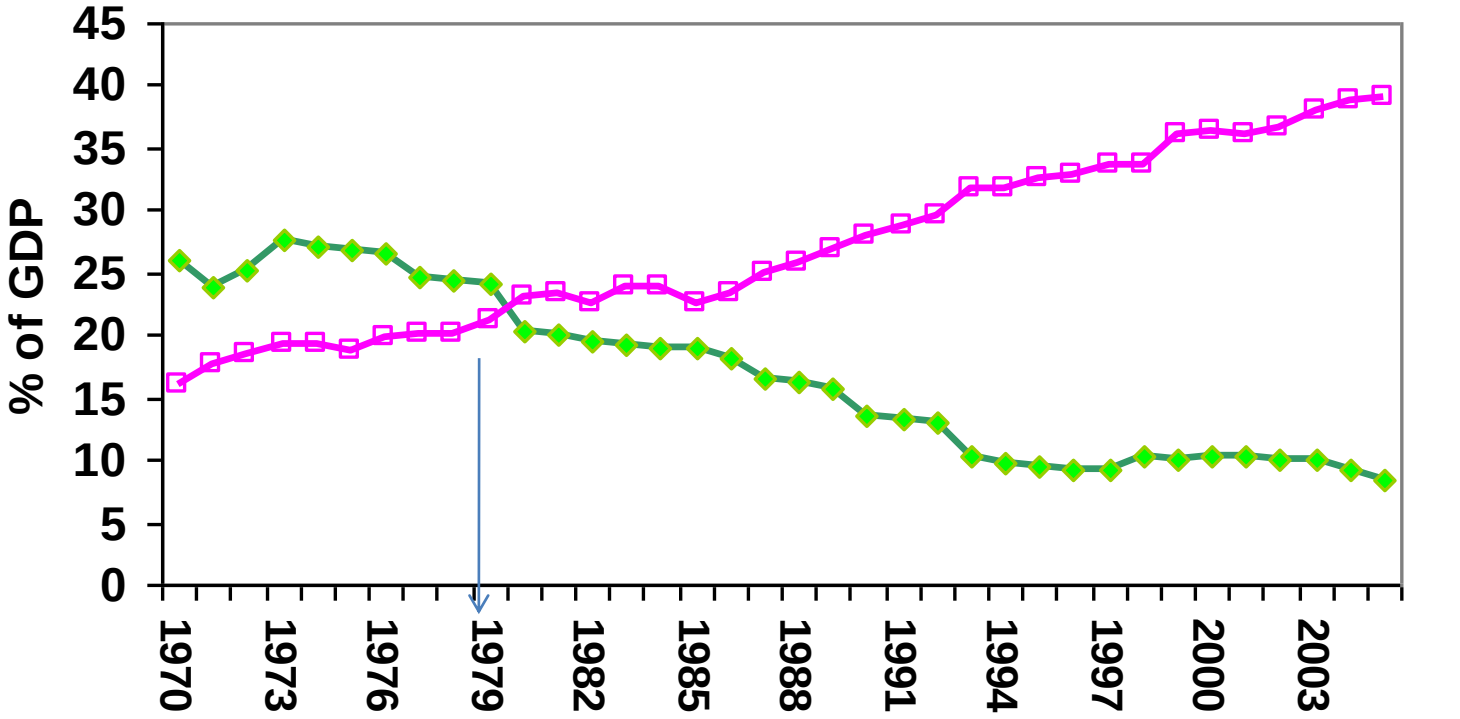
# Viet Nam: Changing output structure



# Cambodia

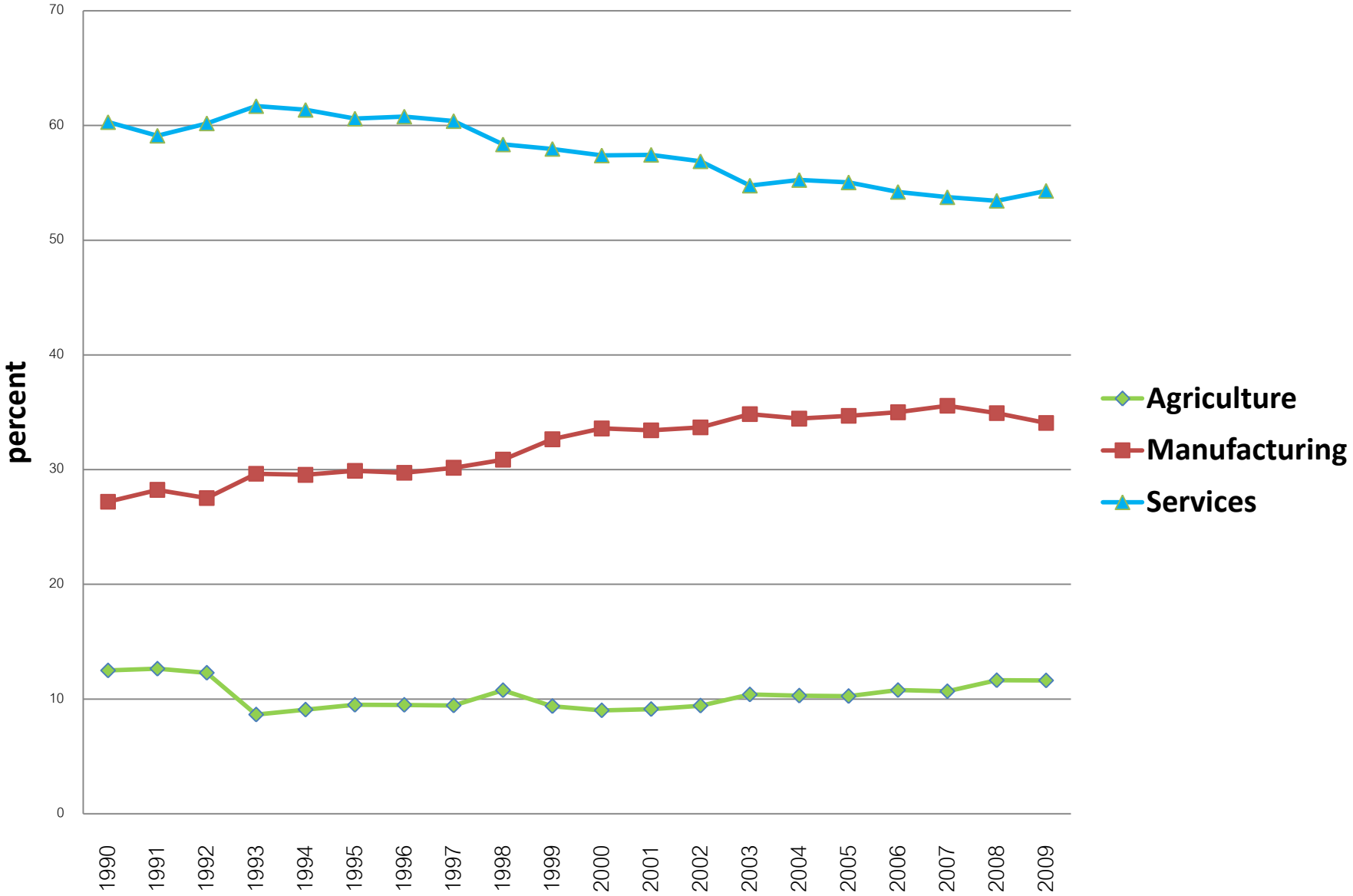

Persent of GDP
60
50
40
30
20
10
0
Year
1991
1993
1995
1997
1999
2001
2003
2005
2007
Year
Agriculture
manufacture
Service

# Changing Output Structure

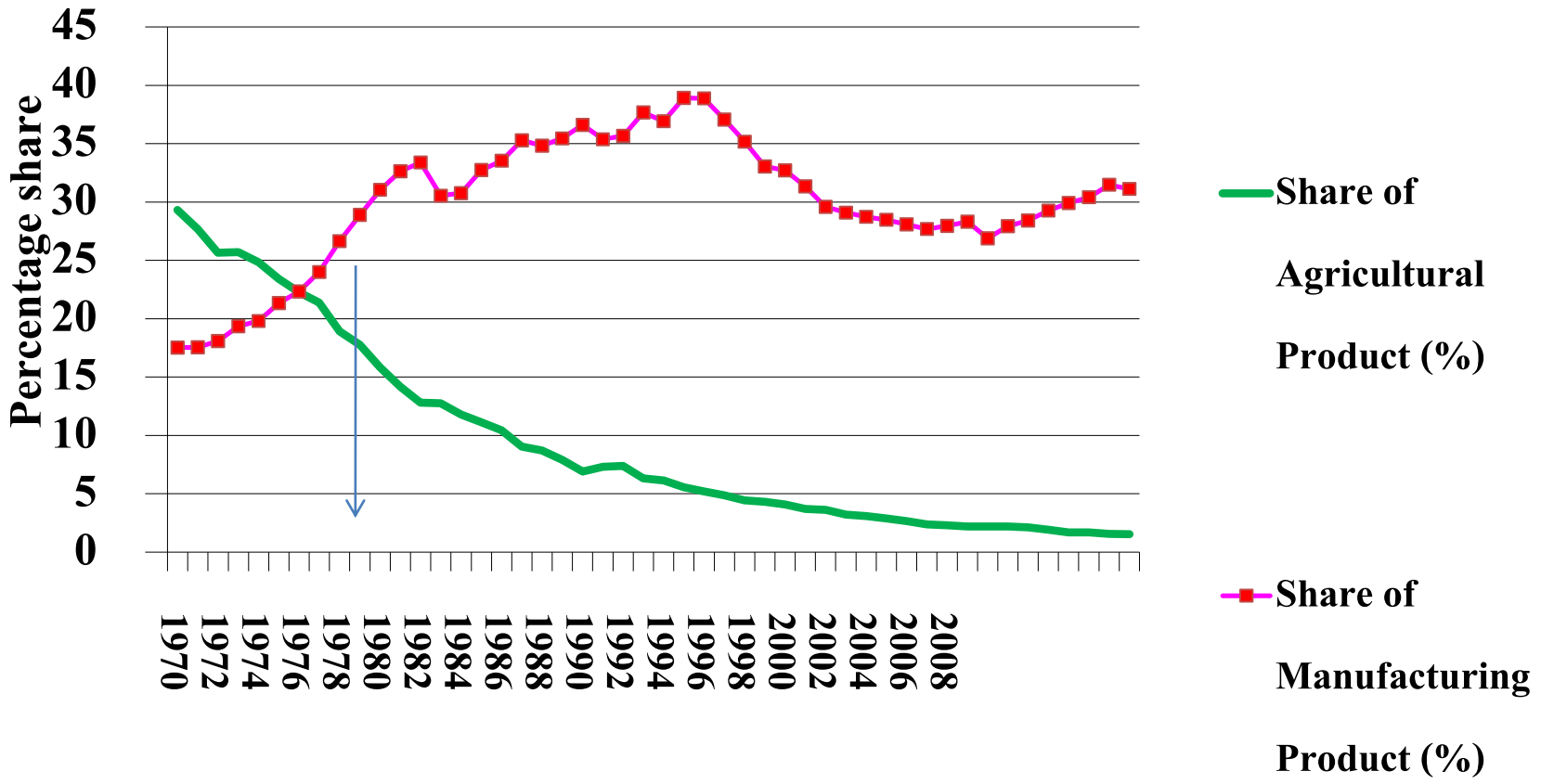


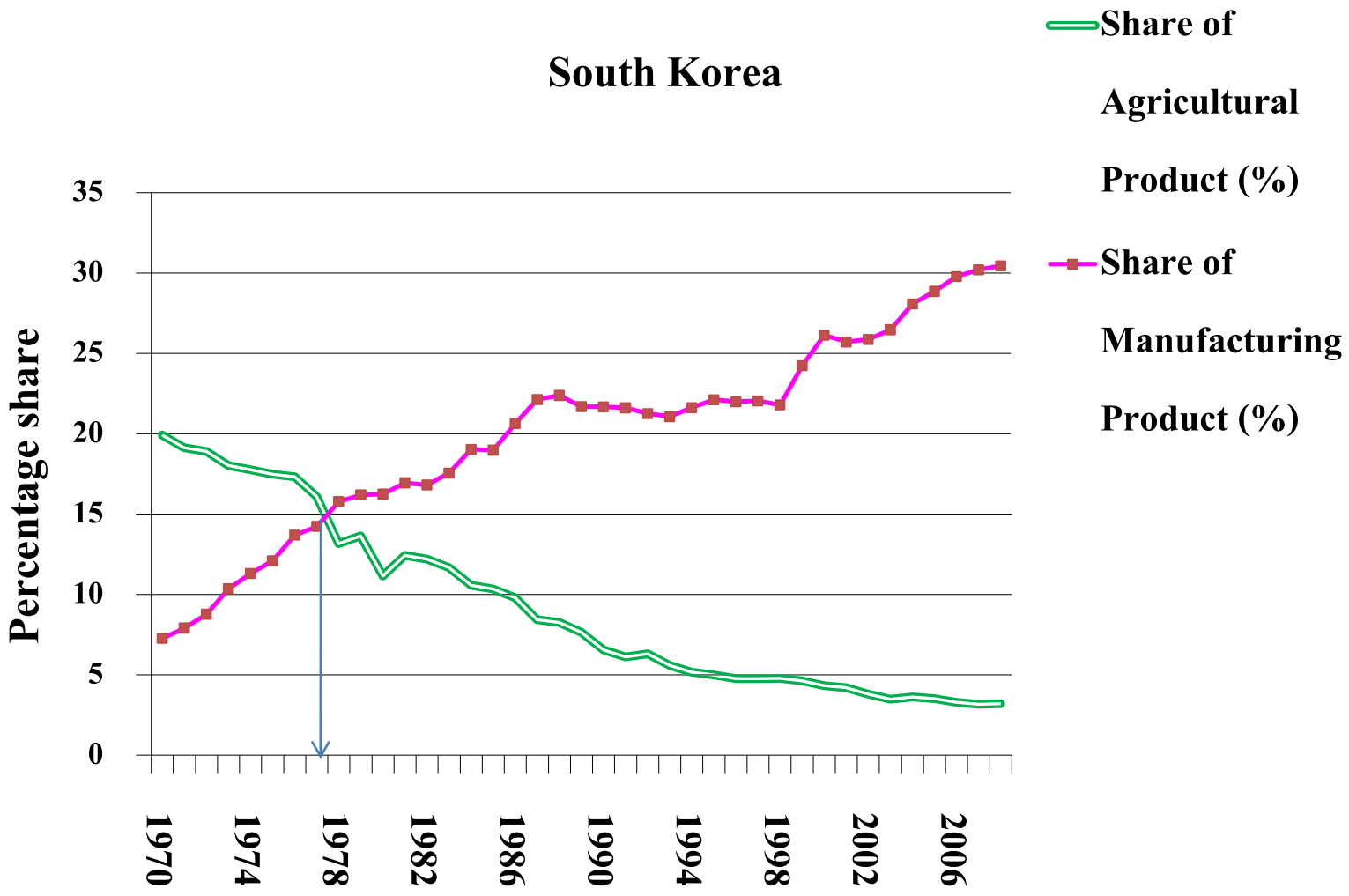

Source: Bank of Thailand, Quaterly Report

# Output structure

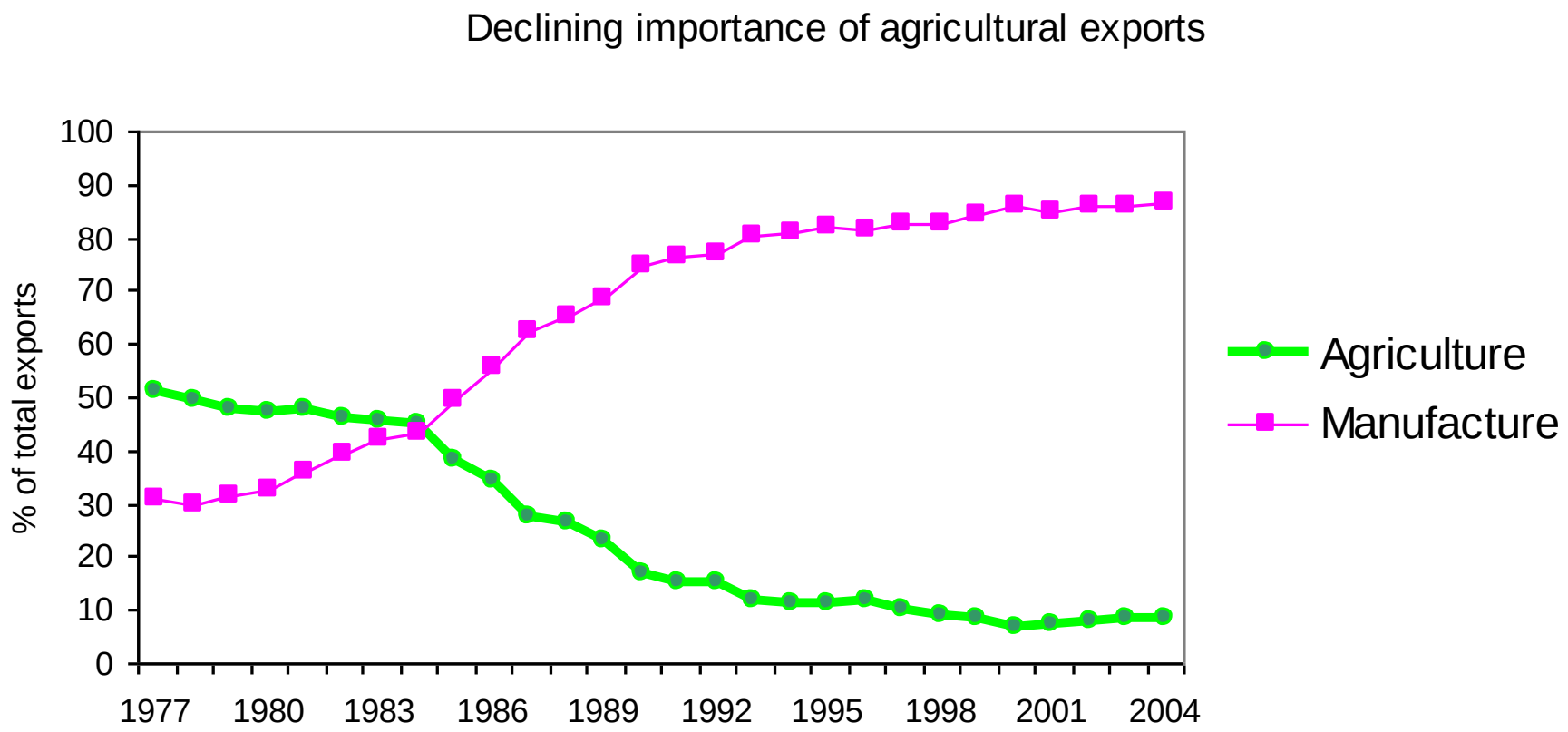


# Taiwan

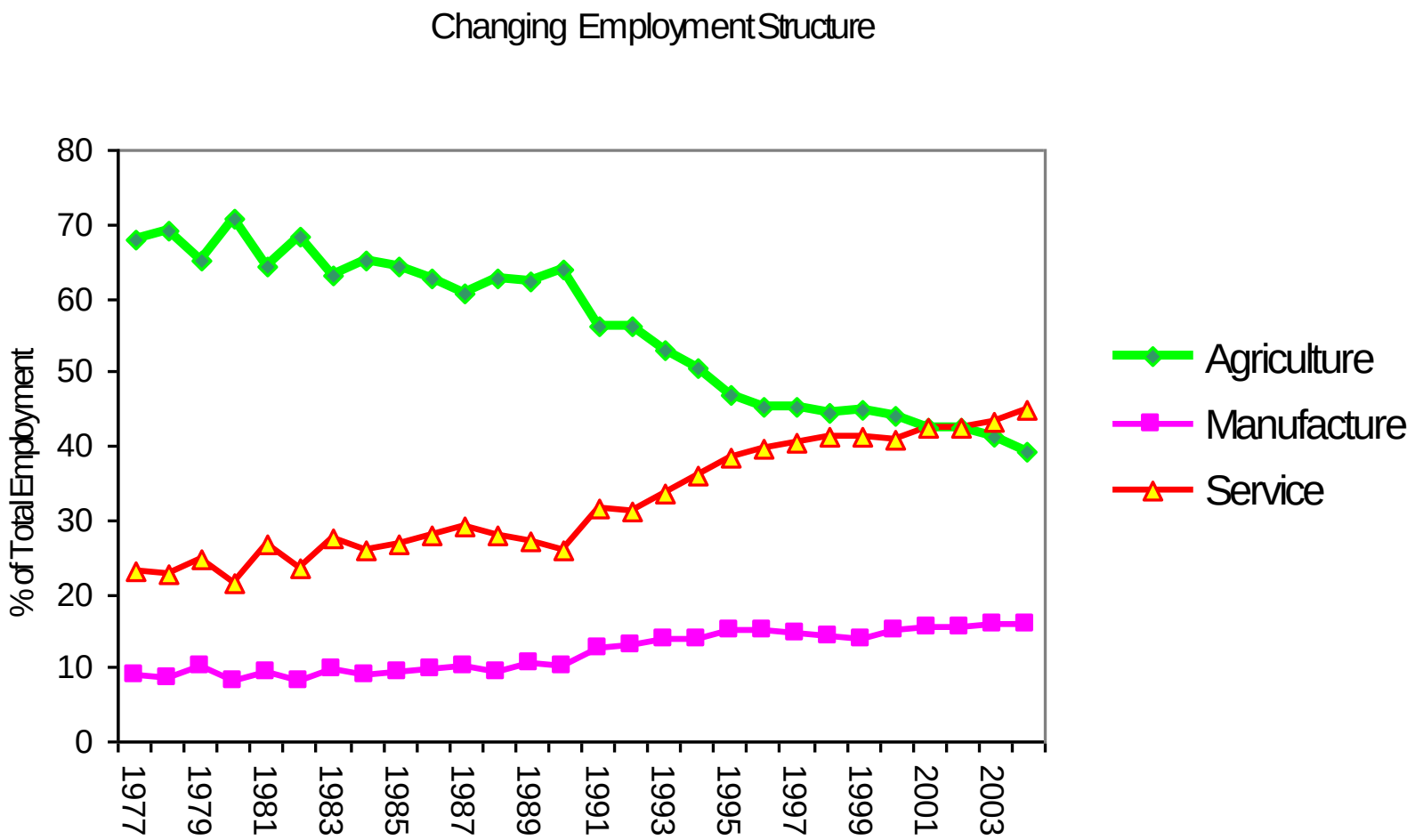

Percentage share
45
40
35
30
25
20
15
10
5
0
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Share of Agricultural Product (%)
Share of Manufacturing Product (%)


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 (%)

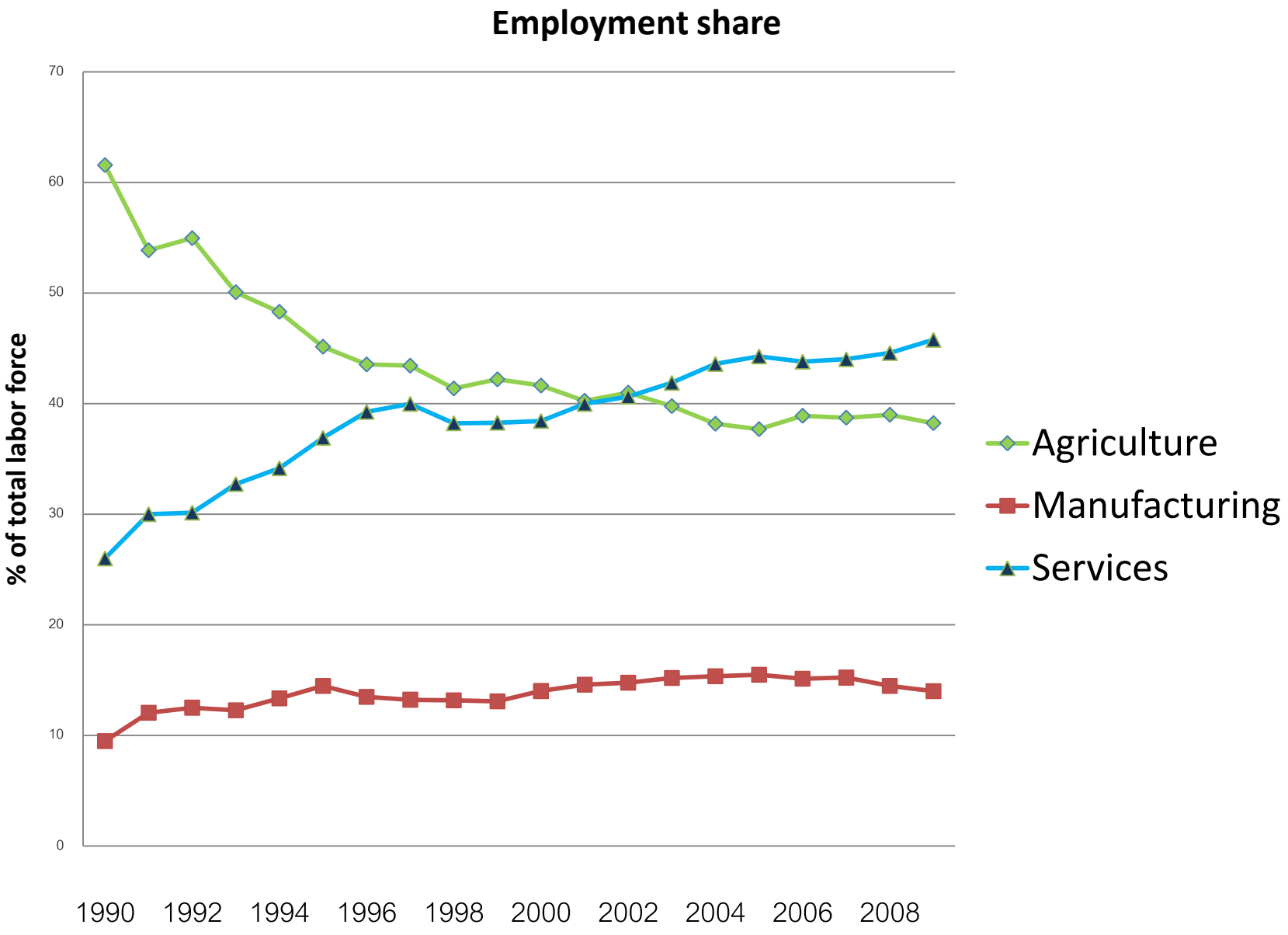
# Structure of Thai exports




Source: Bank of Thailand




Source: Bank of Thailand


Employment share
% of total labor force
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Agriculture
Manufacturing
Services

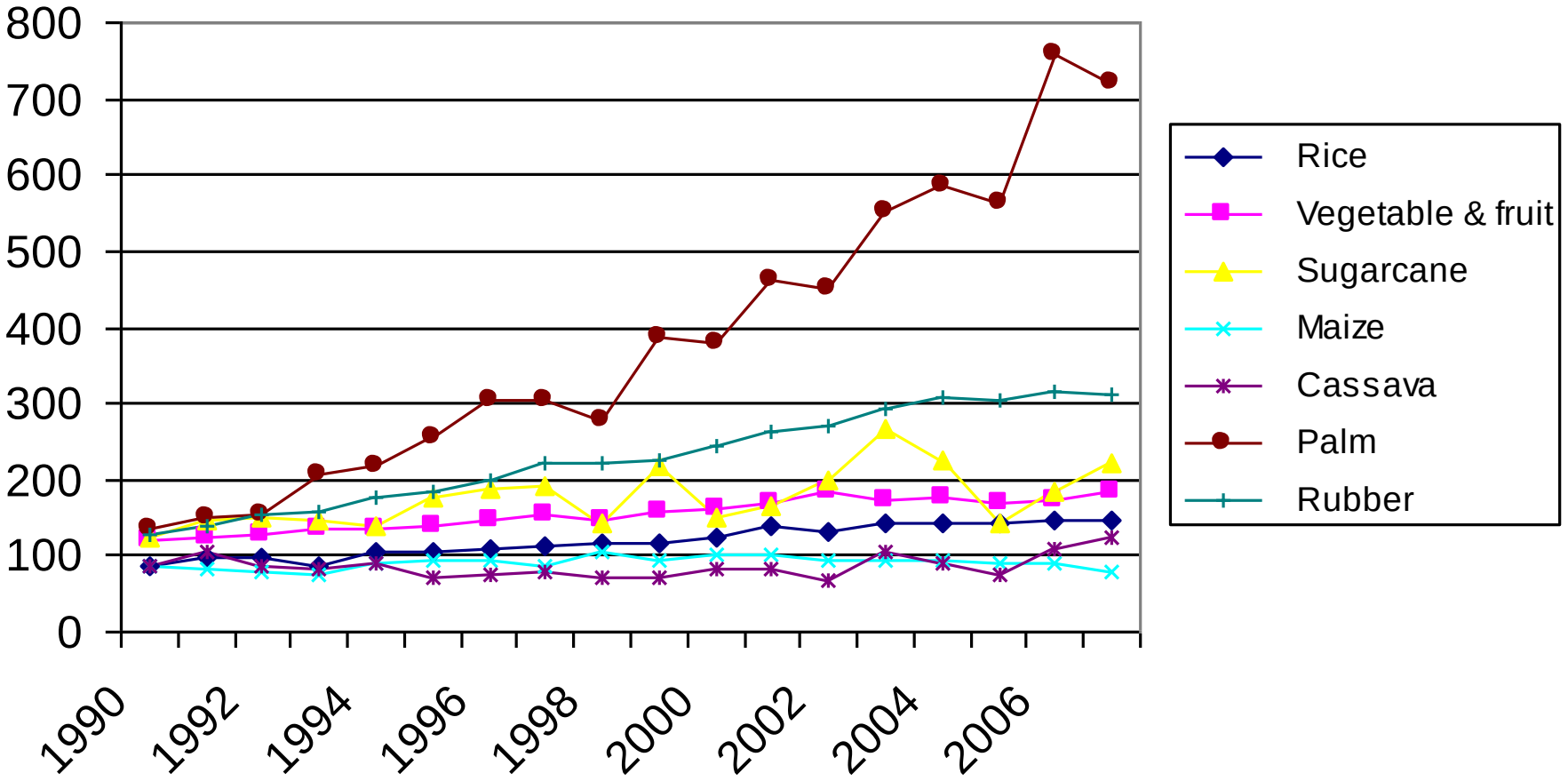
# A dismal view

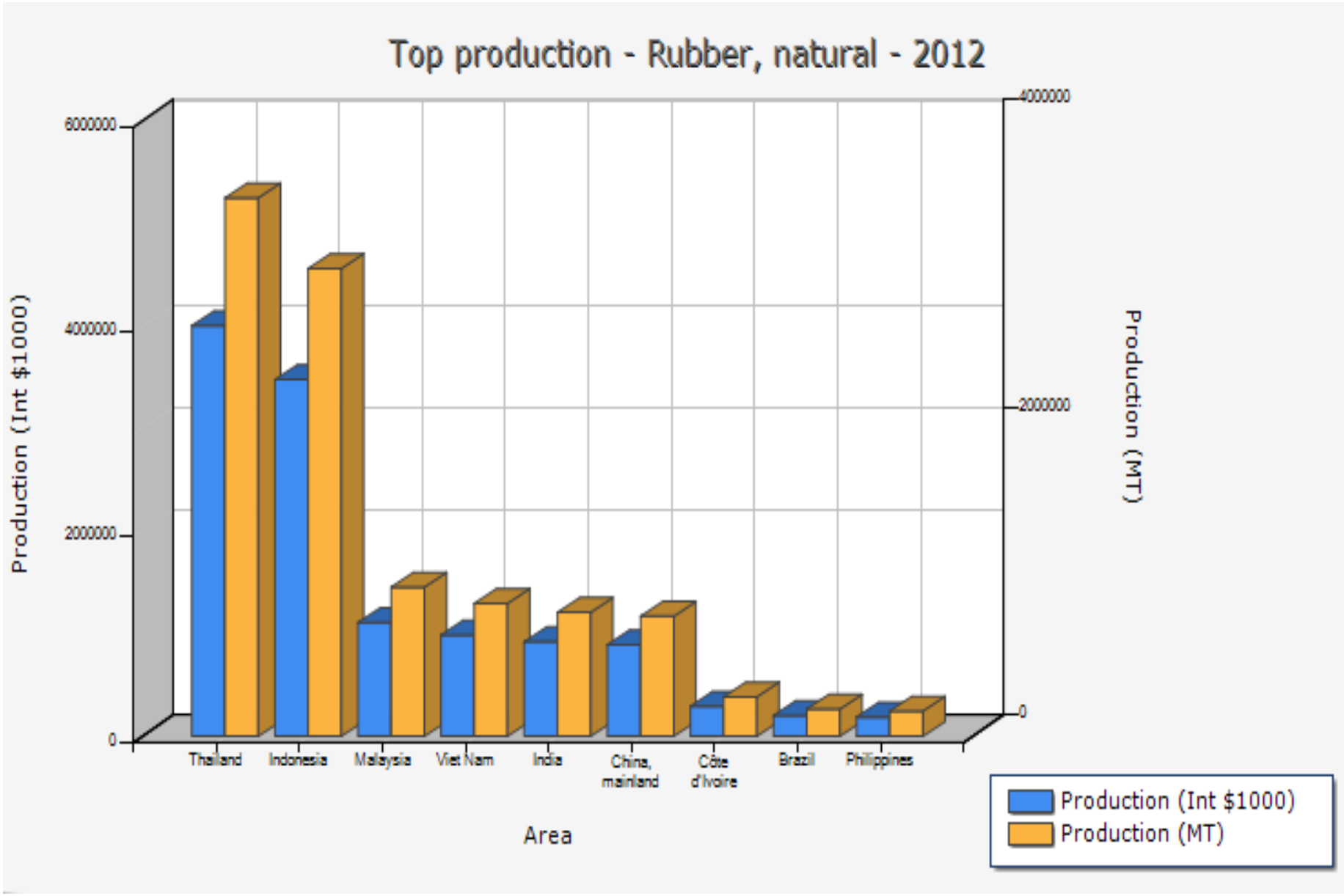
- **“Thailand would lose comparative advantage in agriculture as manufacturing has increasingly become more important than agriculture”.**
- **“Due to the shortage of labor and water during the dry season, with the disappearance of land in the 1980s, the future of Thai agriculture would look bleak”.**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

# Blame the Dutch disease

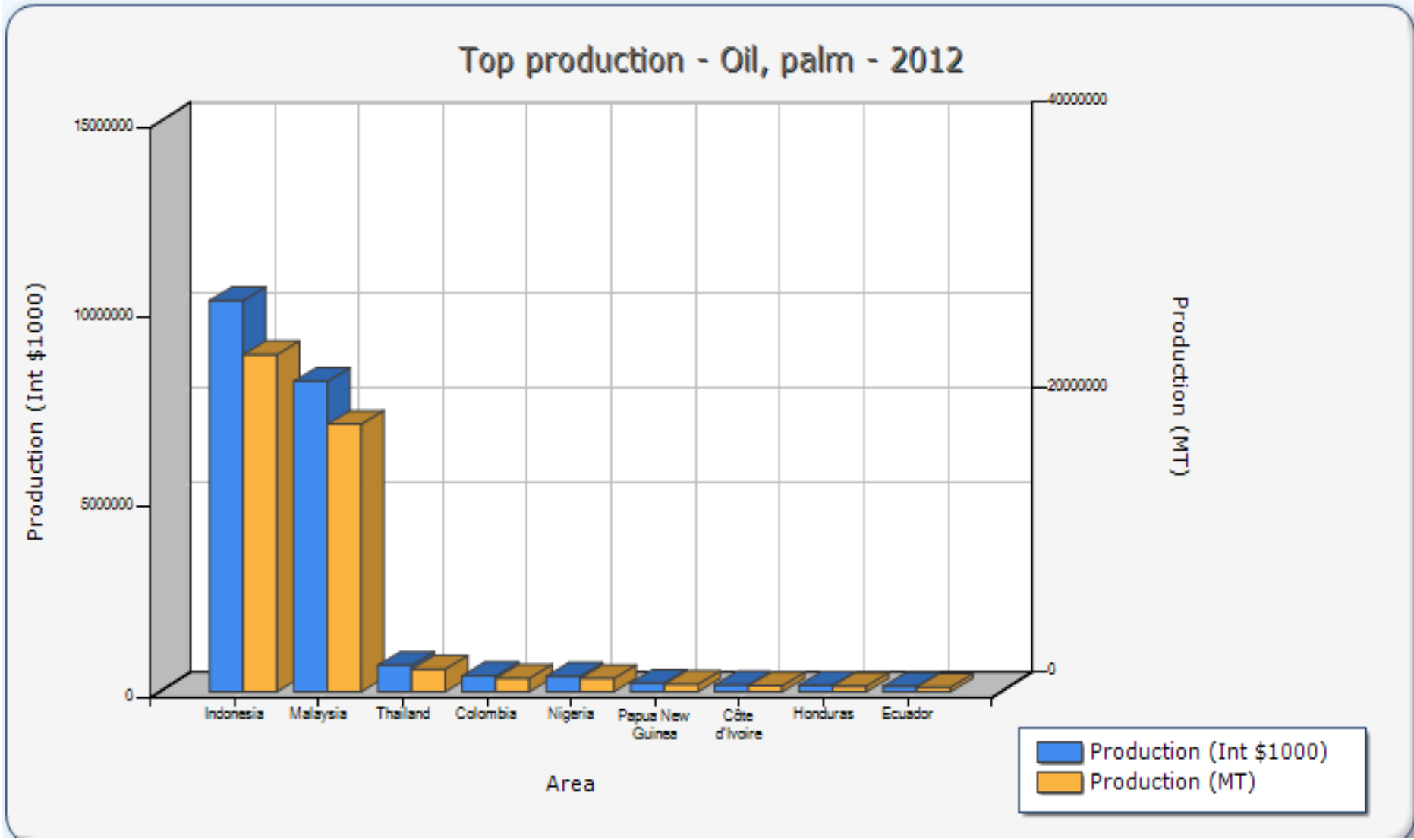
- The boom in the non-agricultural sector led to higher wage rates in urban areas.
- As a result of migration, the lack of labor ***intensified farm mechanization***, which in turn diminished employment opportunities in agriculture.
- Wage pressure and declining agricultural prices squeezed farm profits,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

# Index of Crop Production
## (1988=100)



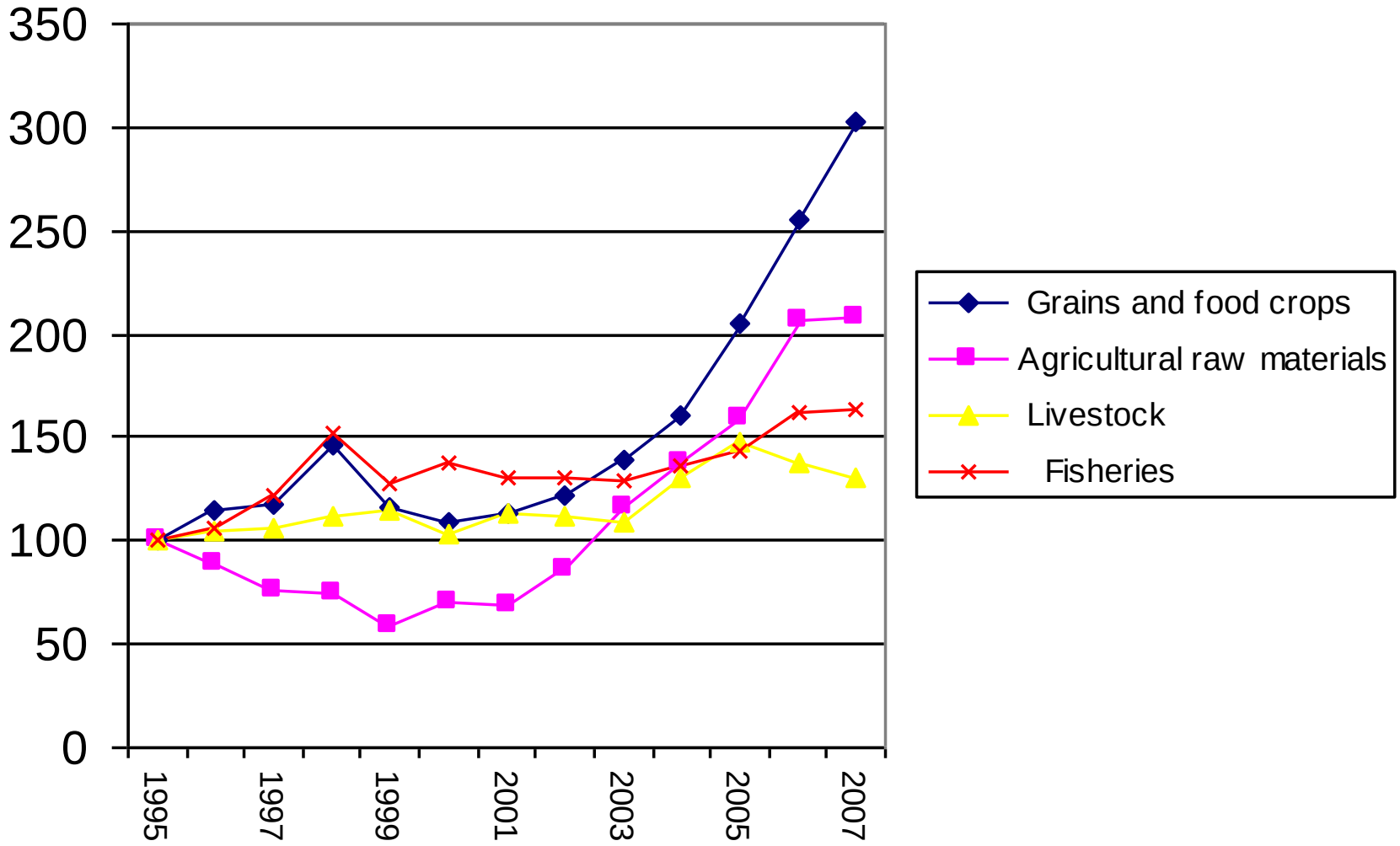



Source: FAOSTAT

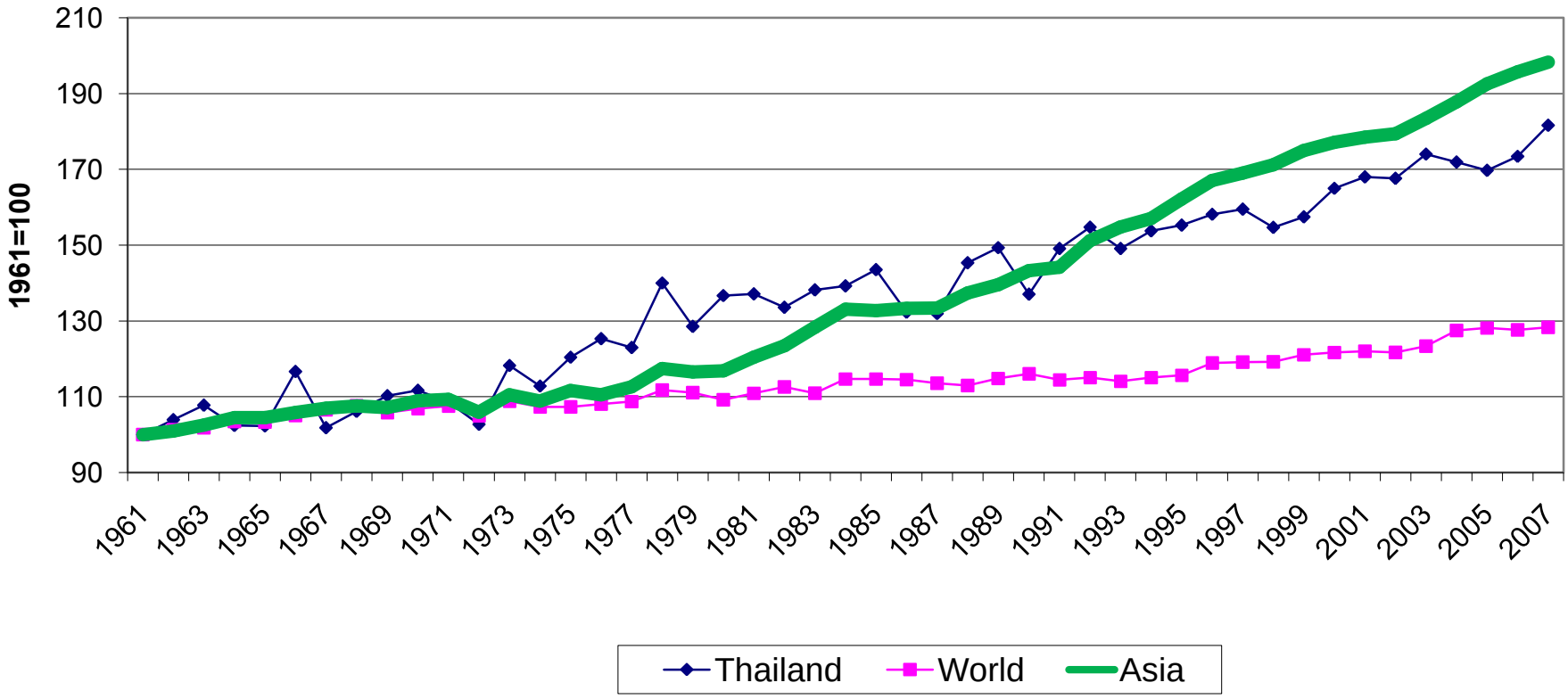



Source: FAOSTAT

# Farm Price Index

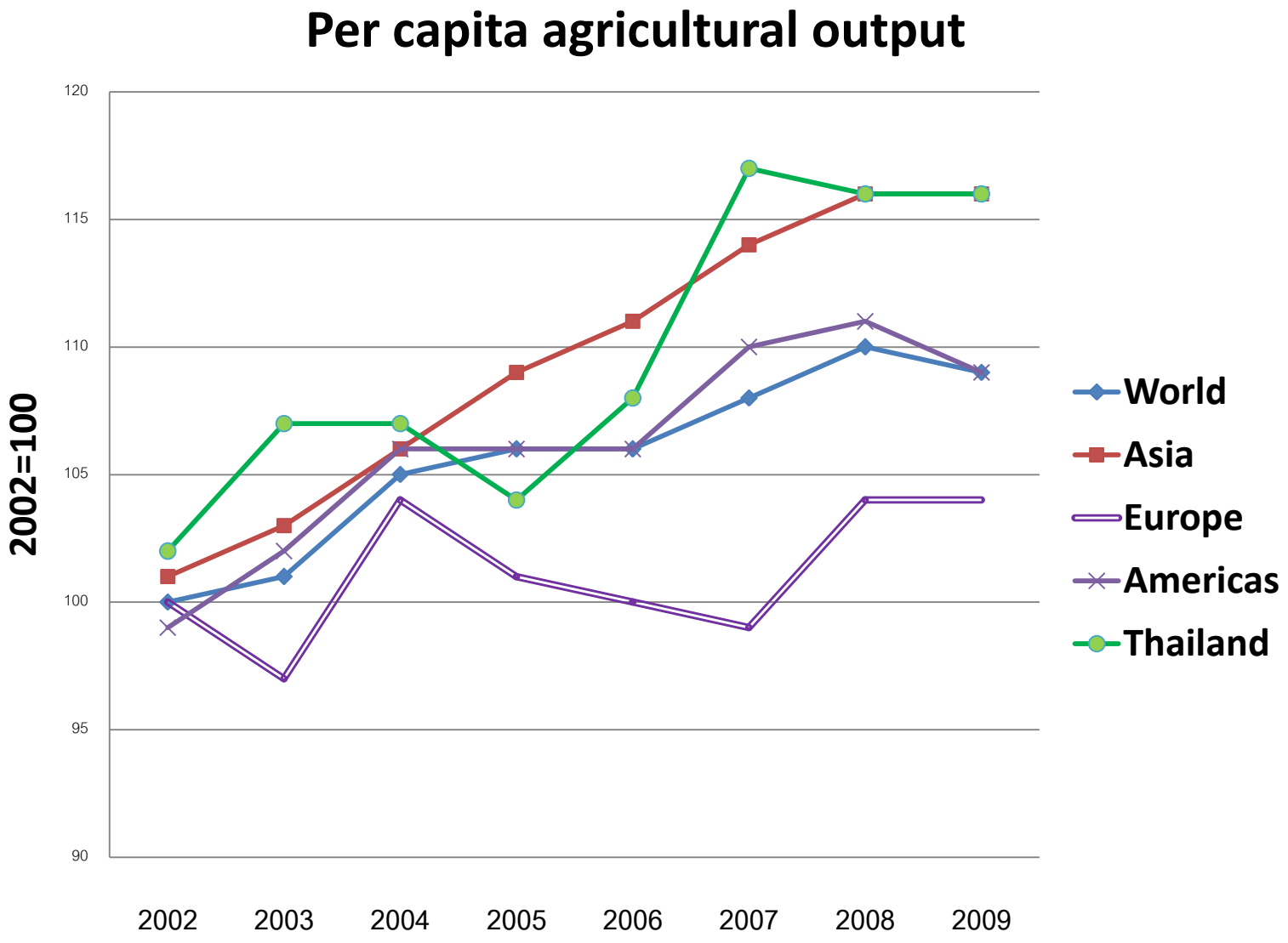


## Agricultural Production per Capita Index



# 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
2002=100
120
115
110
105
100
95
90
2002
2003
2004
2005
2006
2007
2008
2009
World
Asia
Europe
Americas
Thailand

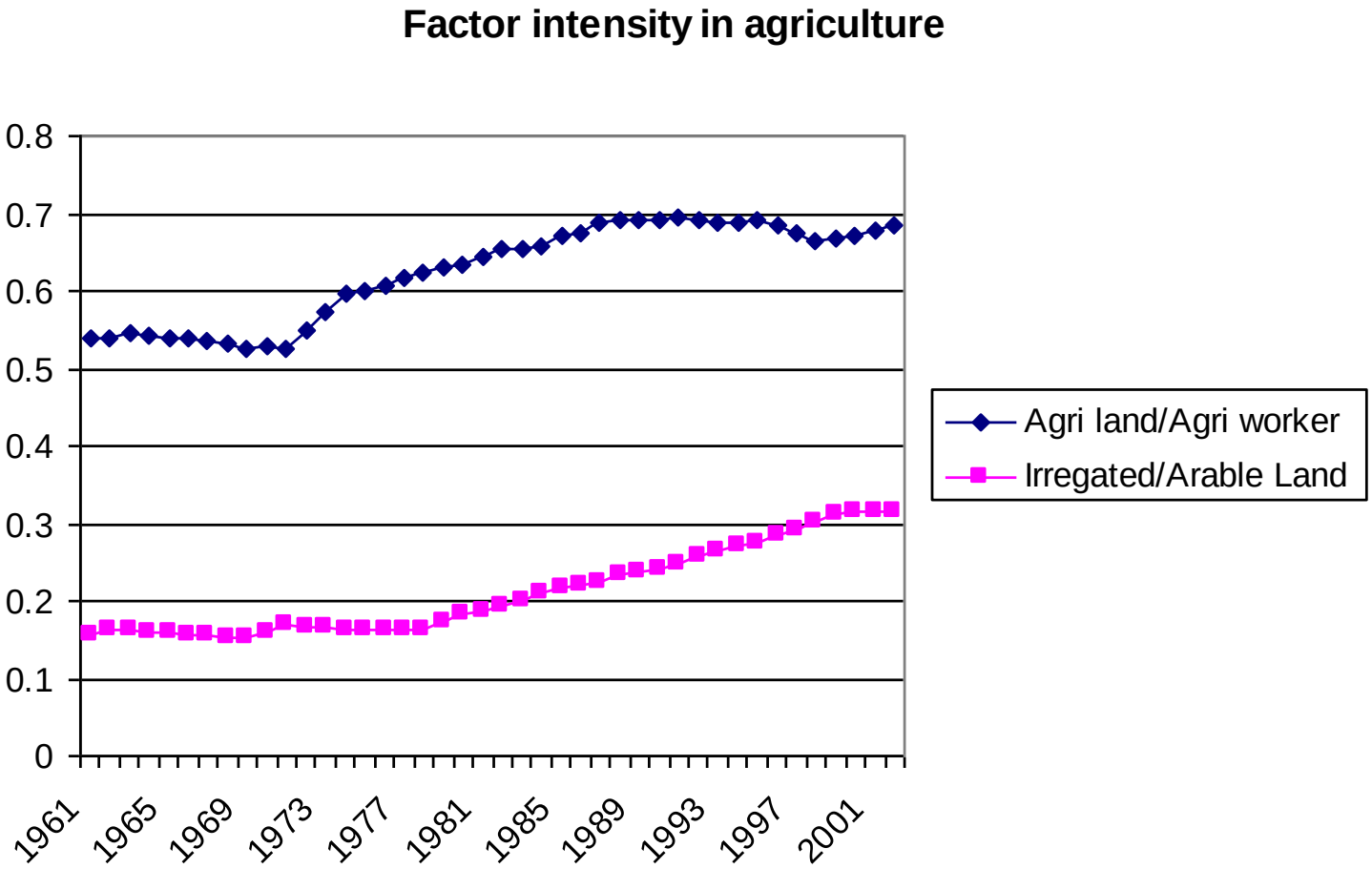
# Yields of major crops

- 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 in1960s.

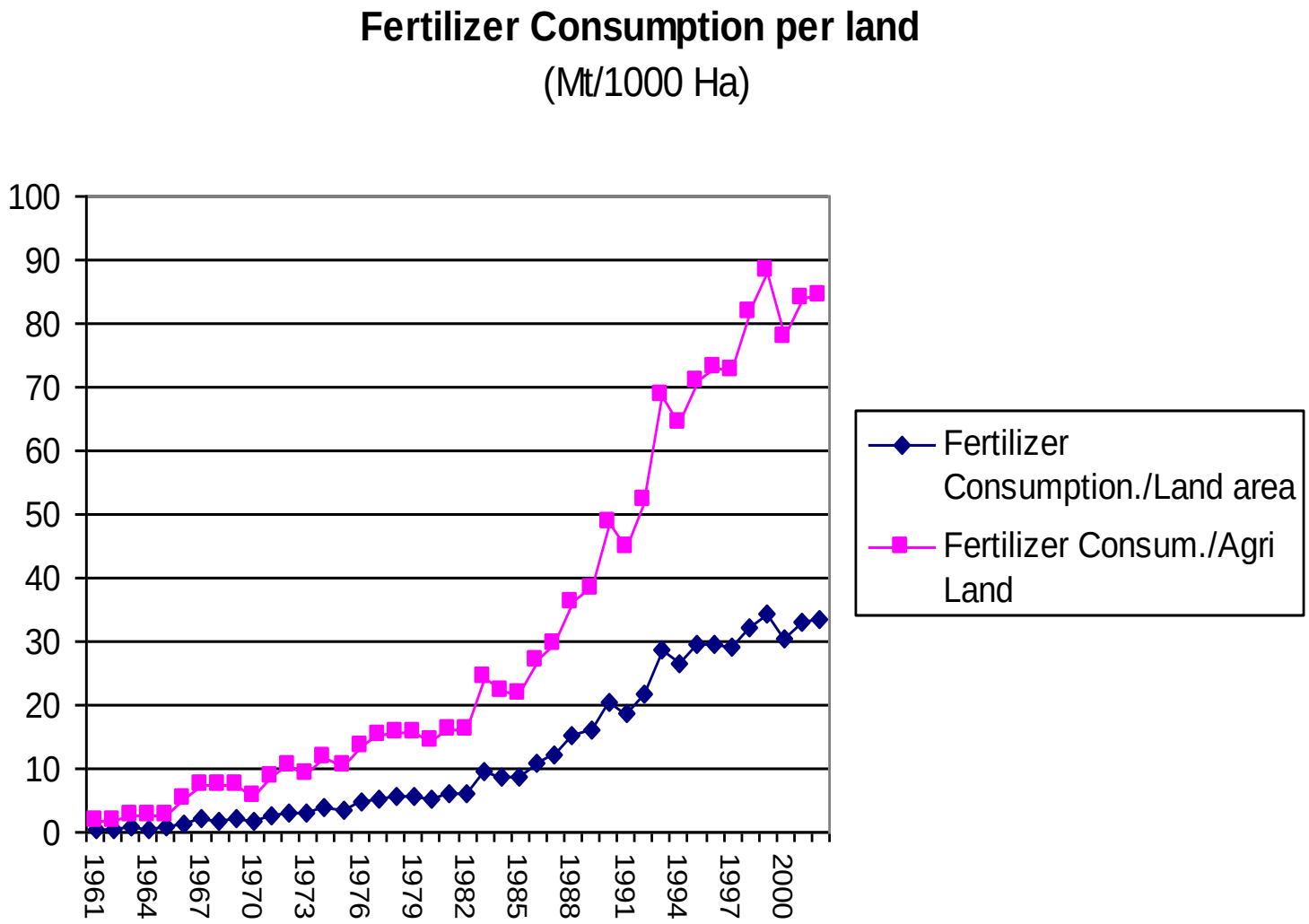
# Why did farm productivity increase in rice?

- 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



# 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 (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.**

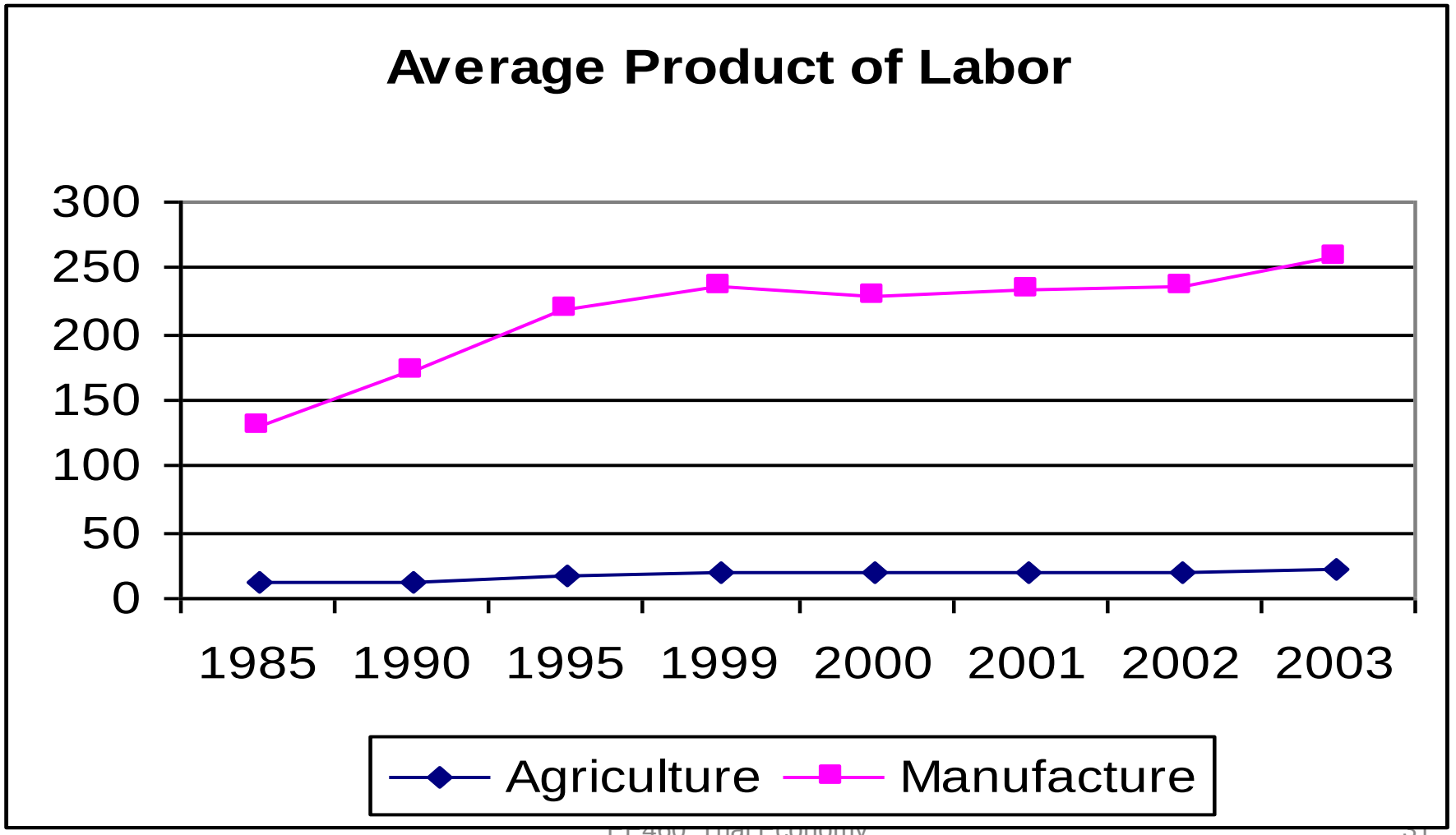
In general for both LDCs and developed countries

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

But in the case of Thailand

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

# Average product=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*.

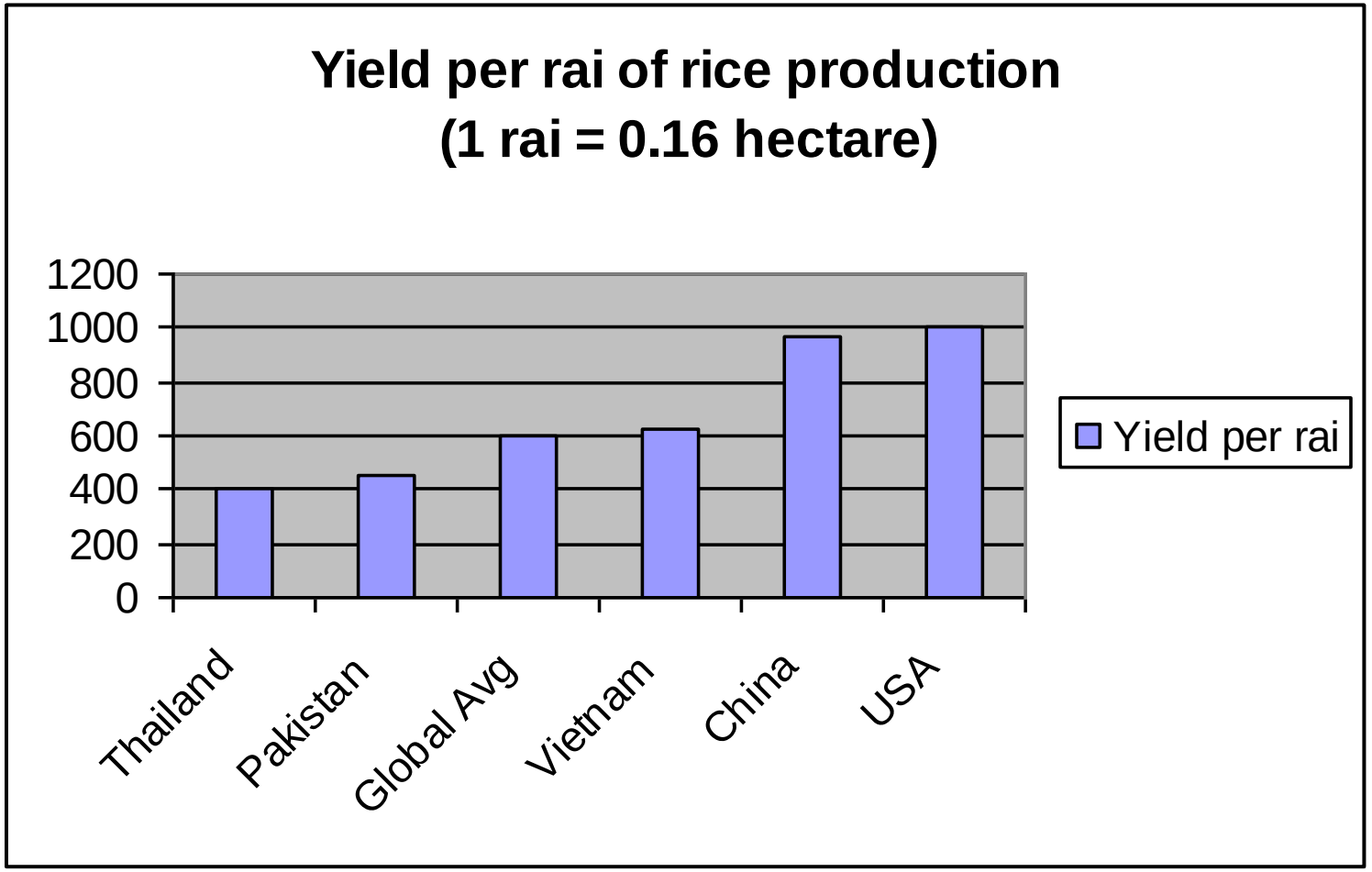
# In the case of Thailand

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

# 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.

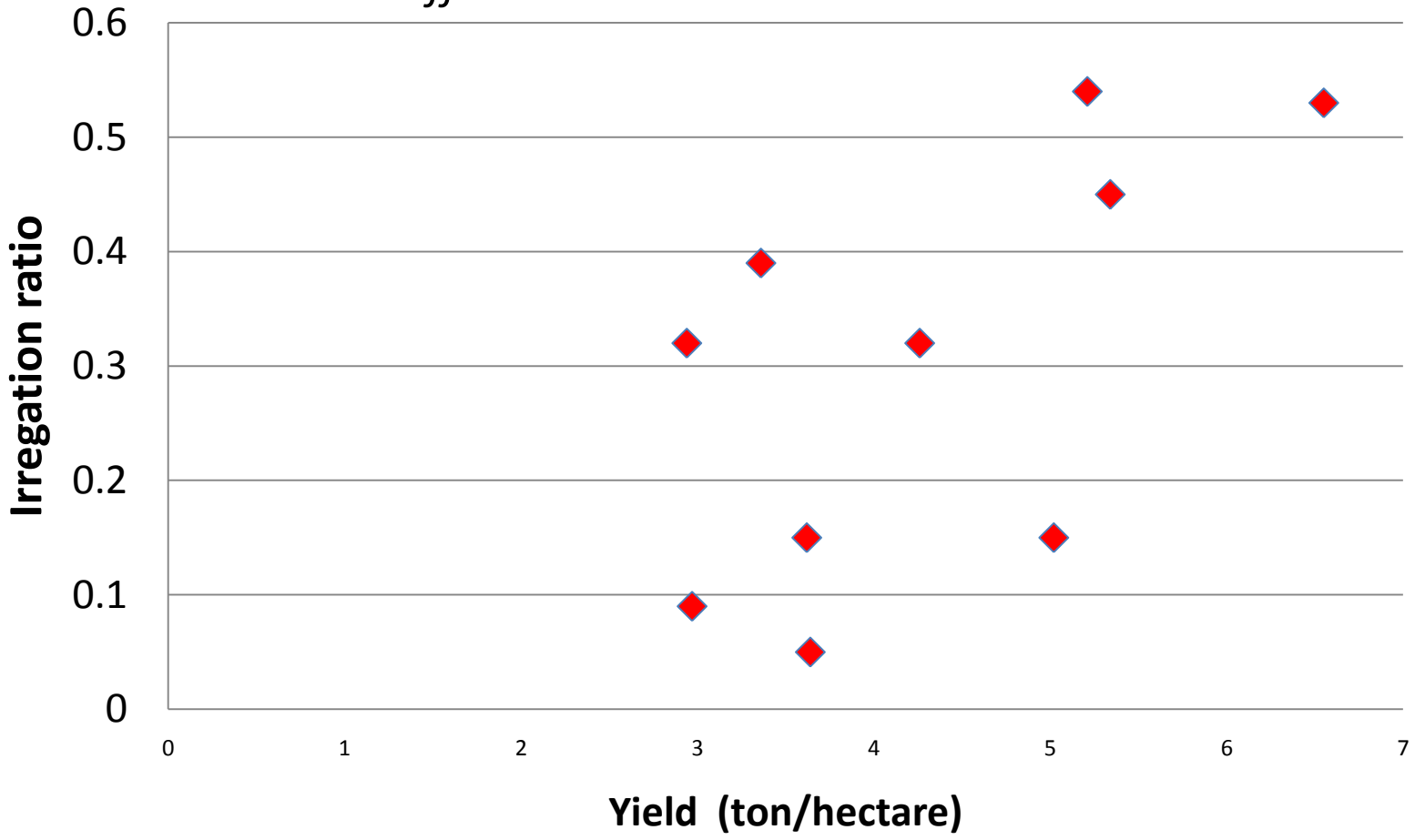
*Explain why Thailand has the lowest yield in rice production but managed to be number one rice exporter in the world.*



| | 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

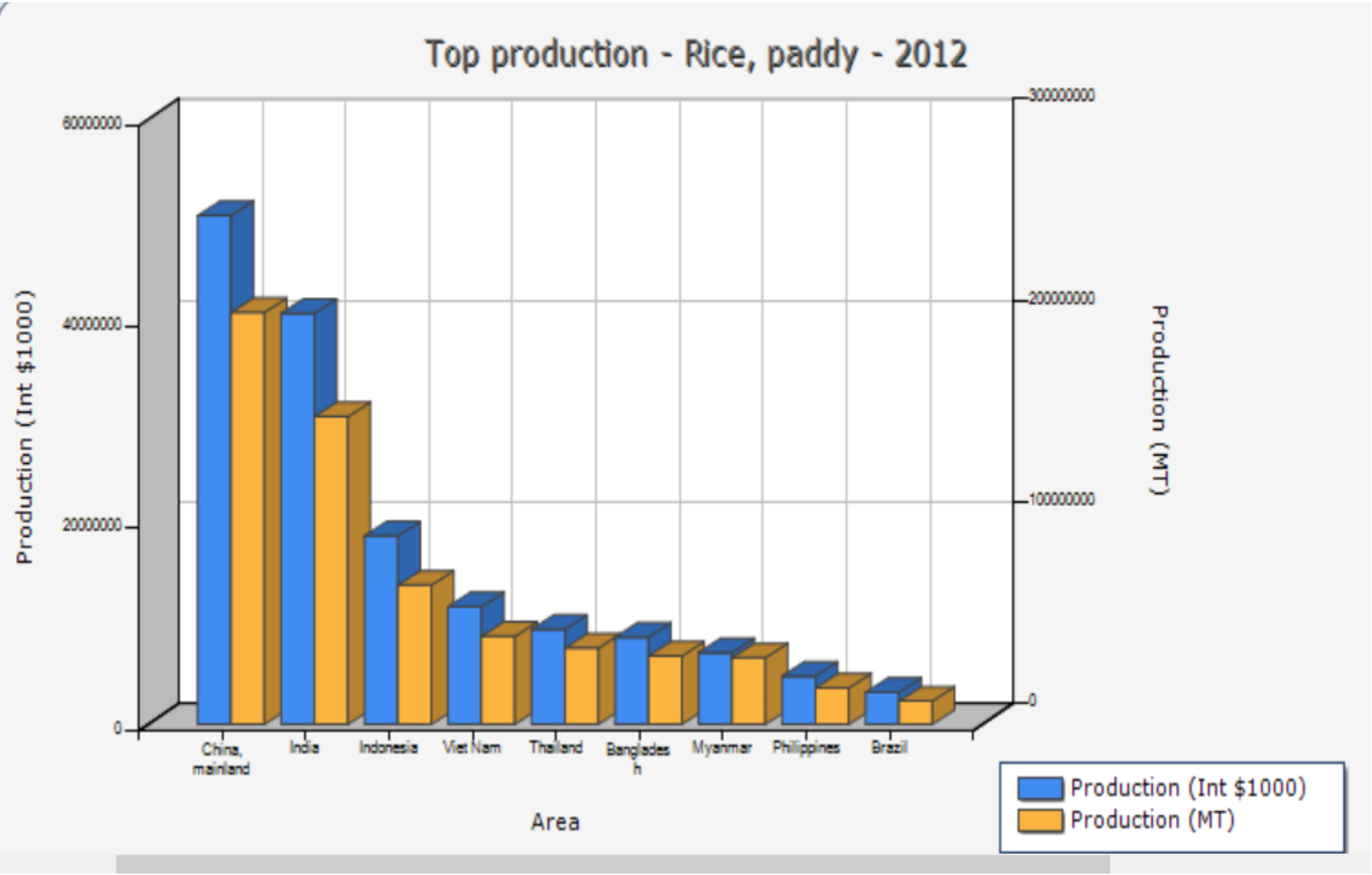
*correlation coefficient = 0.63*

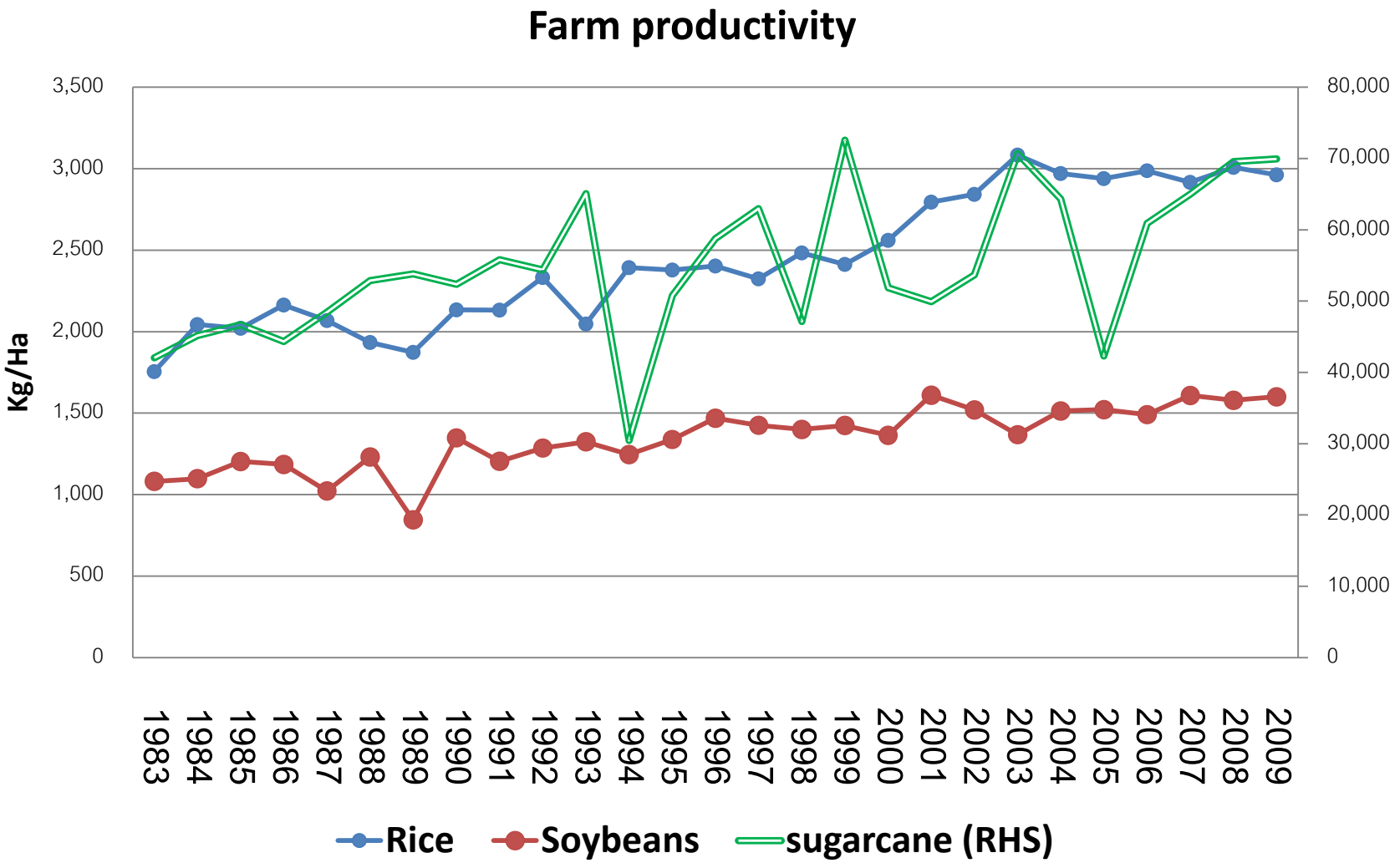


# Super rice

- 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.

# Source: FAOSTAT




Farm productivity
Kg/Ha
3,500
3,000
2,500
2,000
1,500
1,000
500
0
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Rice
Soybeans
sugarcane (RHS)

# What causes farm income volatility