

Structural Changes in Thailand's Agricultural sector

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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 exports contracted by 1.9% and 0.2 % respectively.
- What did go wrong in Thailand?
- In 2014, GDP grew only 0.6 %.

Main themes

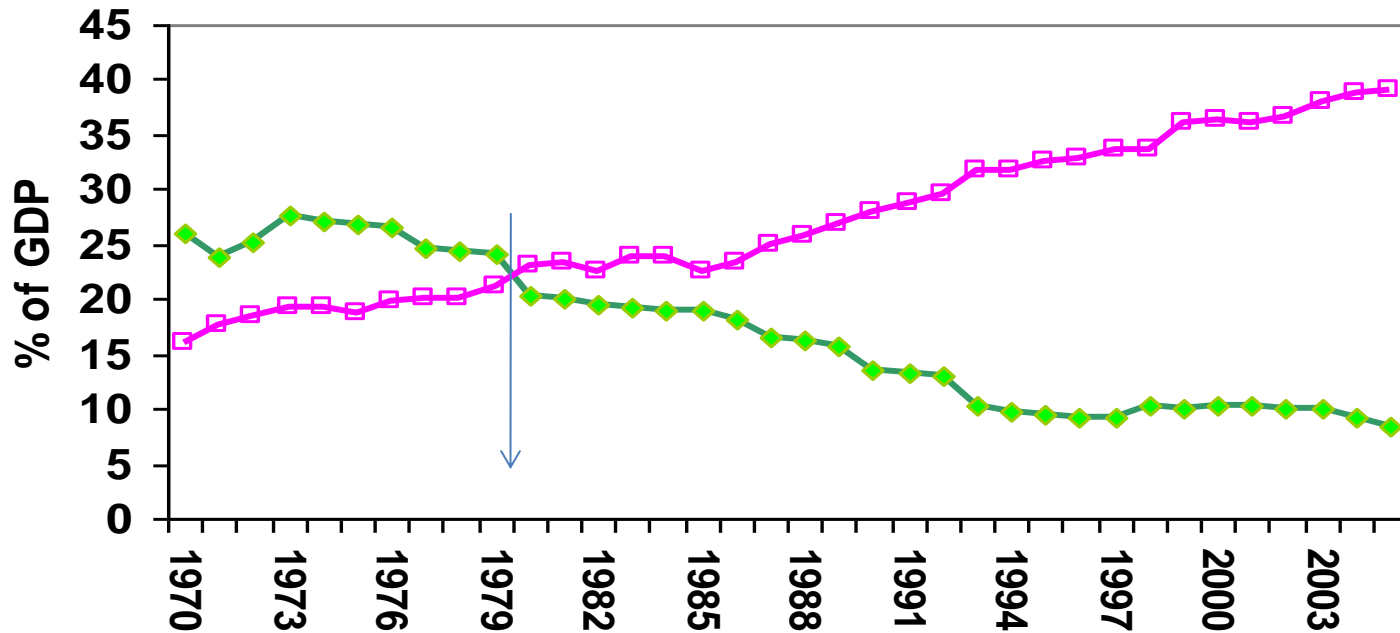
- Changing structure: output, employment, and exports
- A pessimistic view
- Agricultural productivity
- Long-term declining price trends and volatility

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

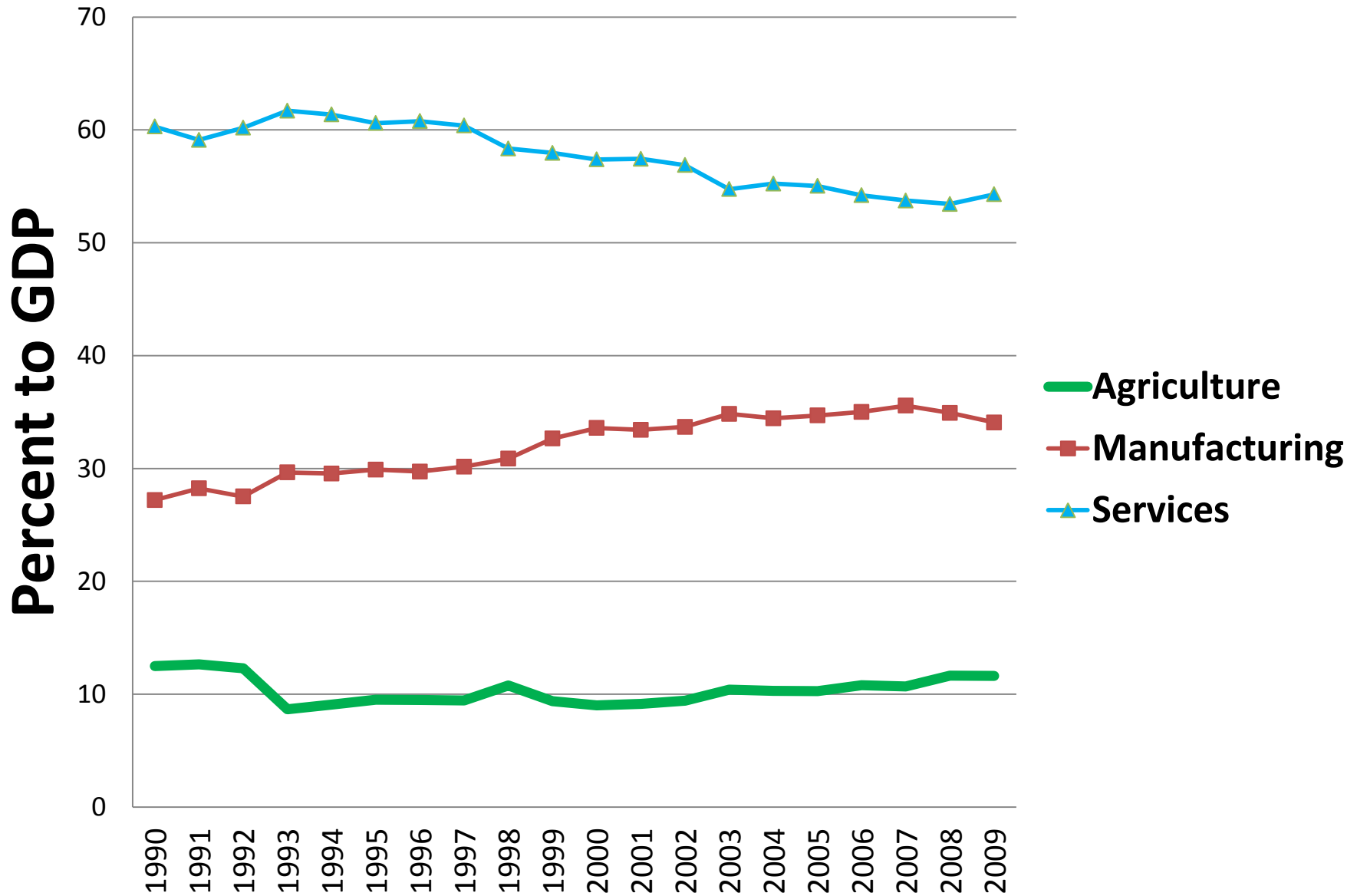
Changing Output Structure



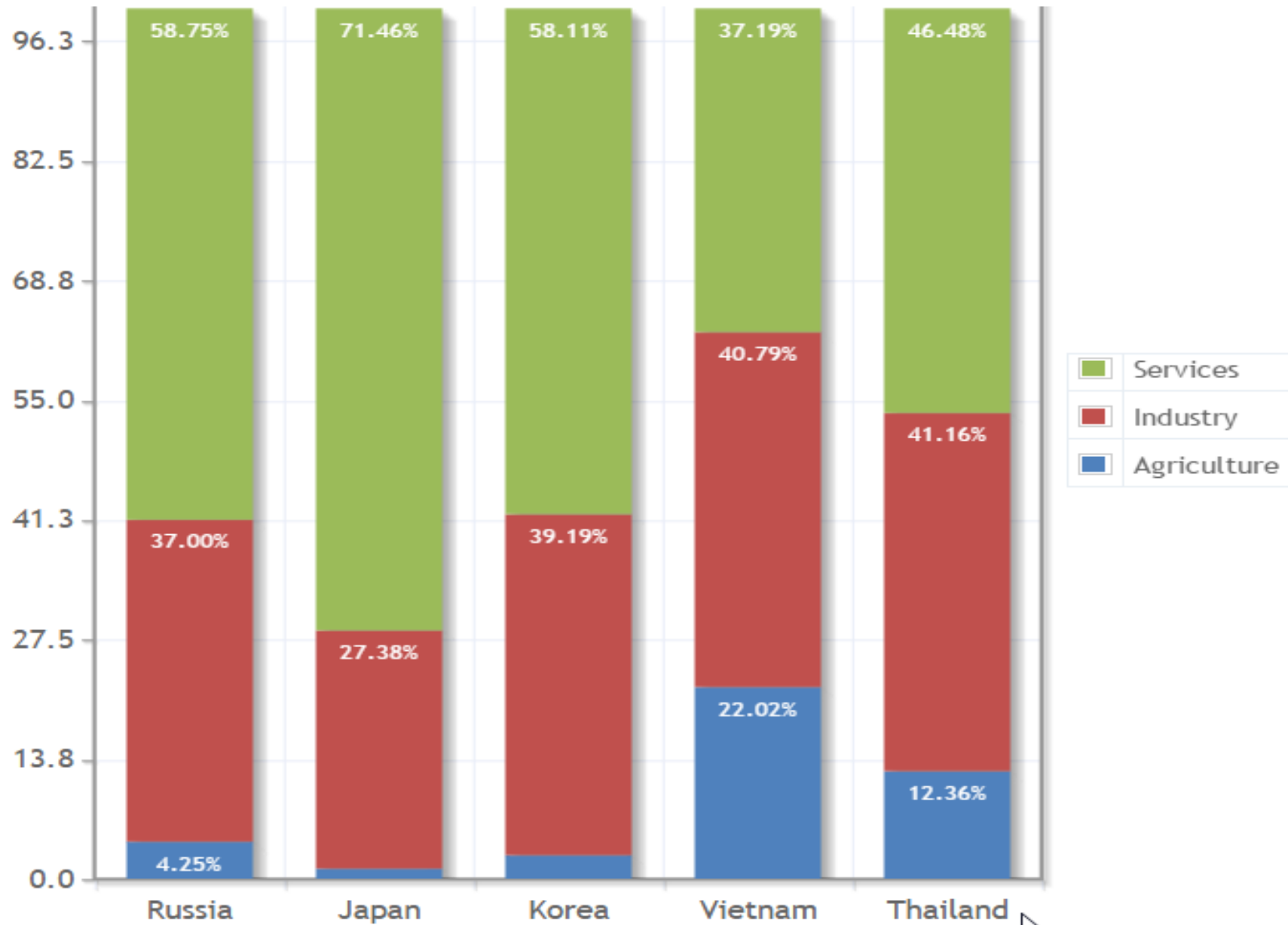
Source: Bank of Thailand, Quaterly Report

—◆— Agriculture —□— Manufacture

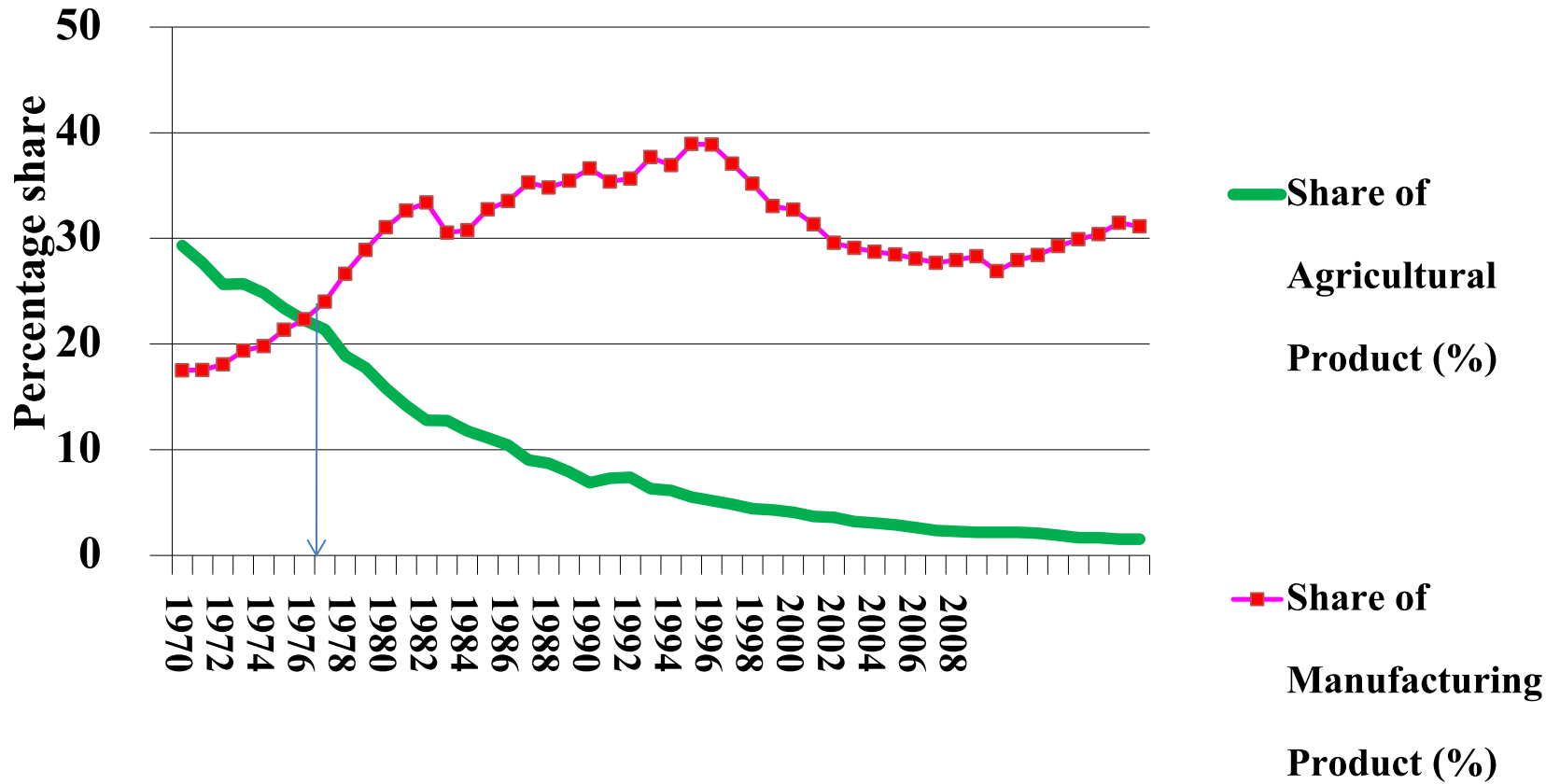
Output structure: 1990-2009



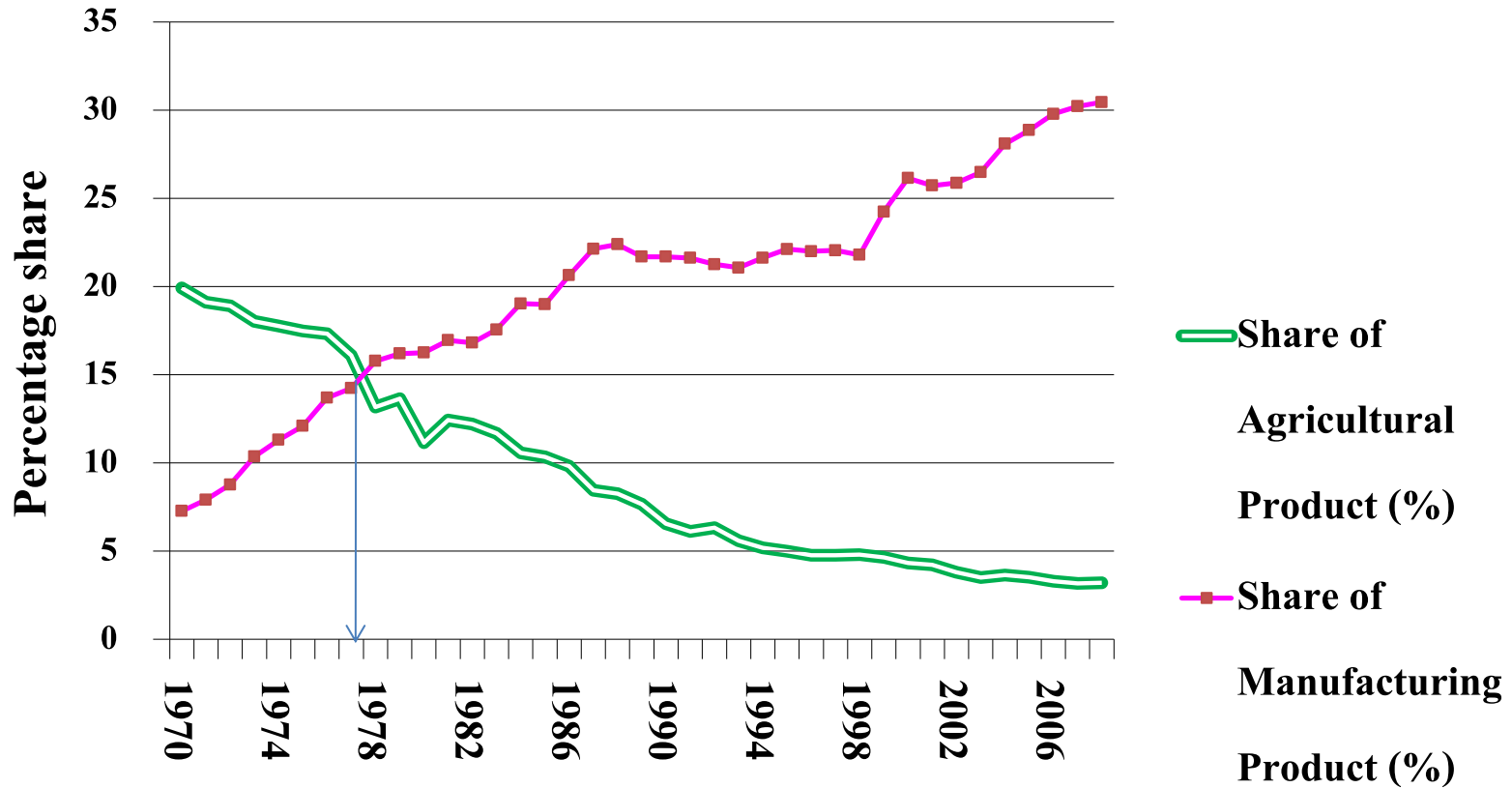
GDP Composition by Sector



Taiwan

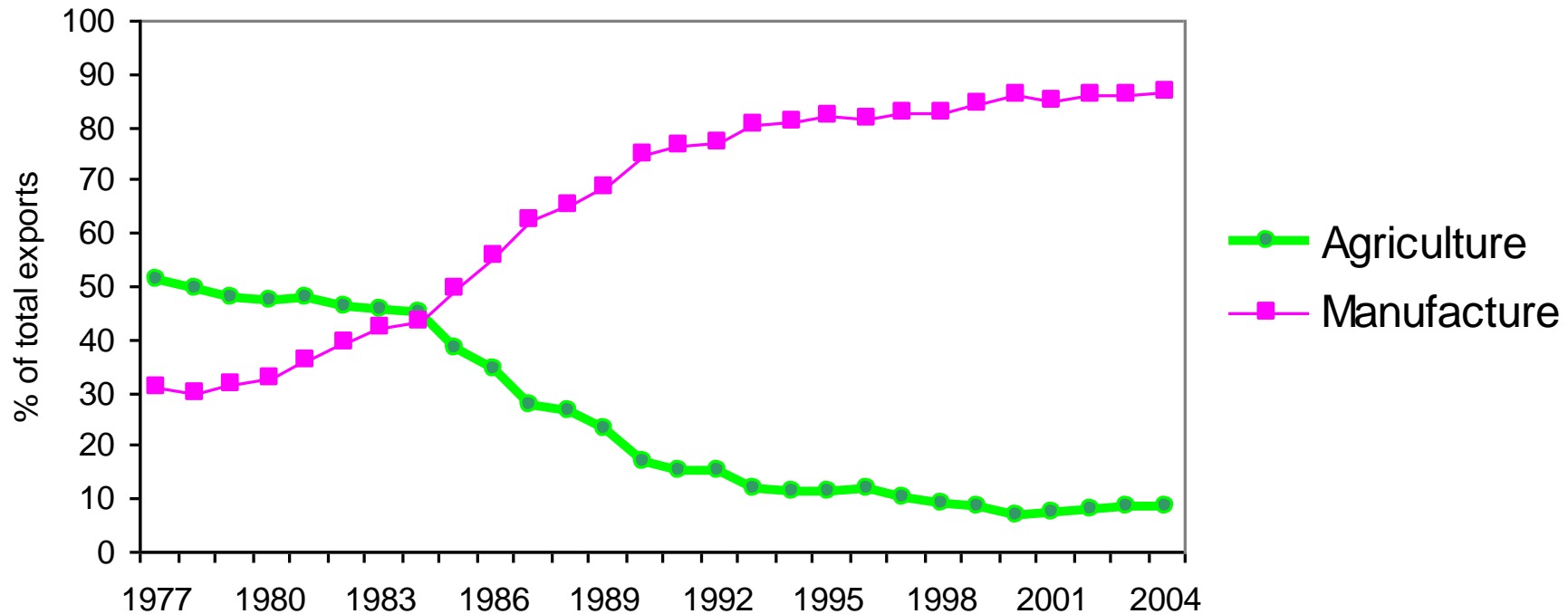


South Korea



2. Structure of Thai exports

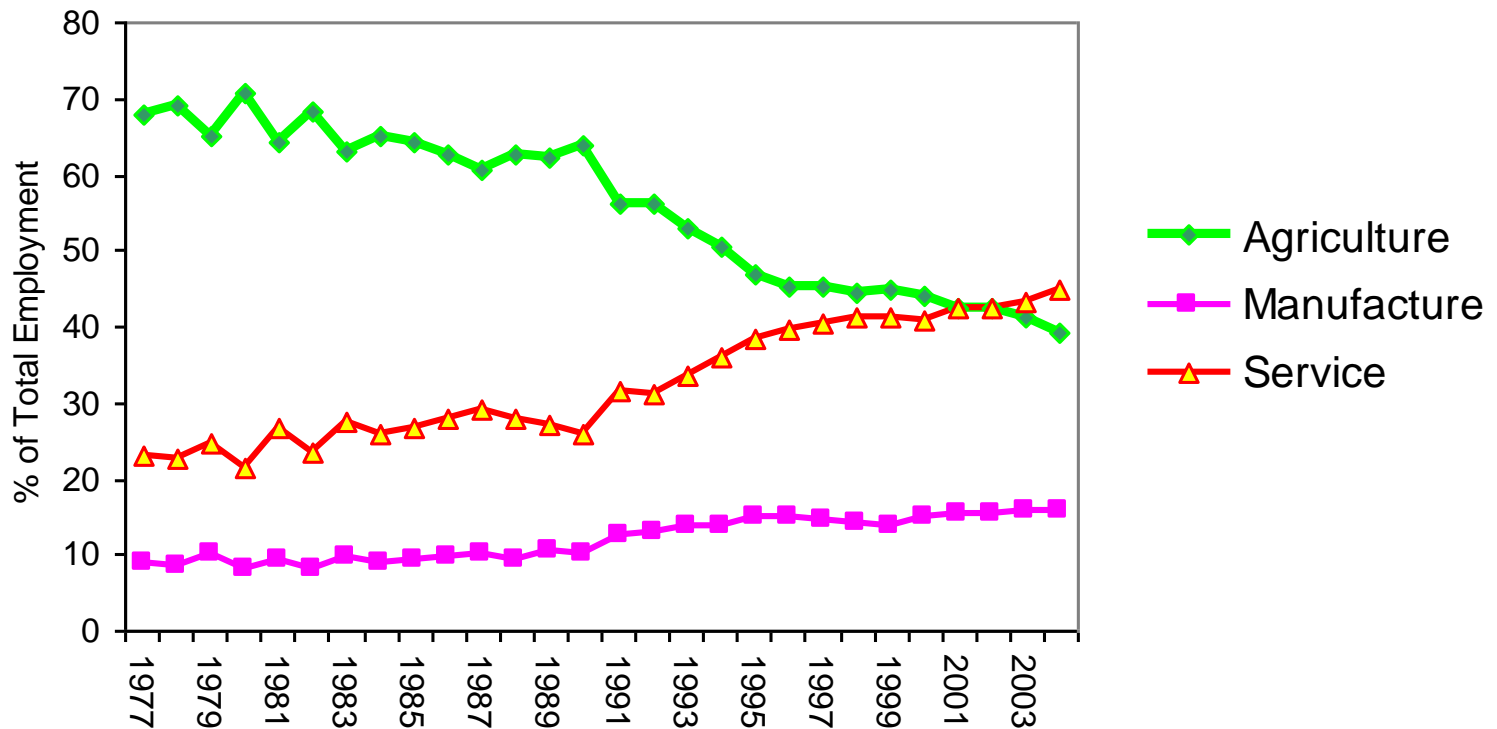
Declining importance of agricultural exports



Source: Bank of Thailand

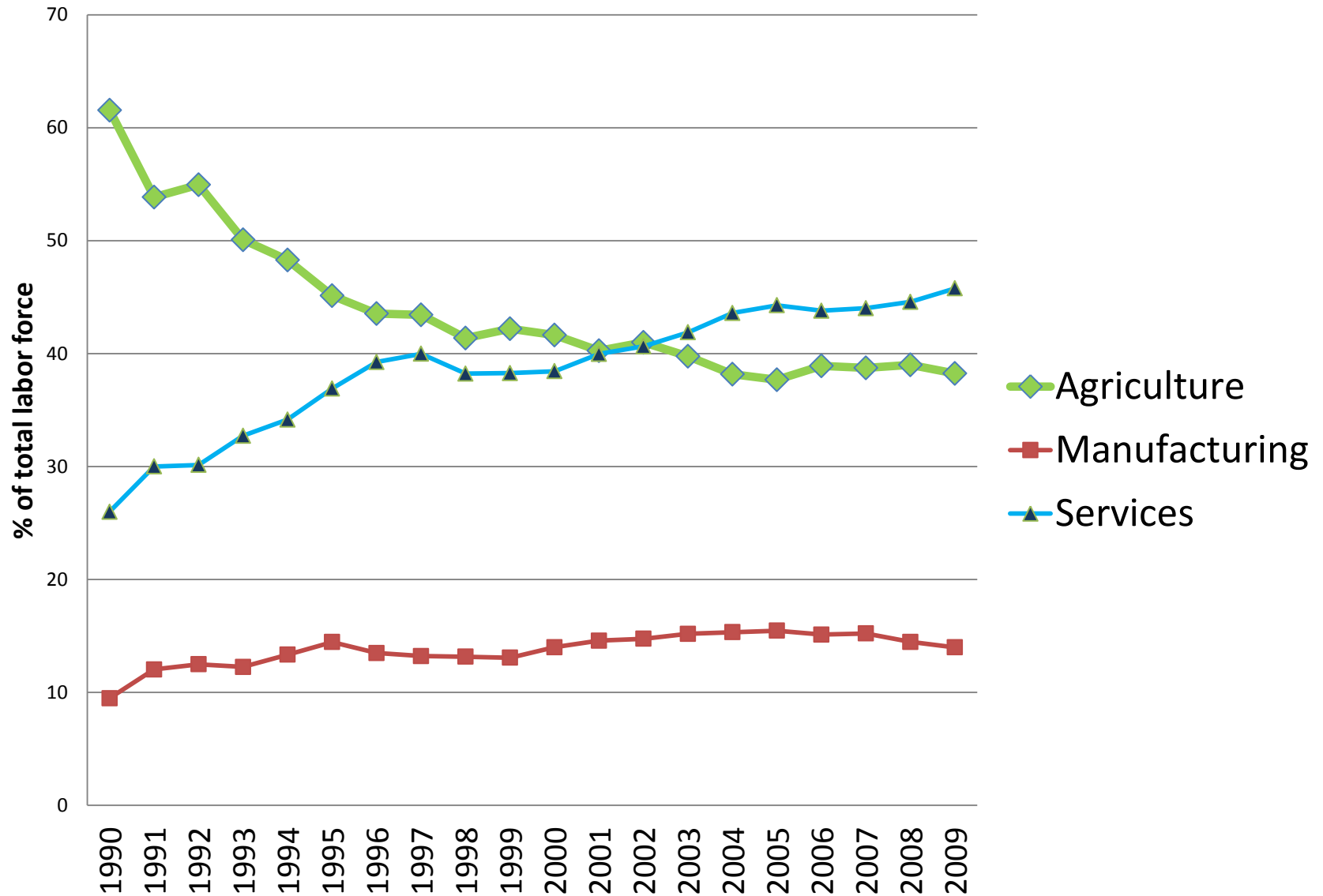
3. Employment Structure

Changing Employment Structure



Source: Bank of Thailand

Thailand's Employment structure: 1990-2009



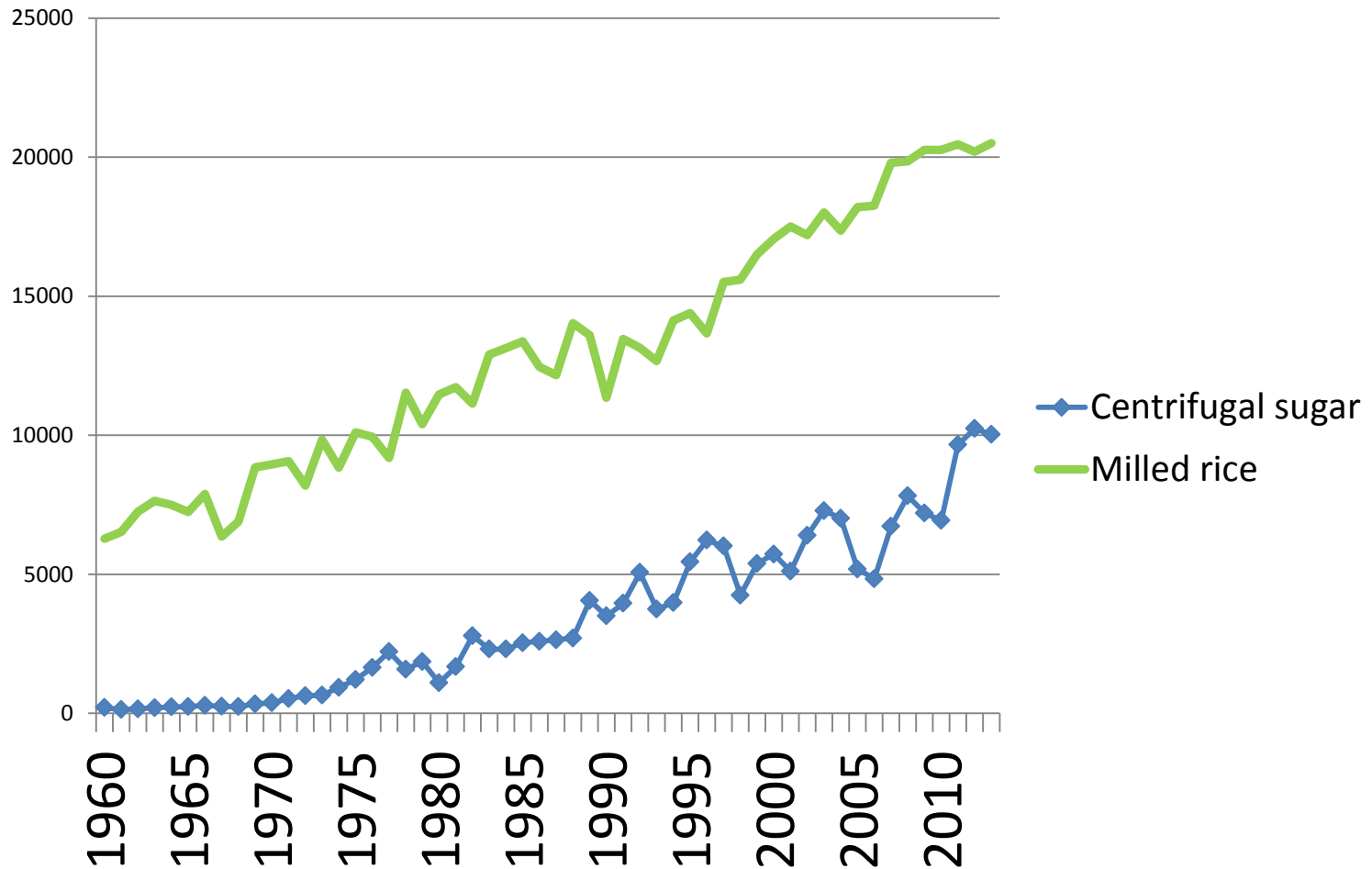
A dismal view

- **“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.

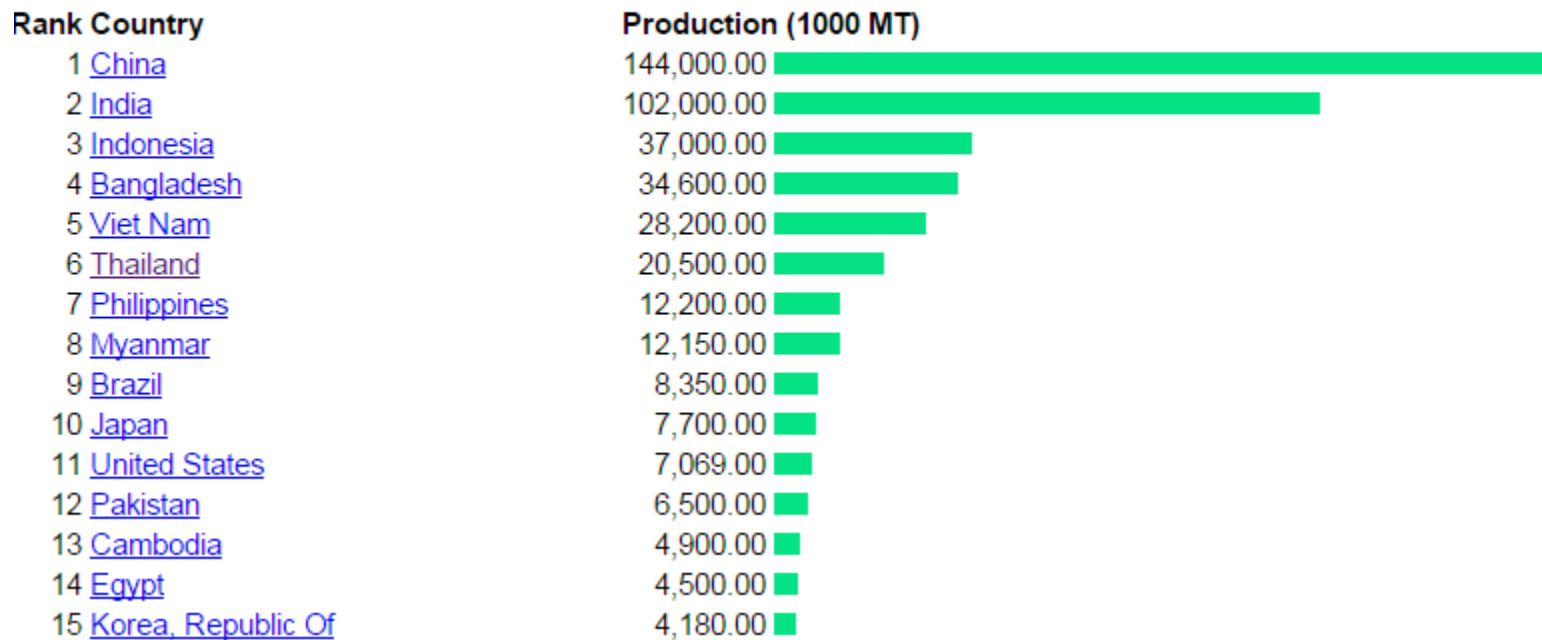
Thailand's rice and sugar production (1000 MT)



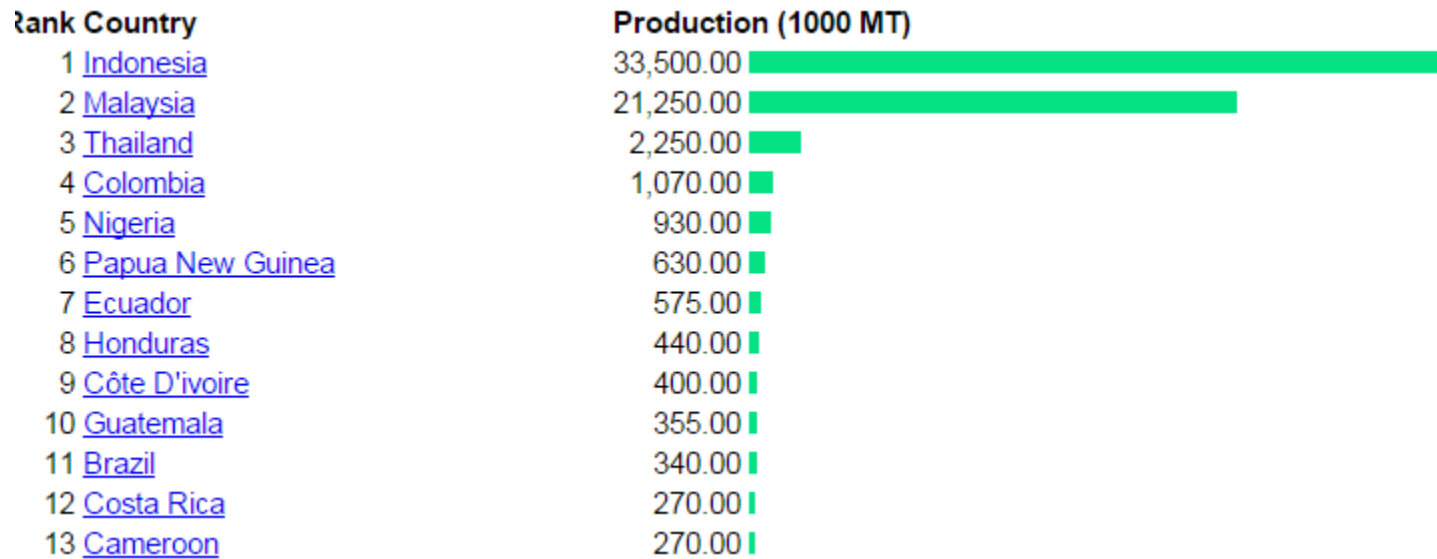
Top 15 rice growers

Milled Rice Production by Country in 1000 MT

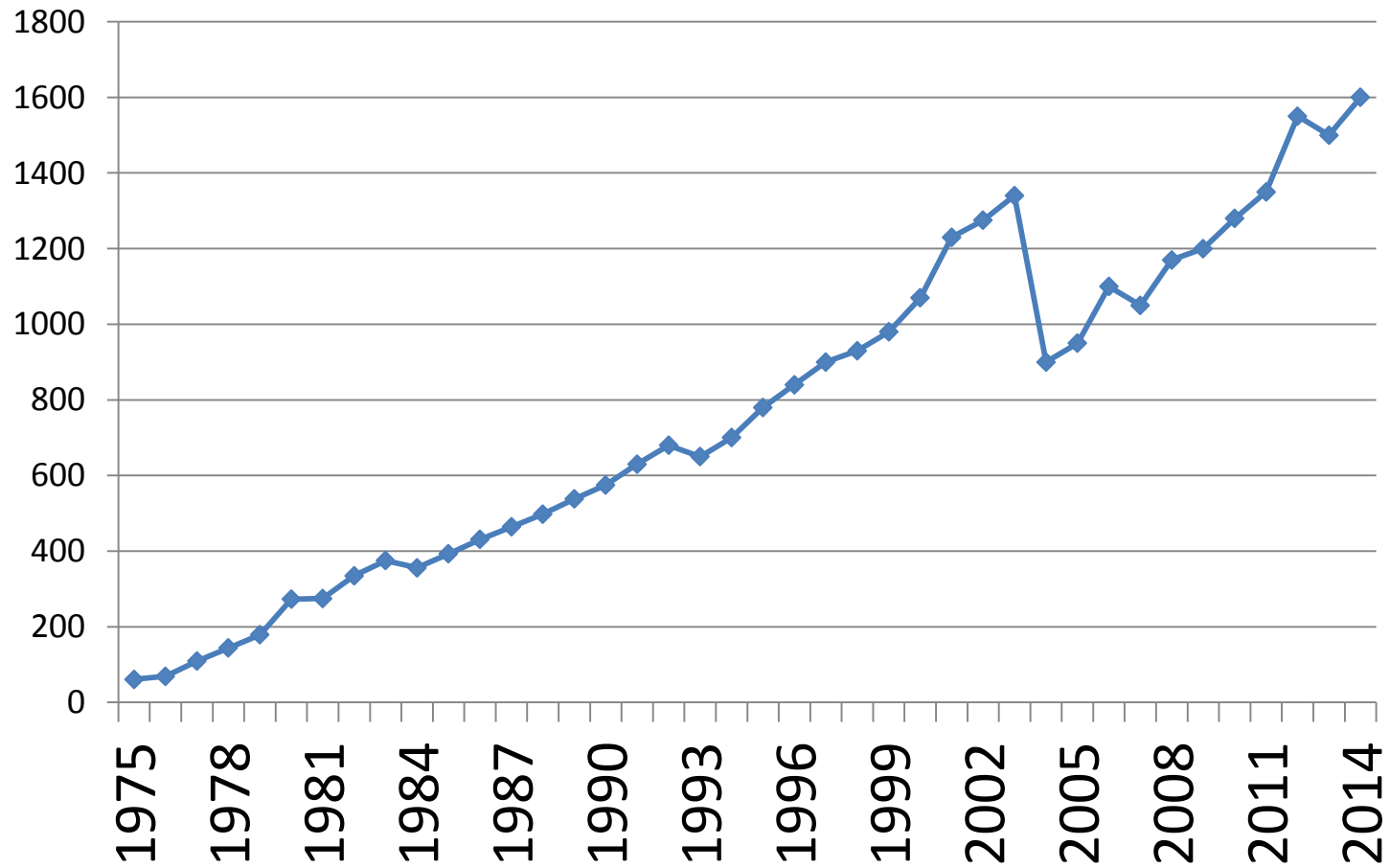
Switch to: [Growth Rate](#) [Map](#)



Palm Oil Production



Thailand's Broiler Meat Production (1000 MT)

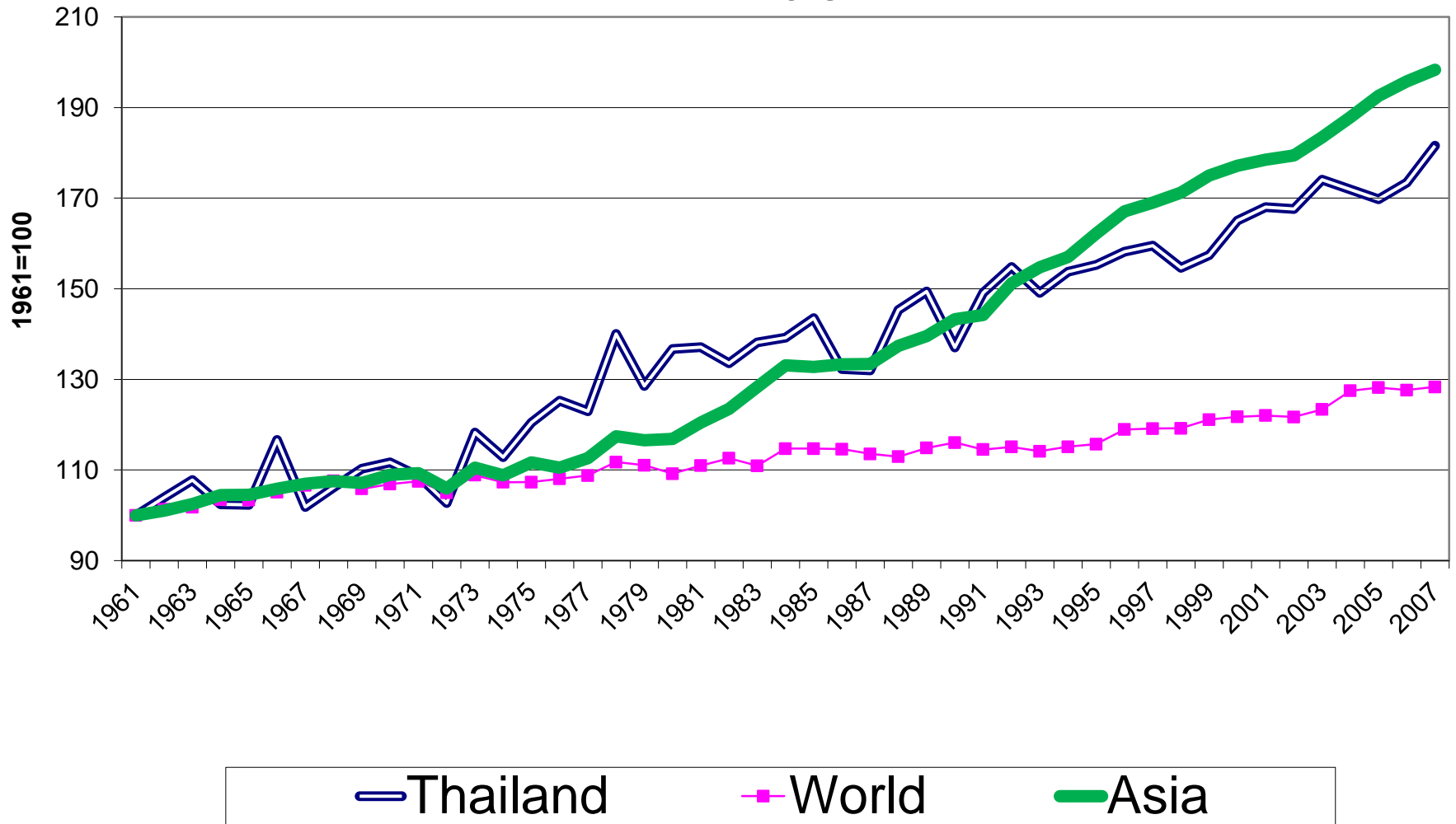


Monthly Price ratio of Shrimp to Rice

Shrimp / Rice Price Ratio



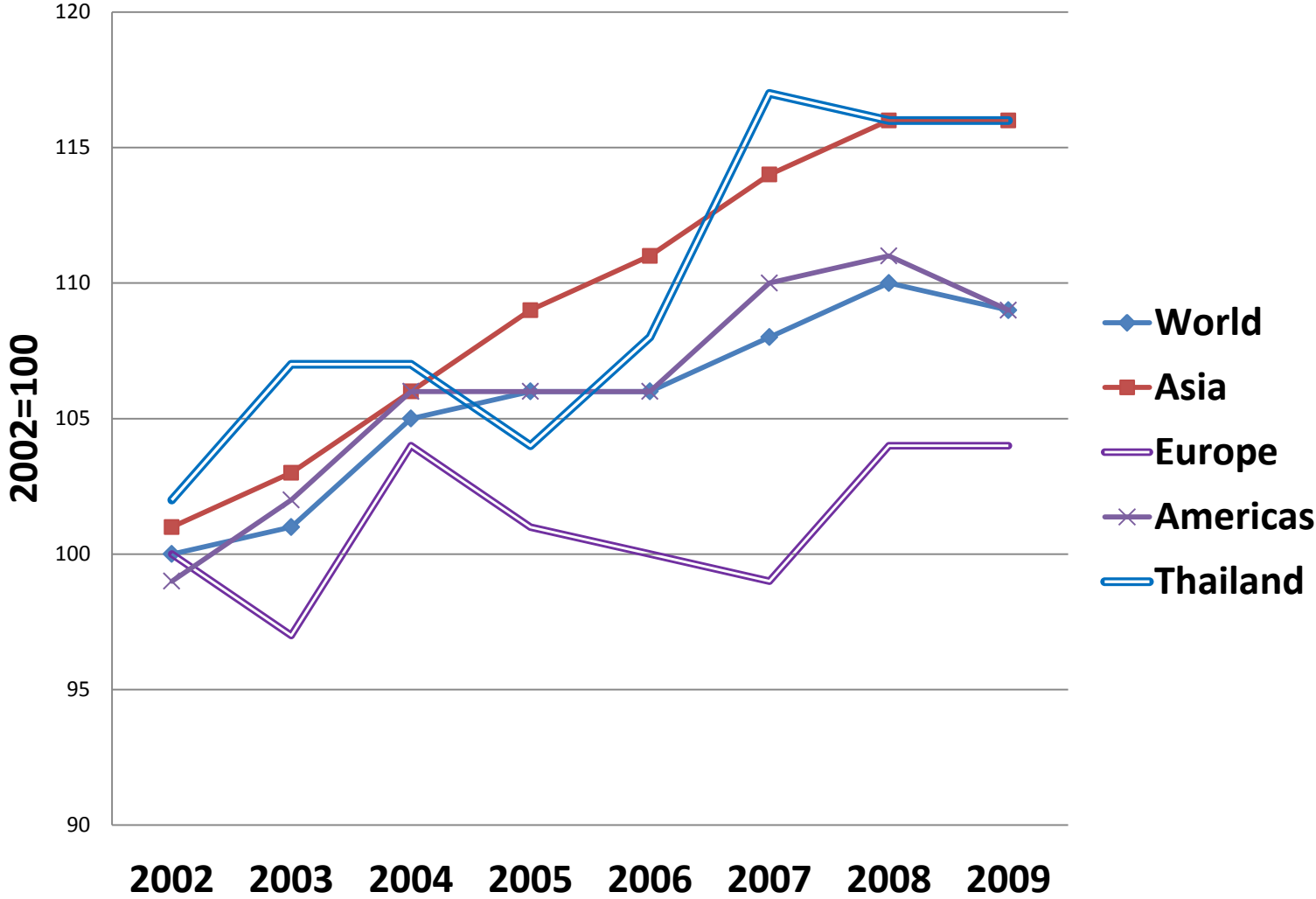
Agricultural Production per Capita Index



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 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.

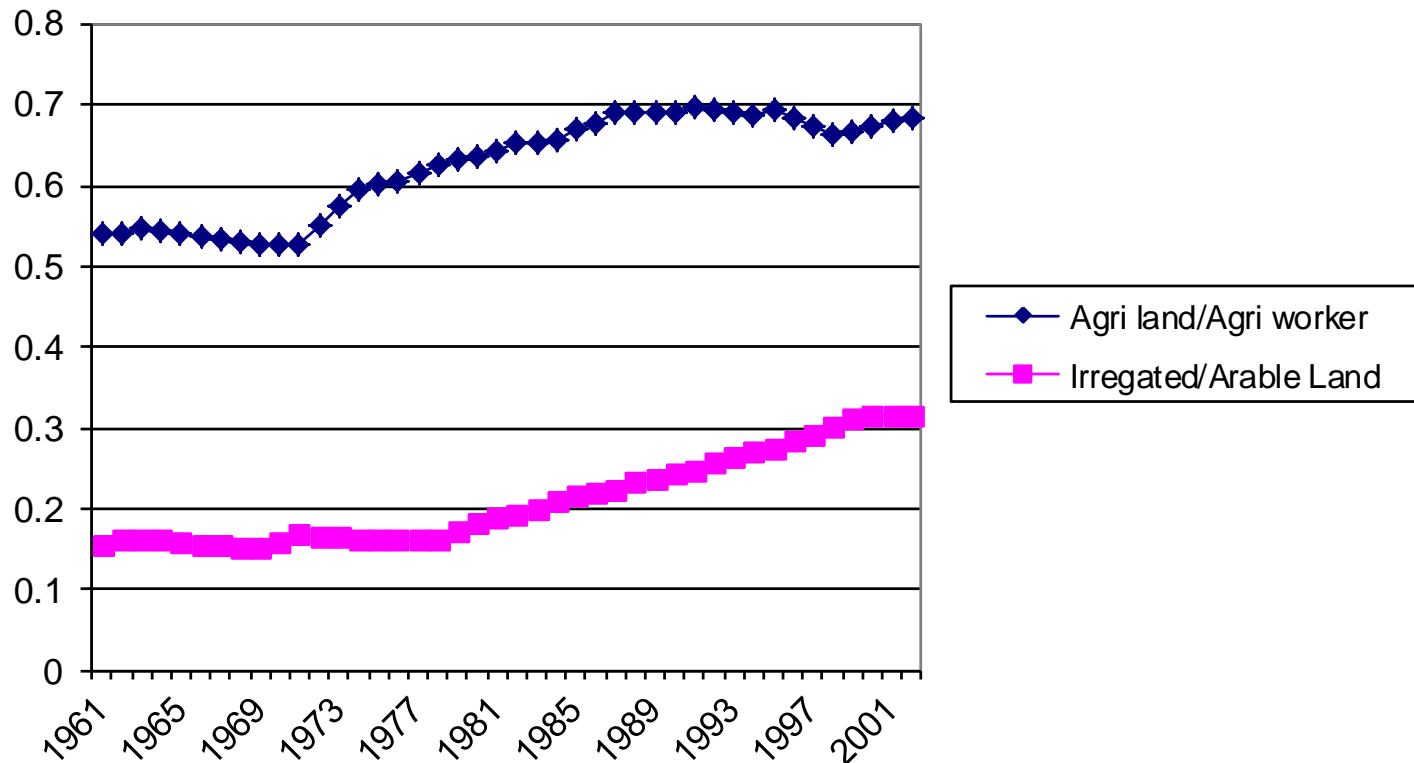
Why did farm productivity increase in rice?

- 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 (LA/L)

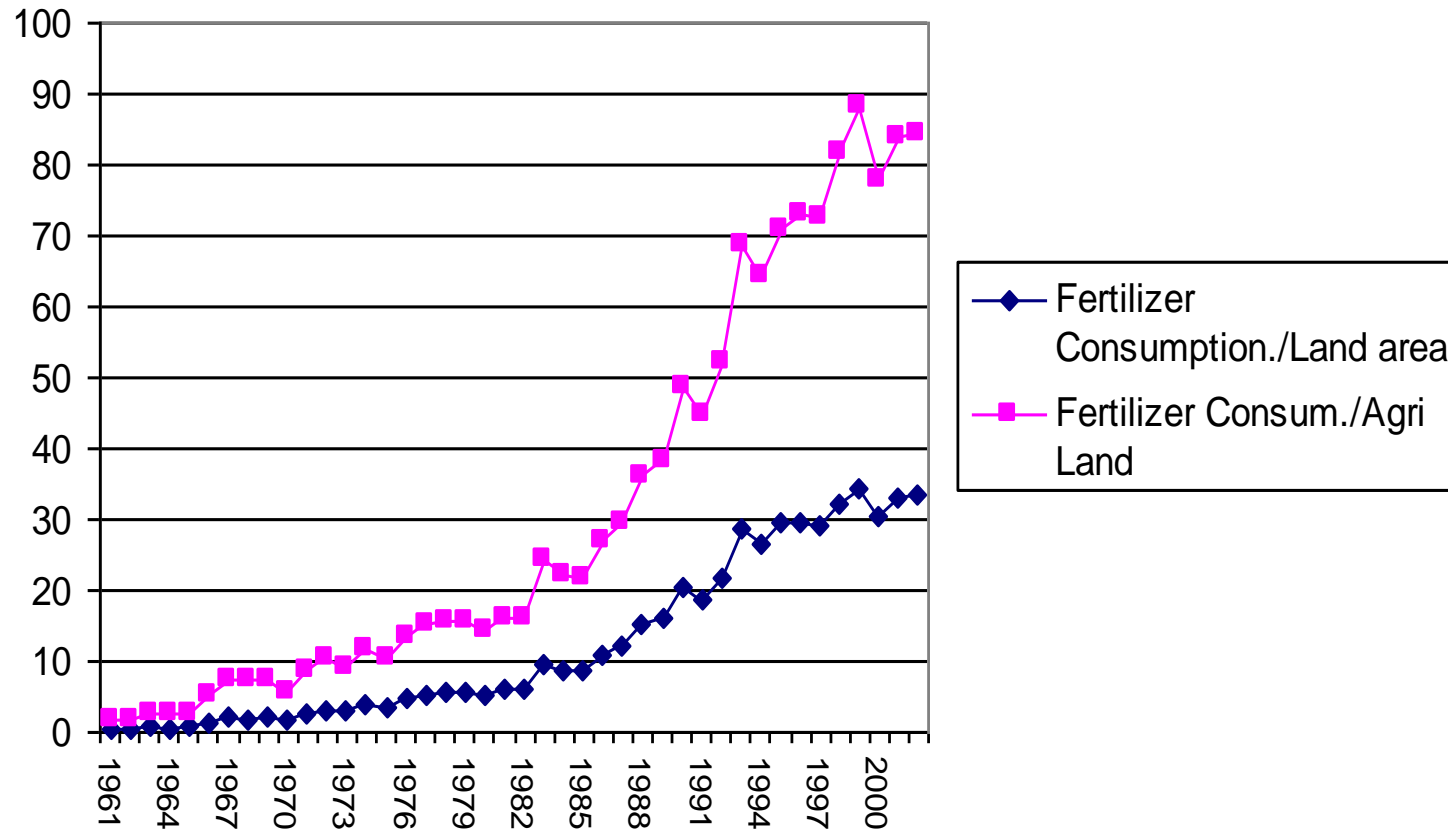
Rain-fed vs. irrigated land

Factor intensity in agriculture



High time for 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: 1961- 2002

(percentage change)

Arable Land/Worker (land-man ratio)	0.8
Fertilizer/Land	62.3
Irrigated/Arable Land	2.0
Imported Machine/Worker	16.3

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.**

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

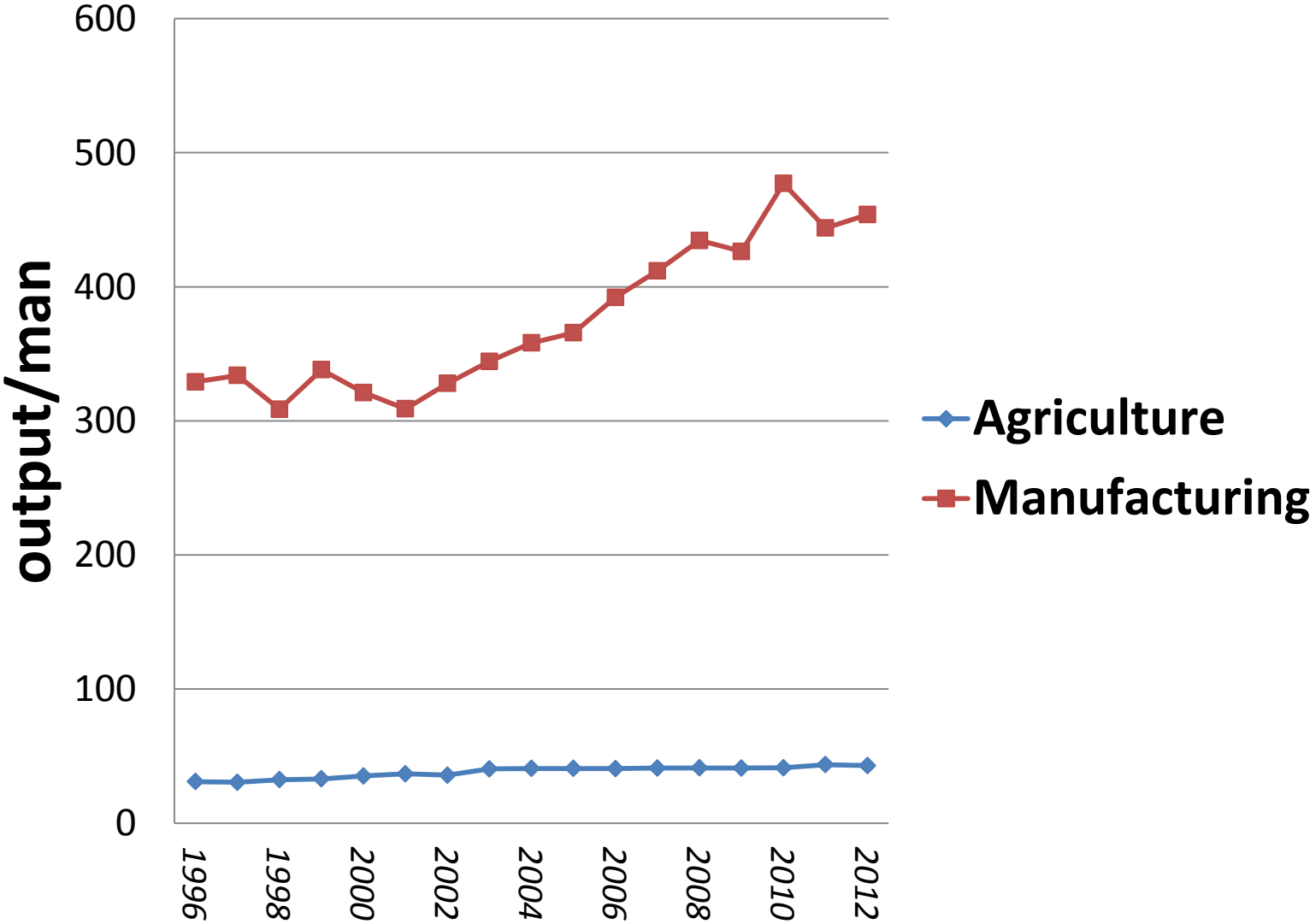
In general for both LDCs and developed countries

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

But in the case of Thailand

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

Average Product of Thai Labor



Median Ages 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 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.

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. (USDA, 2007 Census of Agriculture).
- The percentage of principle farm operators 65 years or older has increased almost 10 percent since 1969, as shown in the graphic to the right.
- The graying of the farm population has led to concerns about the long-term health of family farms as an American institution.

Why has the majority of labor force remained in Thailand's 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***.

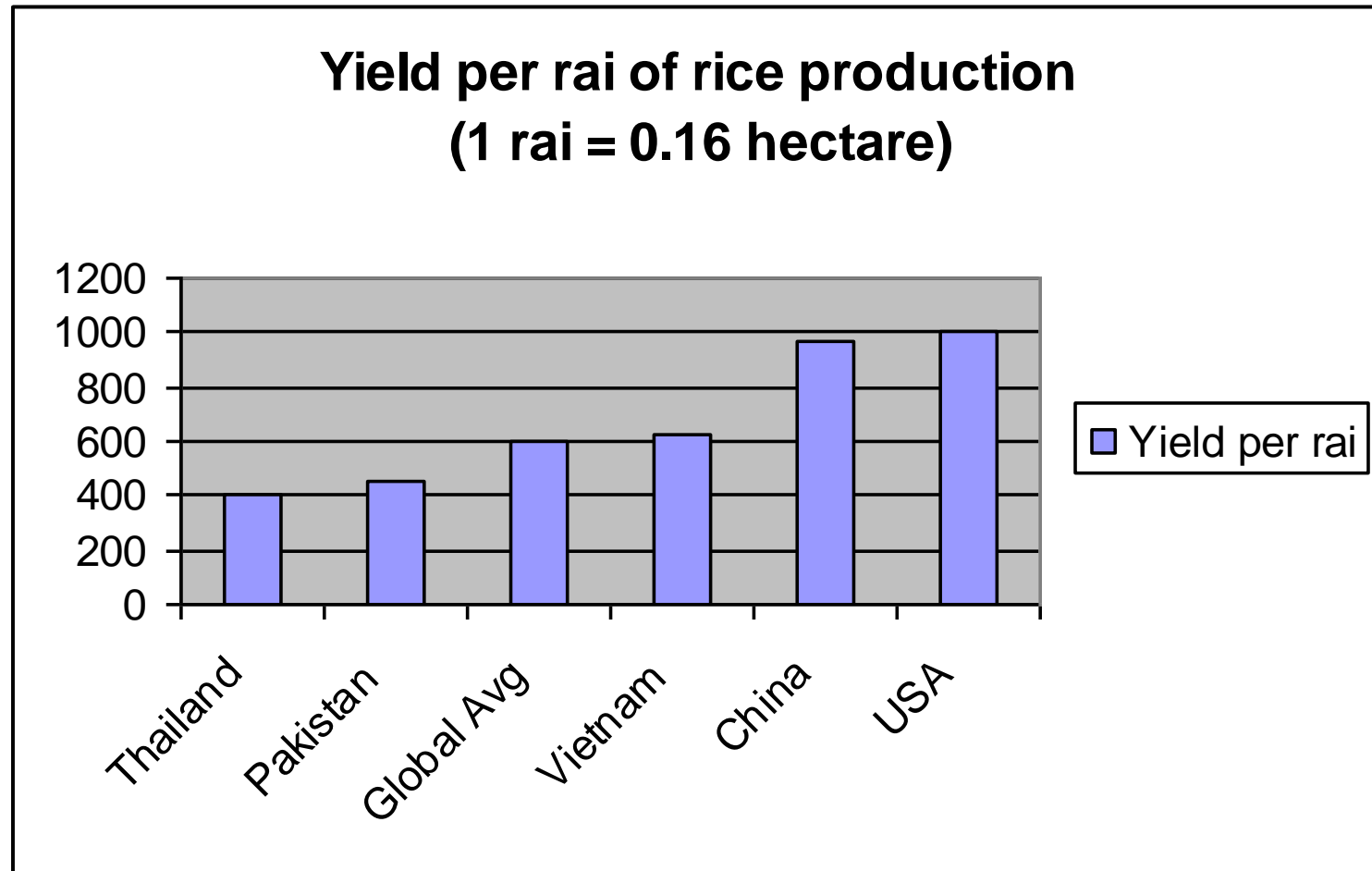
In the case of Thailand

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

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.

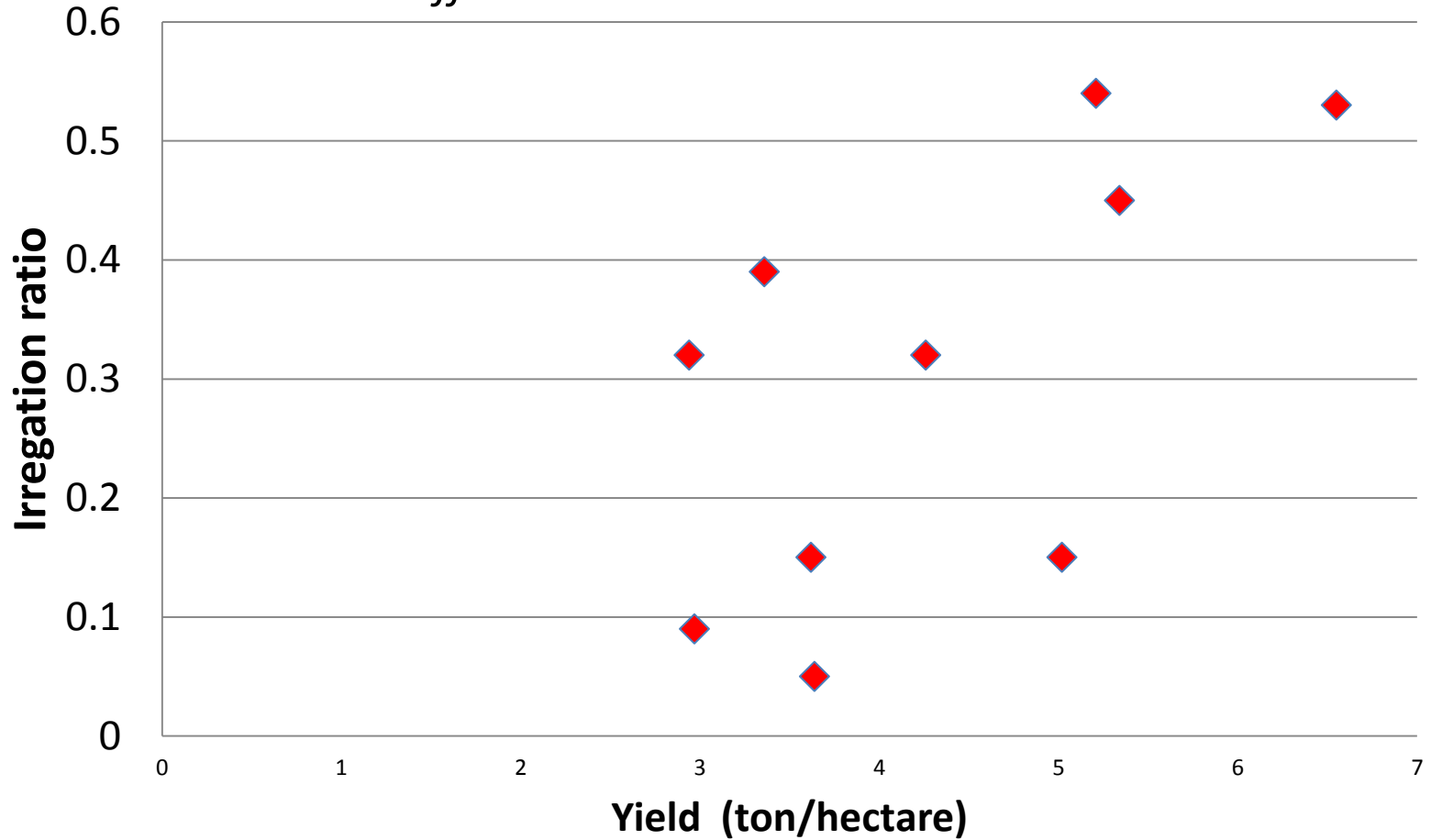
Explain why Thailand has the lowest yield in rice production but managed to be number one rice exporter in the world.



	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

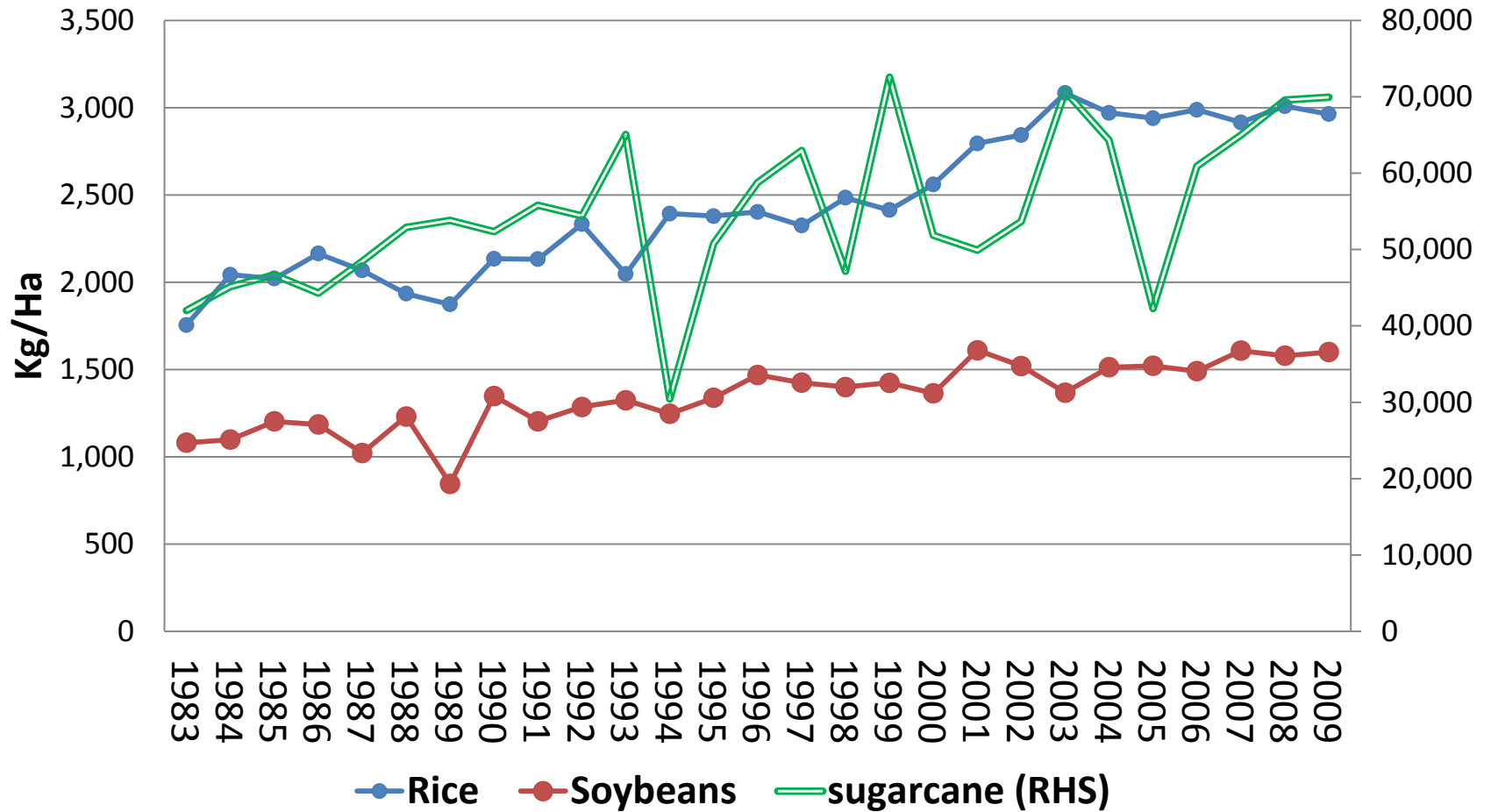
correlation coefficient = 0.63



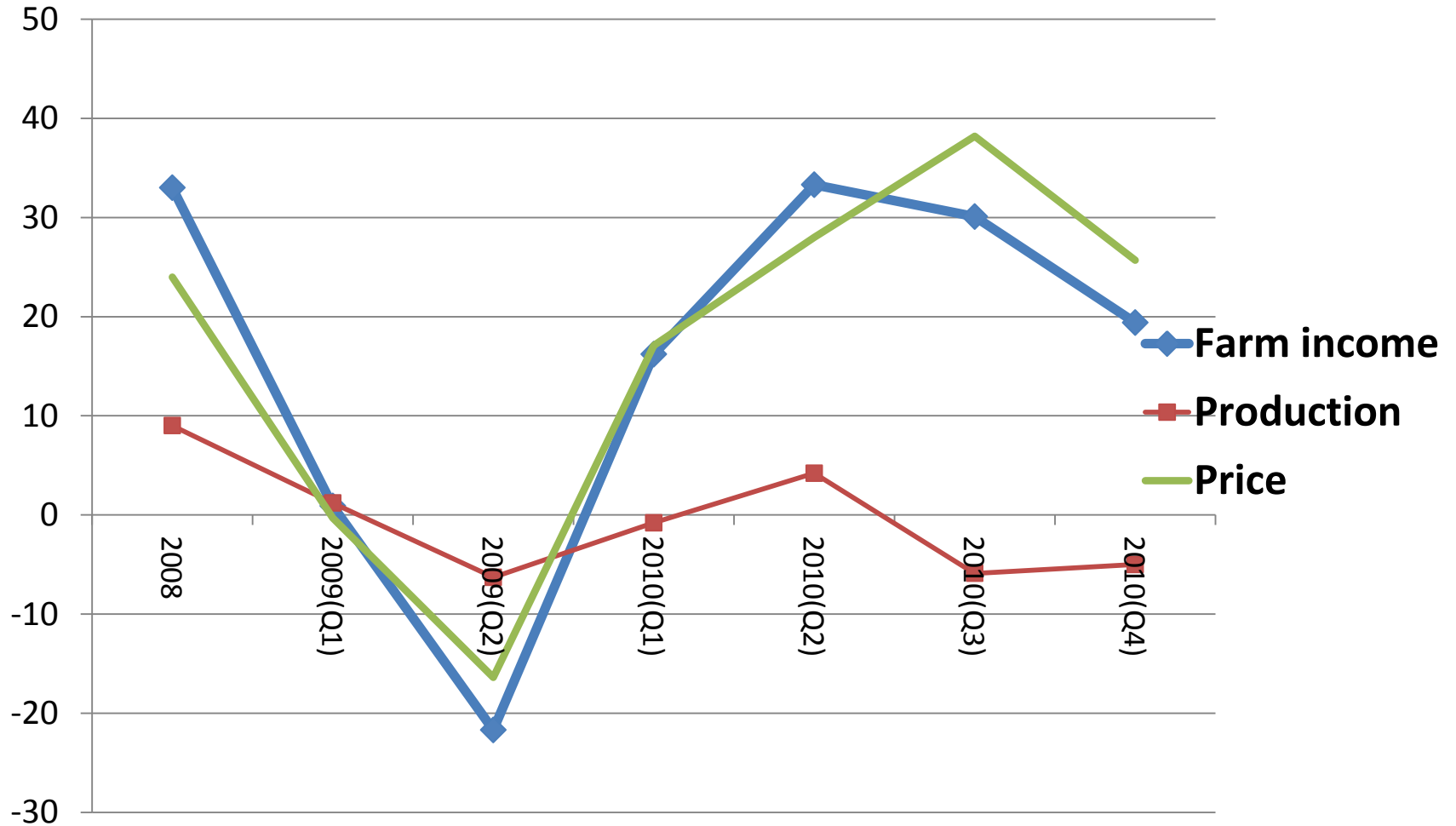
Super rice

- 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.

Farm productivity

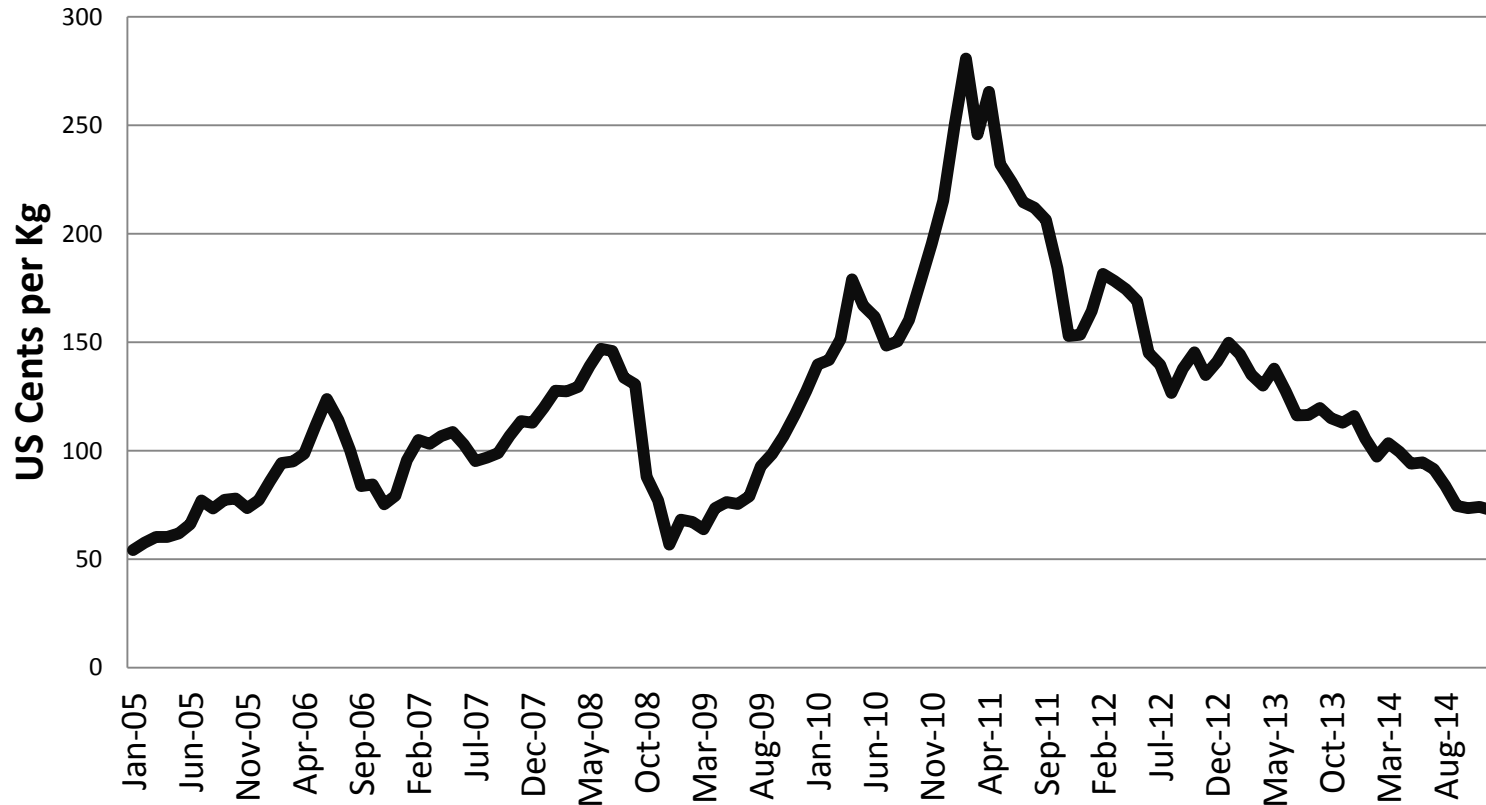


What causes volatility in farm income (% Change)



Source: Singapore Commodity Exchange (SICOM)

Price of rubber smoked sheet No. 3



30-year trend price of 5% broken milled white rice (USD/MT)

Price of 5 % milled white rice

