

Resilience, Vulnerability, and Dynamism of Thai Agriculture

Bhanupong
Lecture 11

The rise and fall of commodities
Diversification and **dynamism**

Key words

- Resilience and vulnerability
- Supply responses
- Elasticities of demand for farm products
- Farm mechanization
- Baumal-Bowen Hypothesis
- Export diversification
- Agricultural dynamism

Productivity growth in Thai agriculture lags behind manufacturing sector's, preventing a natural transfer of agricultural workers to other sectors. Nevertheless, Thai agriculture remained competitive and Diversified in the 1990s.

Dynamism of the Thai Agriculture

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Abstract

This paper traces the development of Thailand's agricultural sector over the past four decades. It analyzes the factors that are contributing to agricultural productivity changes. Productivity growth in Thai agriculture lags behind that in manufacture, preventing a natural transfer of agricultural workers. The paper analyzes the changing pattern of competitiveness of Thailand's agricultural exports by focusing on their growth and their world market shares. The results indicate that in general the Thai agriculture can remain competitive. Exports of agricultural products have been diversified over the years, and their ability to compete in the world markets has been enhanced. While traditional commodities may lose their importance in the future, new agricultural products will emerge. Processed food industry will be the key to the future of Thailand's agriculture, but maintaining export competitiveness requires constant upgrading of food-safety standards. Dynamism of the Thai agriculture through continued productivity improvement will enable Thailand to cope with new challenges and random shocks from both demand and supply sides.

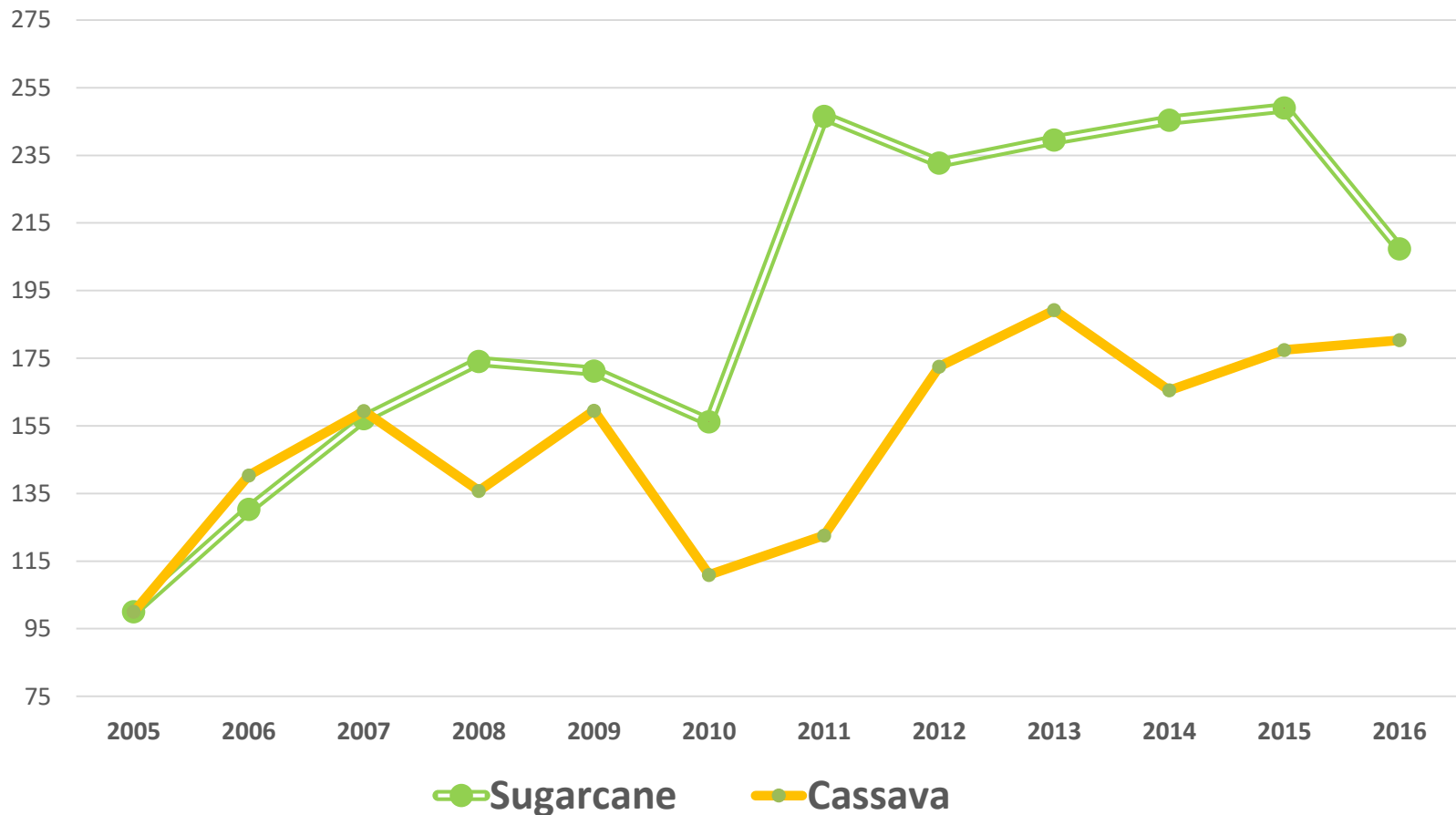
Keywords: Agriculture, Thailand, productivity; *JEL Classification:* O5

October 30th, 2019

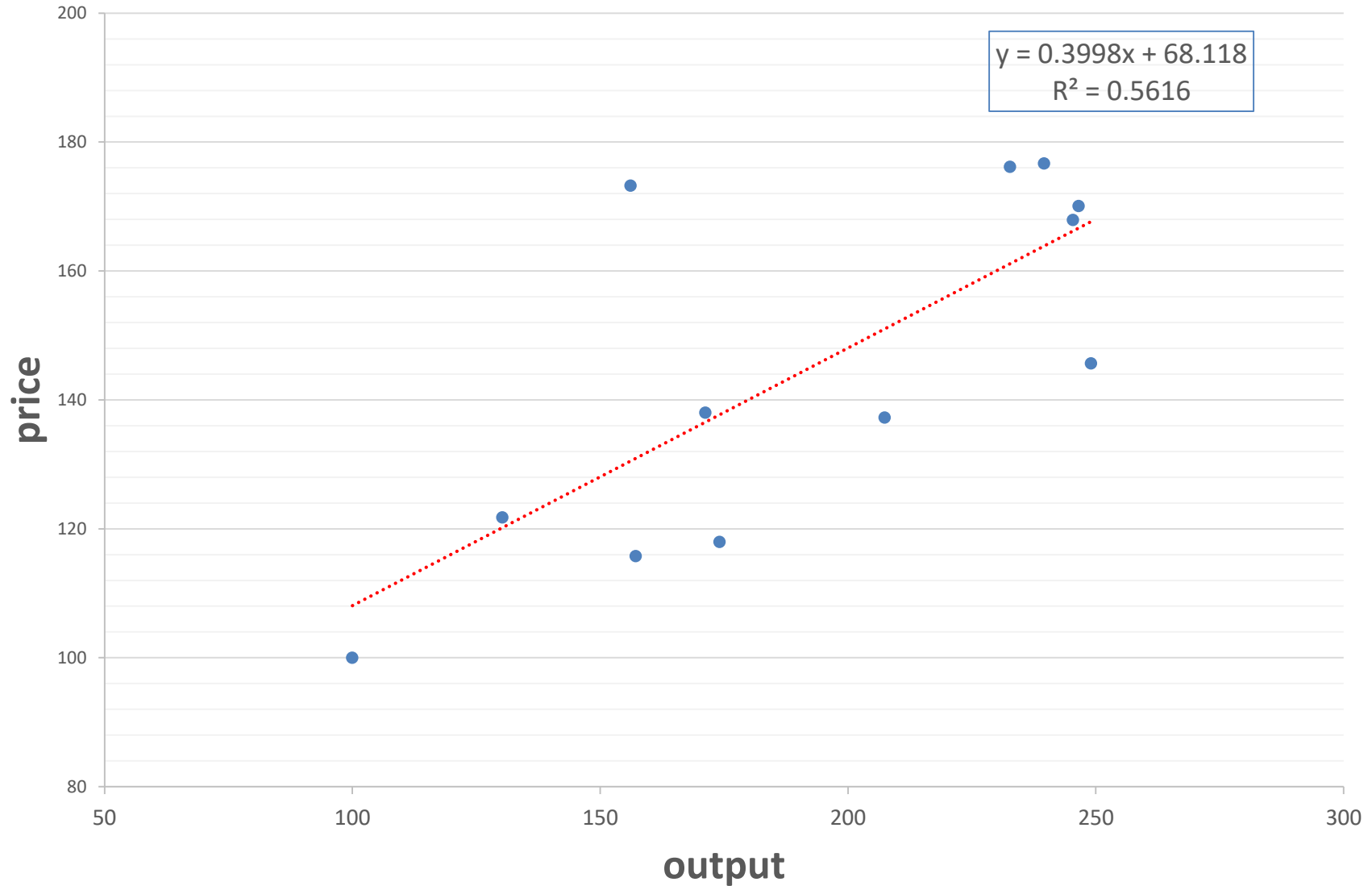


Emerging crops in the early 2000s

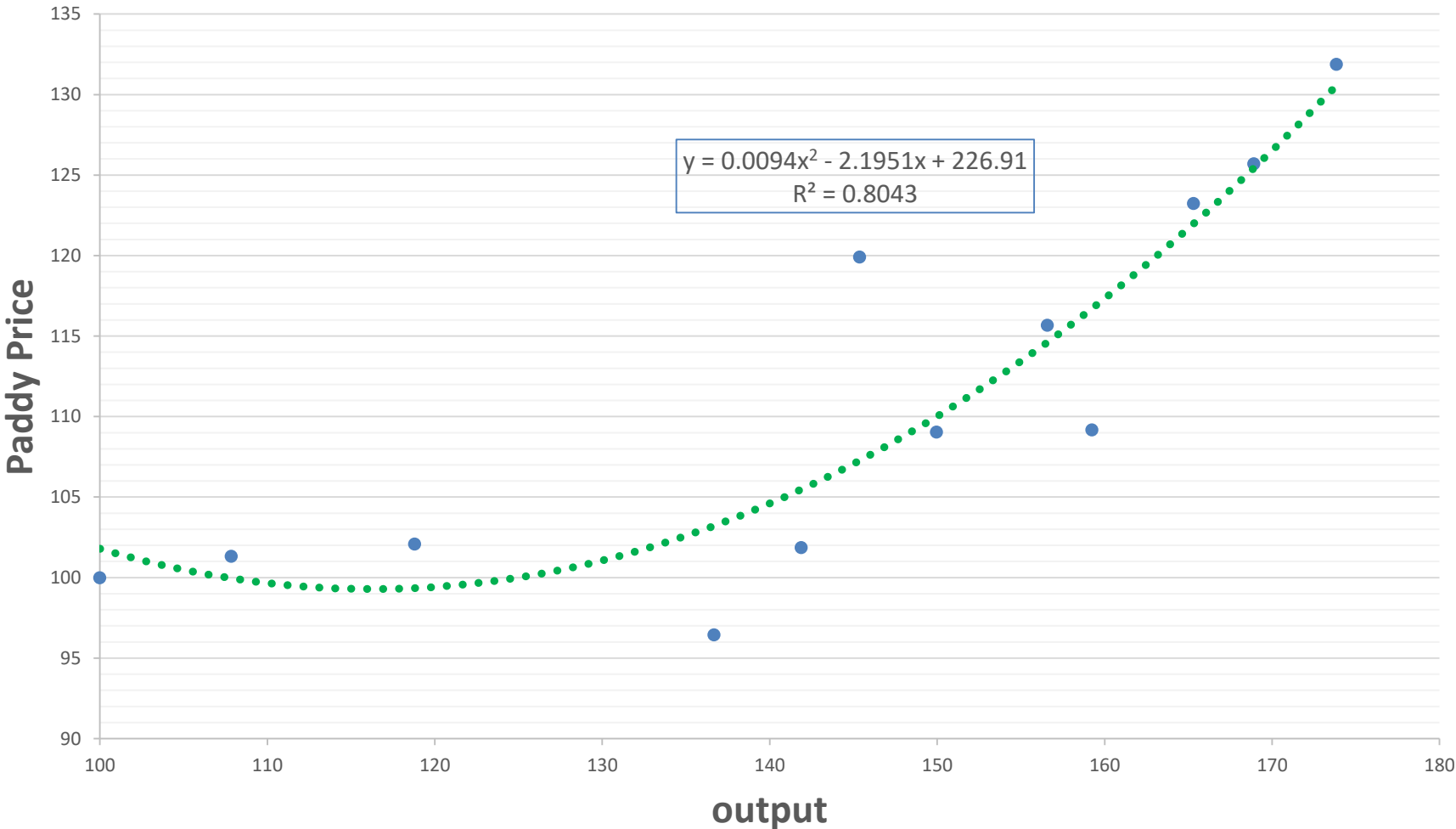
Crop Production Index



Supply response of sugarcane to sugar prices



Paddy supply responses to prices 2005-2016



Rubber Tapping

An eight- millimeter deep and a rough 30-centimetre long incision is made along a spiral shape underneath the cut of the previous day.

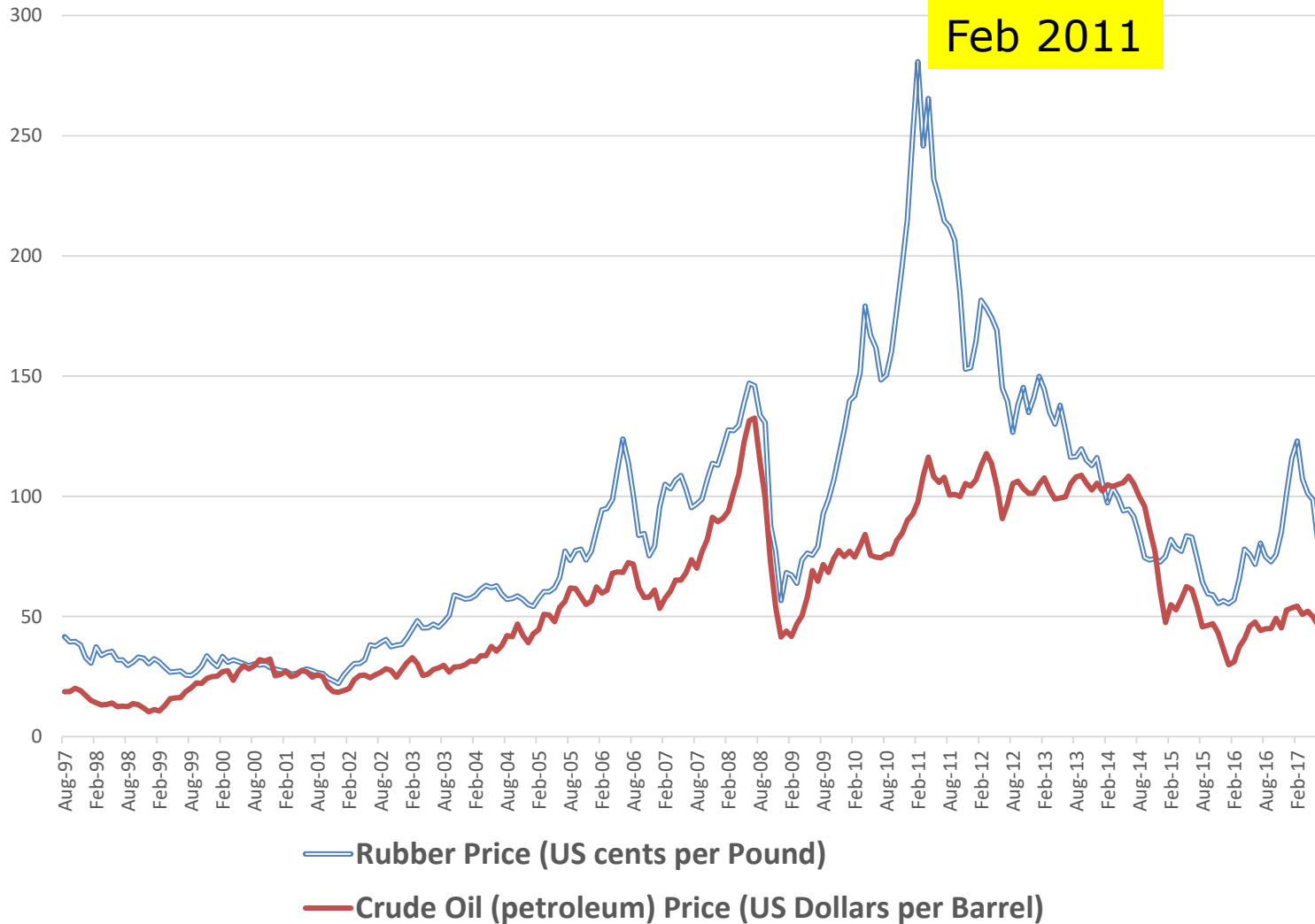


The viscous white liquid slowly drips into a cup attached to the tree for about four hours, until the cut has healed itself.

The prices for natural rubber have decreased dramatically, affecting about two million people in Thailand who struggle to make a living.

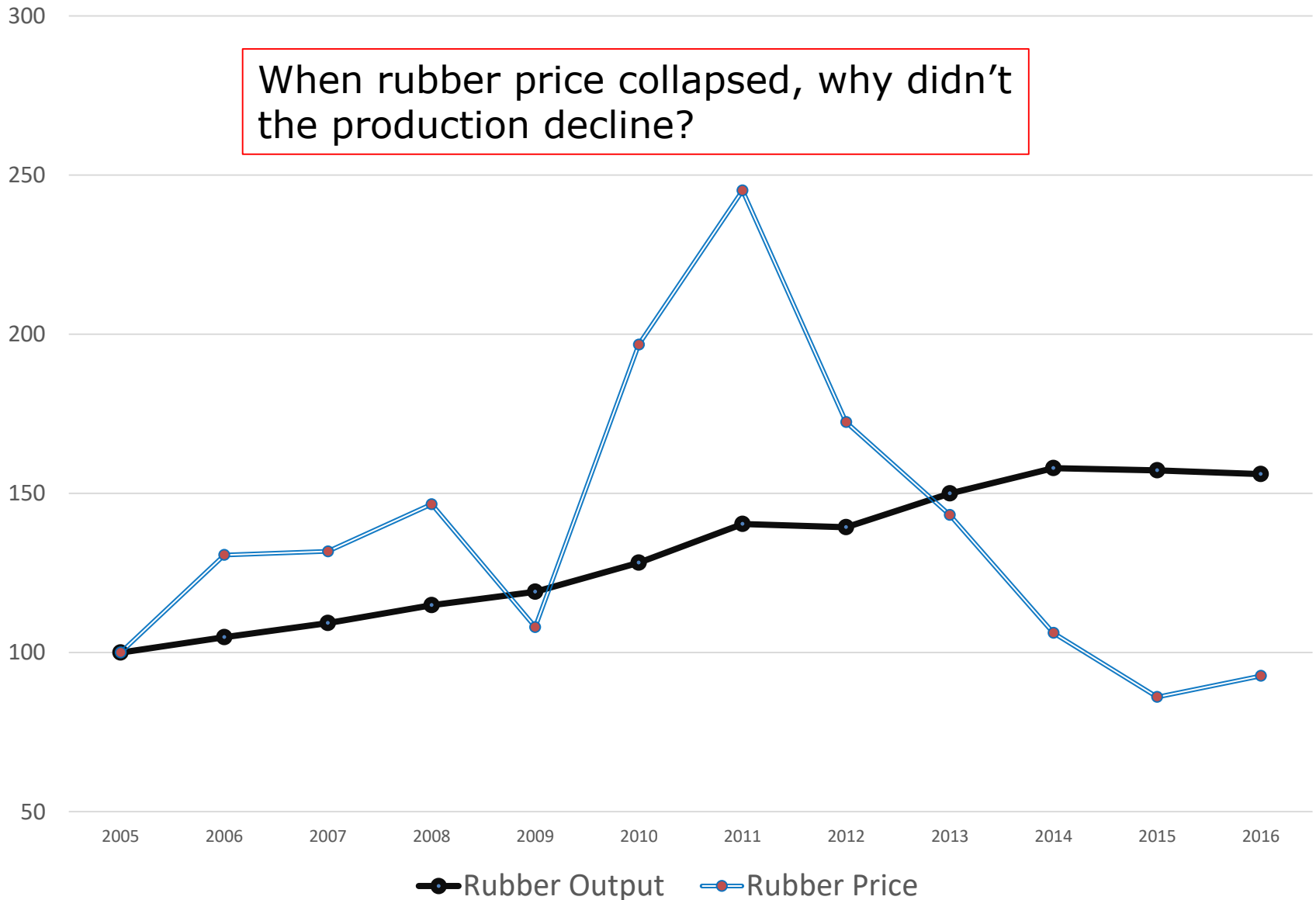


High Correlation: Rubber and Crude Oil Prices January 1997-September 2017

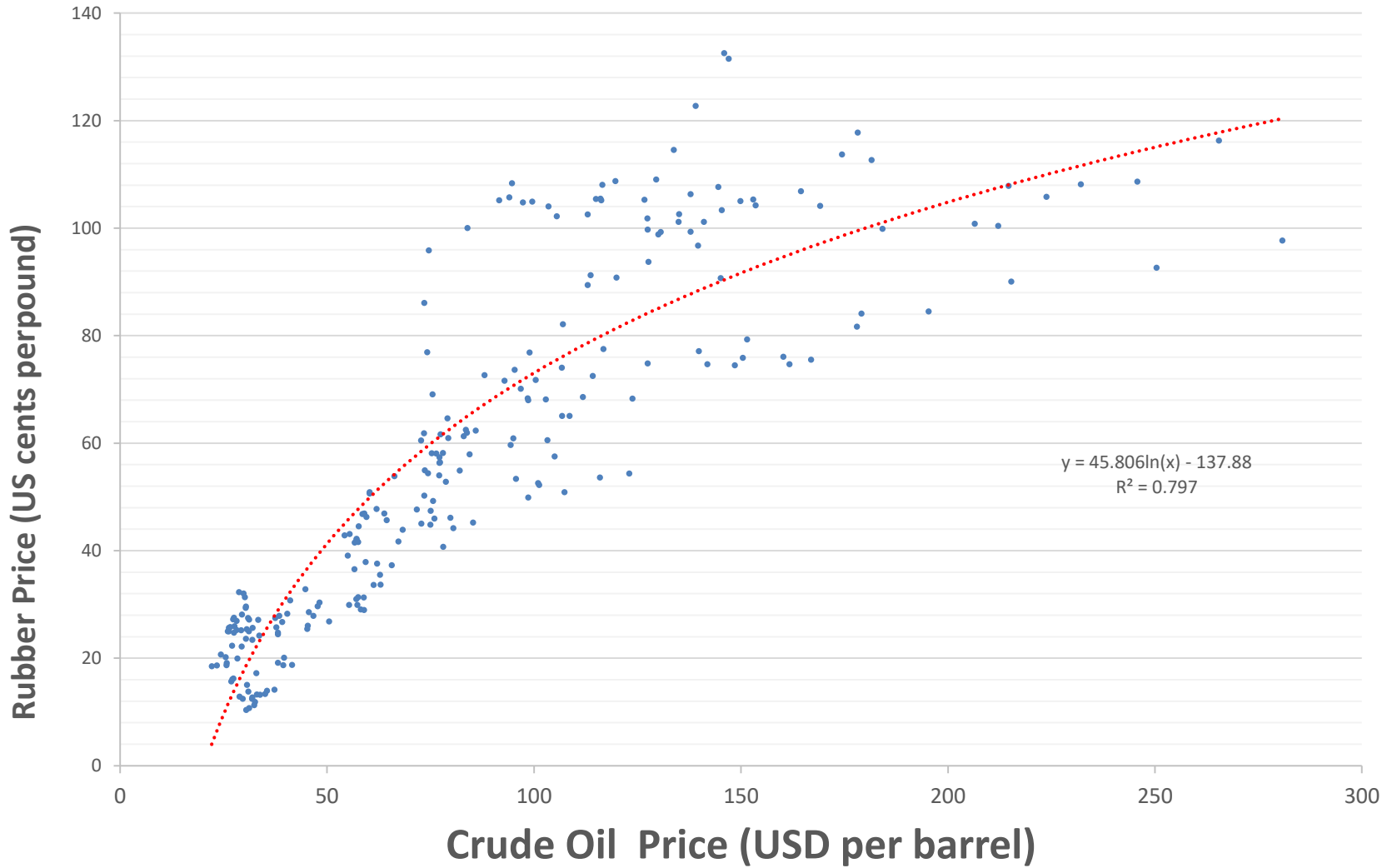


Rubber Farmers in Trouble

When rubber price collapsed, why didn't the production decline?



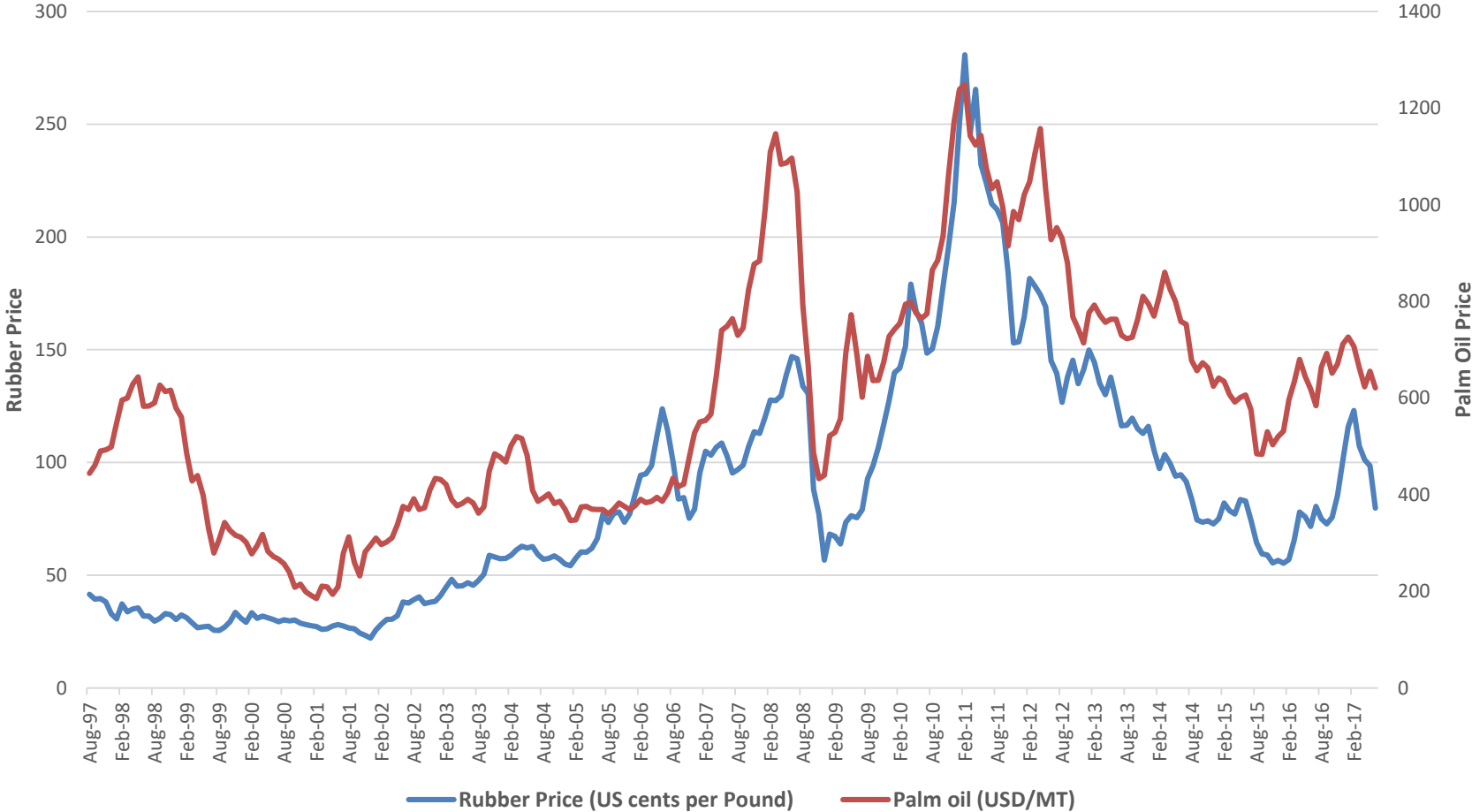
Crude Oil and Natural Rubber Prices January 1997- September 2017



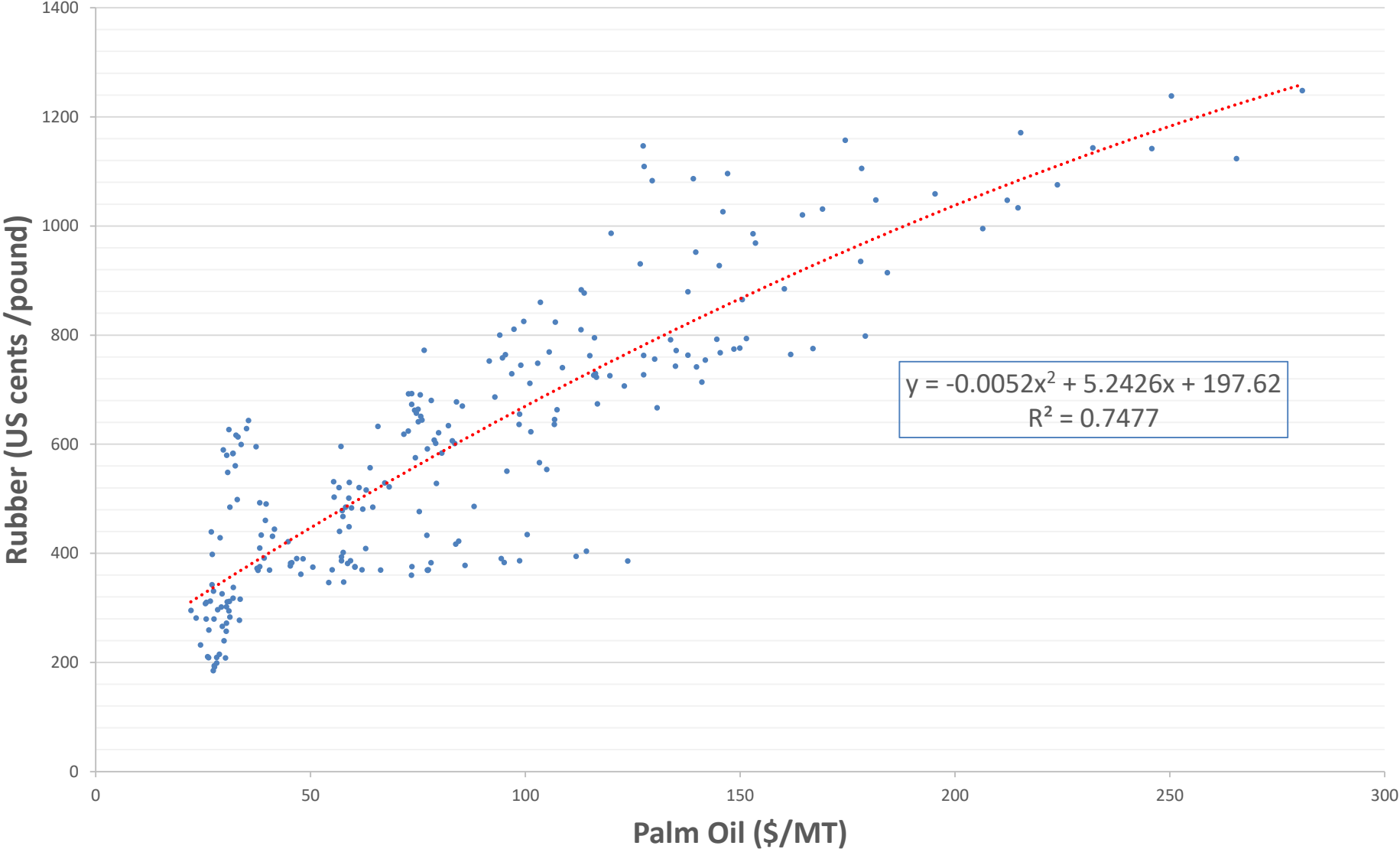
Due to the oversupply of natural rubber and the rising demand for **synthetic petroleum-based rubbers**, many rubber farmers expand into the more profitable palm tree business to produce palm oil.

The biodiversity decreases as palm oil trees cover more and more surface area in Southern Thailand.

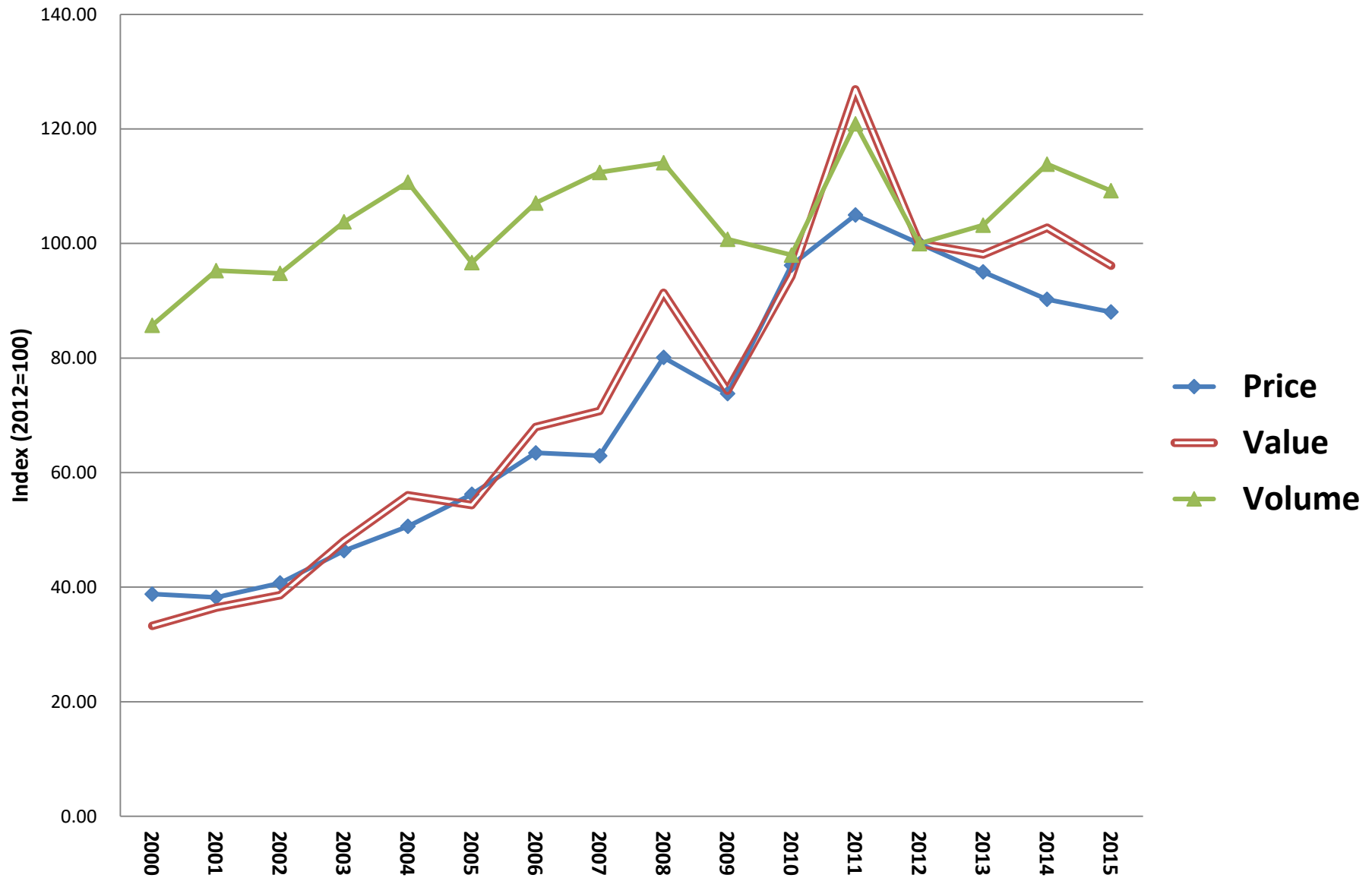
High Correlation between prices of palm oil and rubber



Diversification is not the way out



Agricultural Product Export Indexes



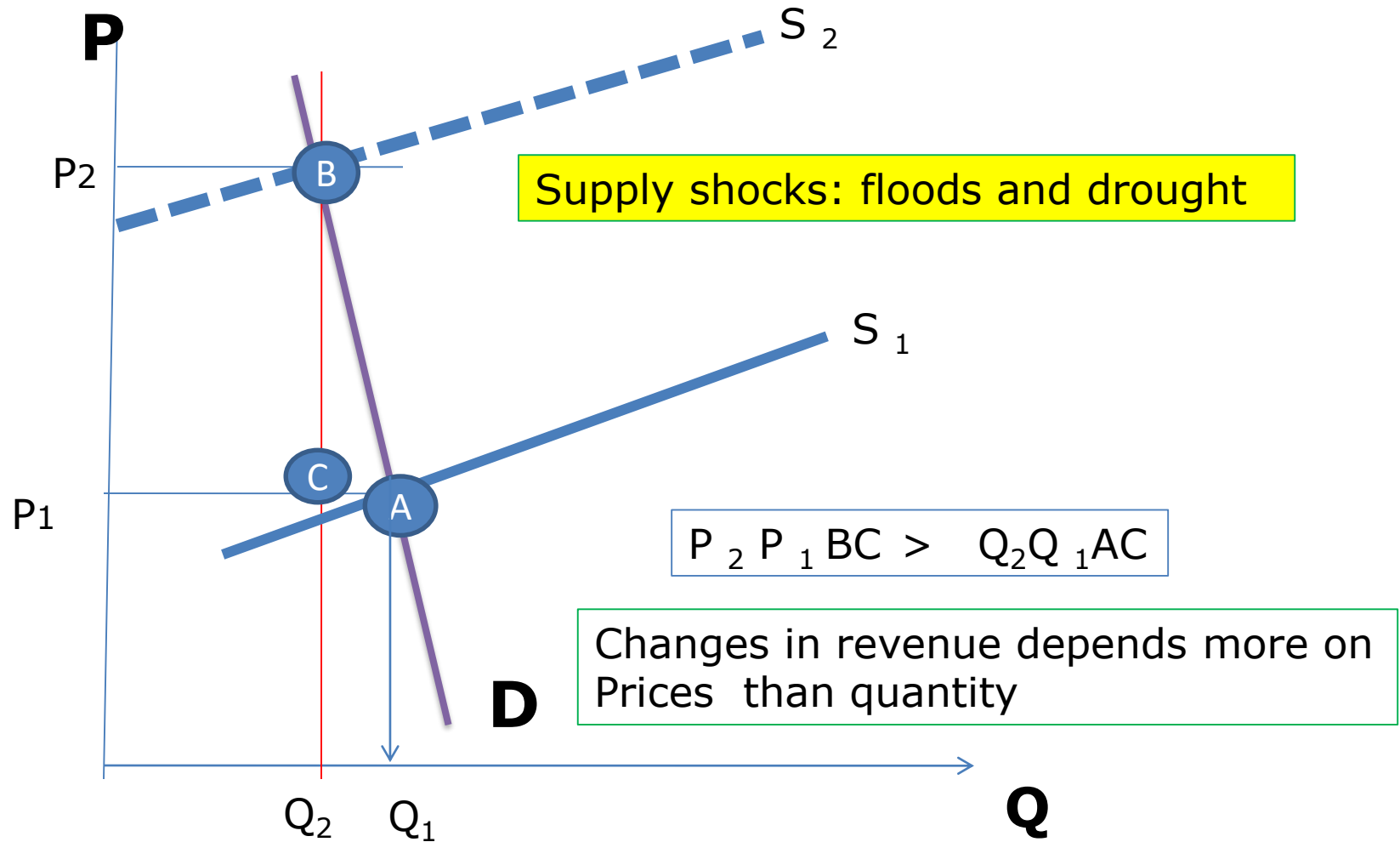
Source: Bank of Thailand

If the demand is price inelastic

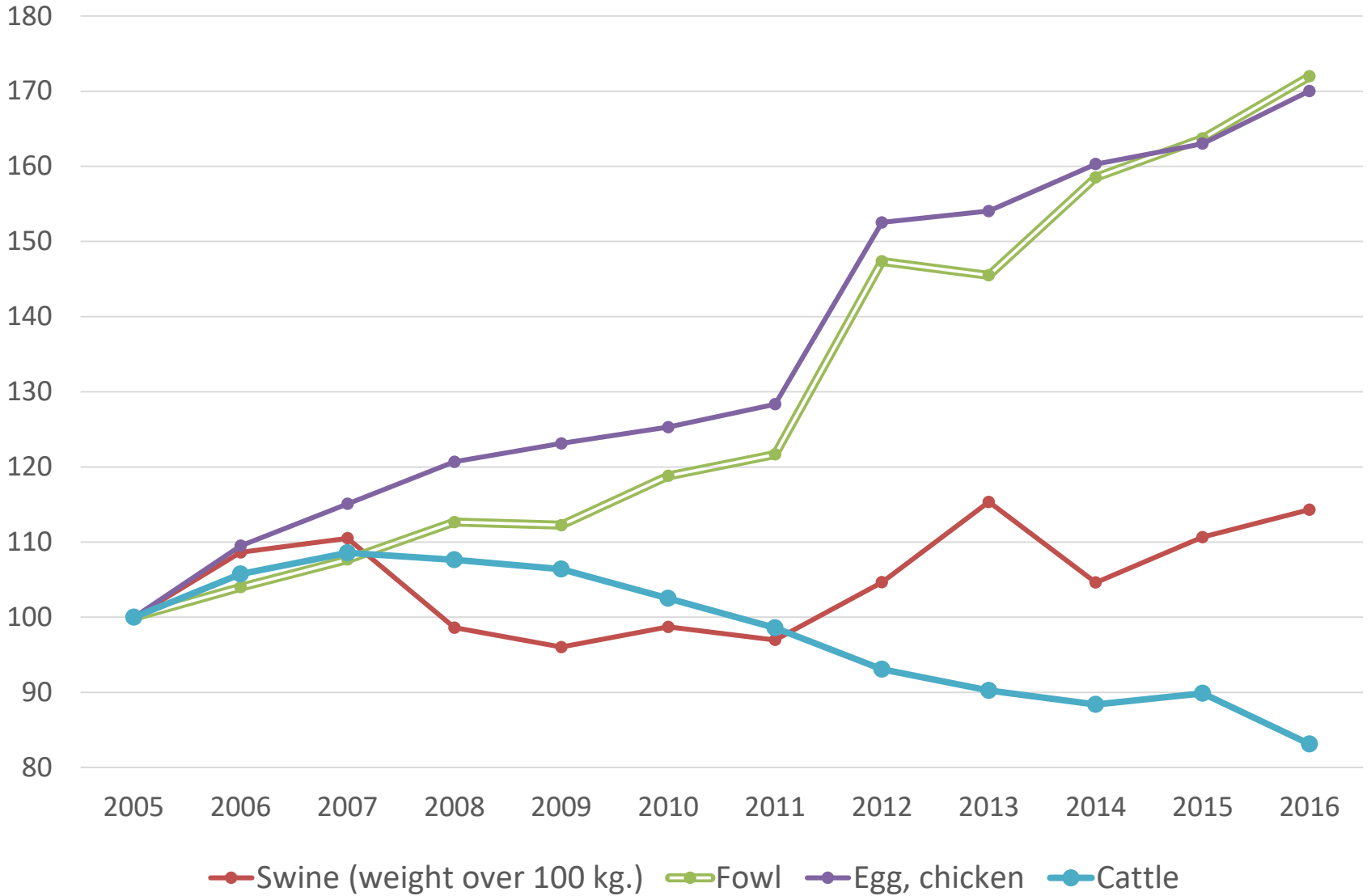
- The value index tracks more closely the price rather than the quantity index.
- Agricultural exports values are largely determined by price movements rather than volatile quantities.
- There is a positive correlation between total revenue and prices.
- Can Thai exporters set their own prices?

Nature of agricultural products

When the demand is *inelastic*

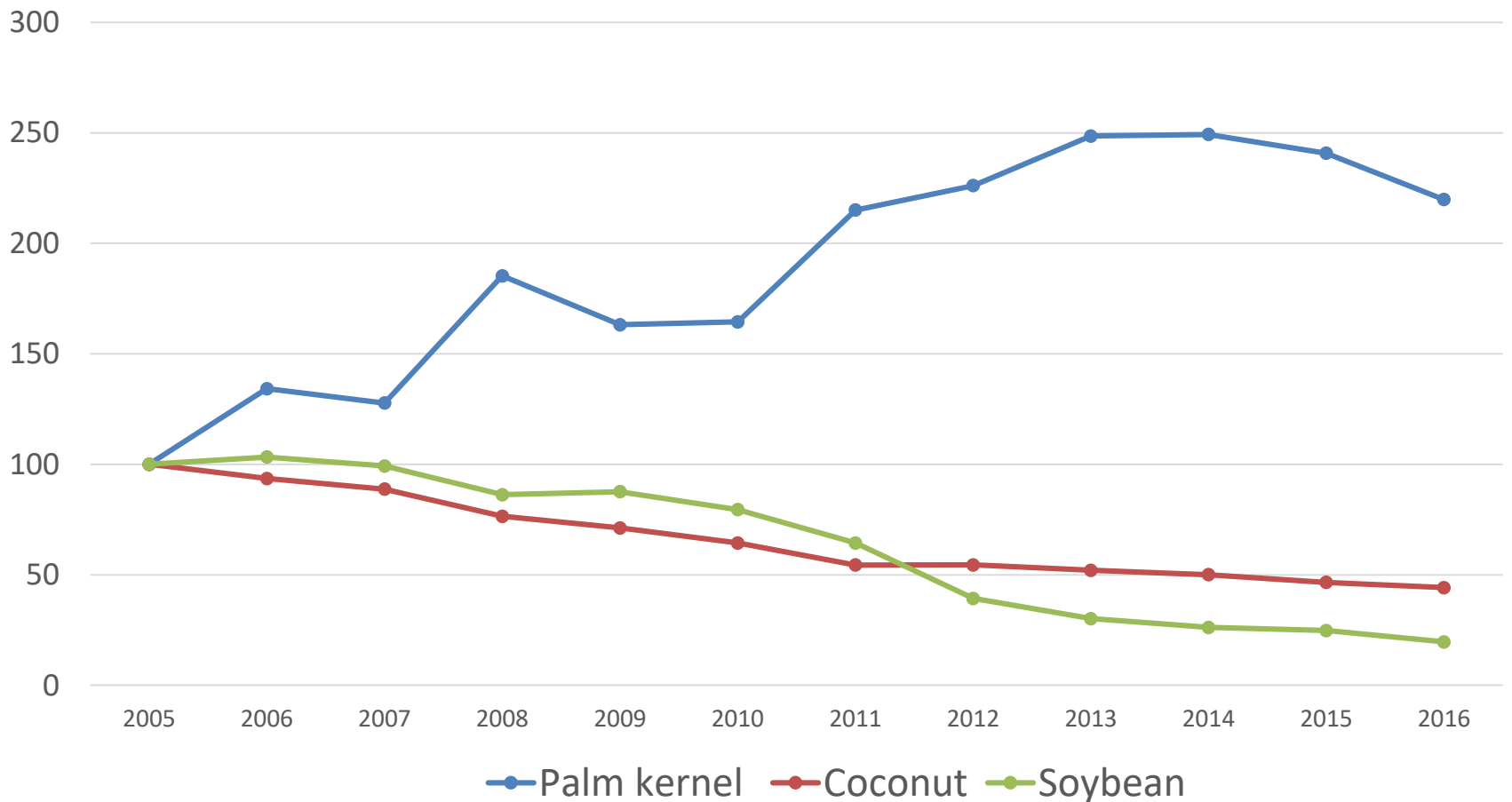


Livestocks Production



Changing Agricultural Production since 2005

Production of oil seeds



Falling palm price:
Two baht per kg



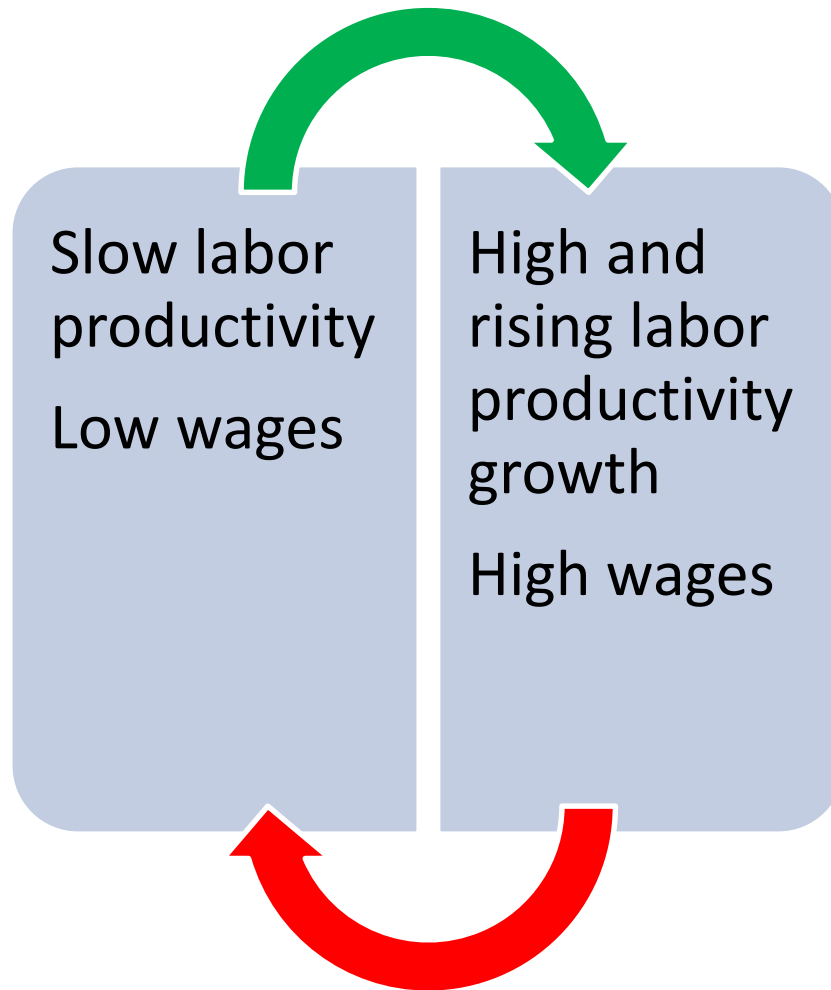
Cost disease

- Total sales depend on the products' prices and quantities sold.
- But profit or net income are more important than total revenues.
- Wage rates are increasing in farm sector
- Declining fertility and rising non-farm wage rates sector causes shortages of labor and raise agricultural wages, further depressing net income of farmers.
- Ageing population (declining health capital) causes further reduction in labor supply.

Baumal-Bowen Hypothesis

- In the **rising productivity** sector, output per man-hour increases more rapidly than the money wage rate.
- The **labor cost per unit** of output in the progressing sector must *fall*.
- The faster the pace of technological advance, the greater will be the rate of increase in the **overall wage rate**.
- Labor is free to move between the two sectors, the overall real wage must rise, following to the average rate of productivity improvement.

Labor movement



Cost pressure

Baumal-Bowen Hypothesis

- To join the rank of rising productivity industries, the agricultural sector would have to learn to increase output per man and to continue to do so into the indefinite future.
- ***The rising productivity and wage rates in the urban areas put upward pressure on the costs in sectors that lag behind in productivity improvement.***
- Live performing arts belong to a ***stable productivity*** sector of the economy.
- Bagatelle in A minor ("[Für Elise](#)") by [Ludwig van Beethoven](#) (1810) lasts 3 minutes
- A pianist still plays 3 minutes just like 200 years ago.

FUR ELISE

SOLO FOR LEAD PAN

Ludwig van Beethoven
Arr. Angeline Moore

Poco Moto

The musical score is written on seven staves of music. The first staff begins with a treble clef, a key signature of one sharp (F#), and a 3/4 time signature. The tempo marking 'Poco Moto' is placed above the first staff. The first measure is marked with a '1' below the staff. The first two measures are marked with 'pp' (pianissimo) and the next two with 'p' (piano). The second staff starts at measure 7 and includes first and second endings. The dynamic 'mf' (mezzo-forte) is marked below the staff. The third staff starts at measure 16. The fourth staff starts at measure 23 and includes first and second endings. The dynamic 'p' (piano) is marked below the staff. The fifth staff starts at measure 30 and includes first and second endings. The dynamic 'mf' (mezzo-forte) is marked below the staff. The sixth staff starts at measure 37. The seventh staff starts at measure 41 and ends with a double bar line.

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Accompanying policy on non-agricultural sectors

Policies generating growth in the agriculture sector may not be enough to reduce rural poverty. They must be accompanied by expansion of the non-agricultural sector. Agriculture and non-agricultural sectors are interrelated through migration and financial resource flows in the form of income transfer and deposit-lending activities of the banking sector. Strong growth in the non-agricultural sector can reduce rural poverty despite stagnation in the agriculture sector. Although the income gaps between the agriculture and non-agriculture sectors tend to decline, the convergence process, left to itself, will take a long time. Enhancing agricultural productivity can reduce income inequality more effectively than the mere process of labor migration can do. Dynamism of the Thai agriculture and its survival depend primarily on continued productivity improvement in the sector.

Raising farm productivity can reduce income inequality.

Dynamism and survival of agriculture depend primarily on continuing improvement in farm productivity.



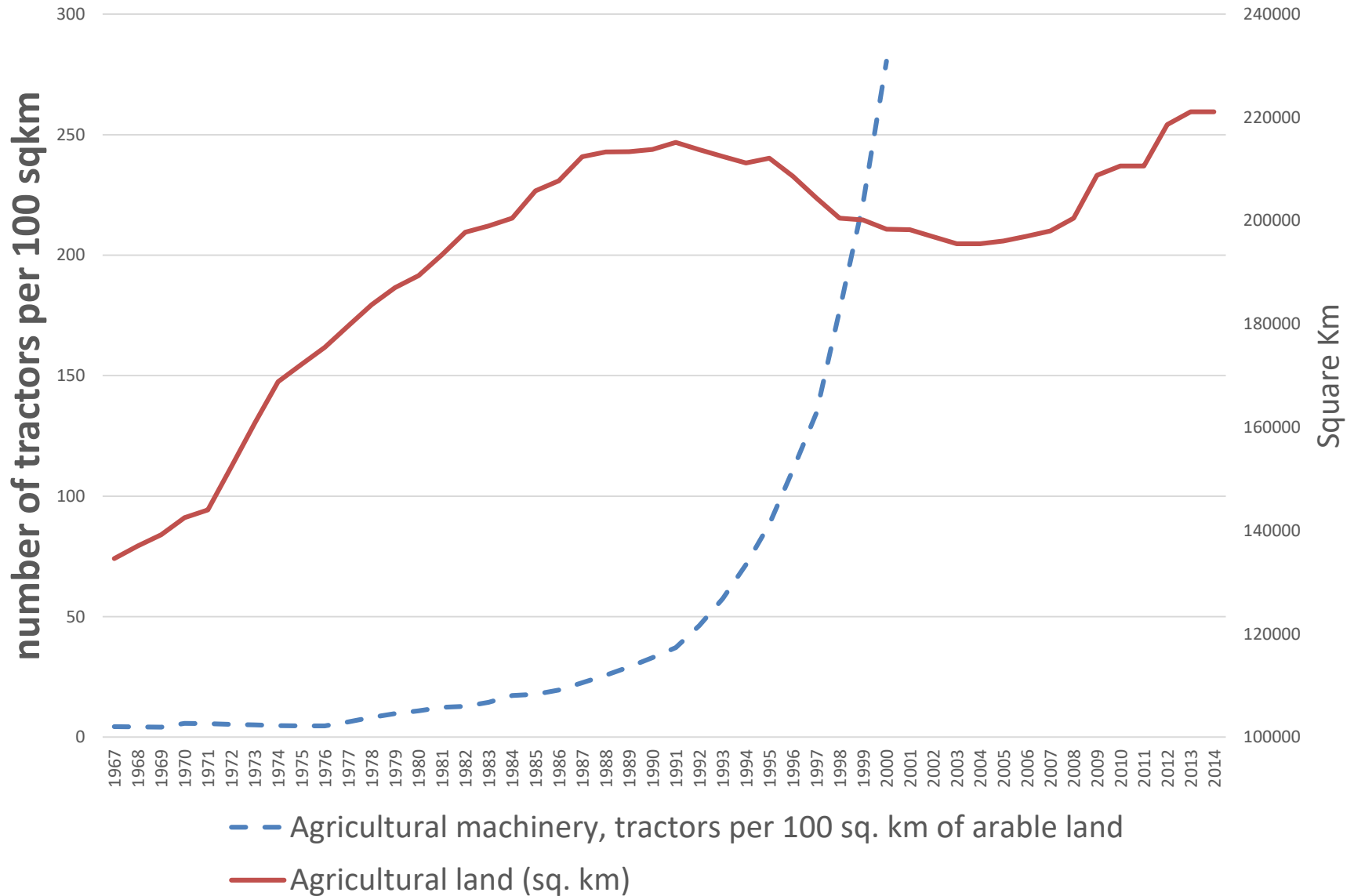
Rice ***transplanting*** (and opposed to broadcasting) method has remained unchanged over centuries.

A rice-seeding machine at Suphan Buri's Rice Science Institute September 11, 2017



Prime Minister Prayut Chan-o-cha had a photo op on a rice-seeding machine Monday at Suphan Buri's Thailand Rice Science Institute. He held a mobile cabinet meeting, but was greeted by key politicians of the Chartthaipattana Party, which dominates the province, and got his first political-party endorsement to stay in office indefinitely. (Photo via [@wassanananum](https://twitter.com/wassanananum))

Agricultural inputs: Land and machine



Kubota tractor in the rubber plantation



John Deere Sugarcane harvester



John Deer's Speed and fuel efficiency

- The 45 degree articulated frame steering system allows for a quicker turnaround in areas not fully prepared for mechanization.
- Designed to work well in ***a small sugarcane farm*** in Thailand.
- Sugarcane can be harvested at a faster rate (more than 20 tons / rai), and it is important for the sugarcane farmer to save fuel consumption (0.8 liter per ton).

High income elasticity of demand

- **Maize** was a commodity boom in the period 1961-1980, Thailand's exports of maize also grew by 13.8 %.
- When the world growth rate declined to 0.34 percent in the period 1981-2003, Thailand's exports of maize also declined sharply by 15 %.
- **Cassava** also turned from being a rising star in the period 1961-1980 into retreat later on, Thailand's exports of cassava also adjusted accordingly to the negative price incentives and the decline in the world market.
- **Canned pineapple** exports of Thailand also adjusted its position from **rising stars** into **falling stars**.

Nothing remains unchanged

- Top five agricultural exports commodities followed the same pattern of other successful commodities.
- In the future some of these top products would soon be disappearing and they would be replaced by newly emerging agricultural commodities.
- *This is an element of dynamism and resilience of Thai agriculture.*

New products connote dynamism

- **Vegetable and fruit** exports illustrate the flexibility of the agricultural export sector.
- When the world market expanded during the period 1976-1989, the Thai **processed food industry** responded at high growth rates in both value and quantity terms.

Income elasticity of demand for exports

$$\eta = \frac{\partial \ln X}{\partial \ln Y_w} = \frac{\% \Delta X}{\% \Delta Y_w}$$

If $\eta < 0$, product X is disappearing

Jute is a commodity with negative income elasticity of demand disappeared completely since 1980.

Snapshots from the past

- The changing pattern of Thailand's agricultural exports in the last four decades is shown by snapshots of top five agricultural commodities.
- Shares of rice and natural rubber in total agricultural exports have been gradually declining as new products have emerged and old products have faded away.
- Jute, maize, and cassava were no longer the principal agricultural commodities as they have little productivity improvement.
- Back in 1961, milled paddy rice and natural rubber were main export products.
- Jute, maize, and cassava flour were other items on the top five items accounting for 88.4 percent of total agricultural exports.

Principal Agricultural Exports: 1961

(percent of total Agricultural exports)

	Share
Milled Paddy Rice	42.7
Rubber Natural Dry	25.7
Jute	7.5
Maize	7.3
Cassava Flour	5.2
Total of top five:	88.4

Principal Agricultural Exports: 1970

(percent of total Agricultural exports)

	Share
Milled Paddy Rice	24.3
Rubber Natural	21.7
Maize	18
Cassava Dried	9.8
Jute	6.9
Total Share	80.7

Principal Agricultural Exports: 1980

(percent of total Agricultural exports)

	Share
Milled Paddy Rice	28.1
Cassava	19.8
Rubber Natural	18.1
Maize	10.5
Sugar (Raw)	4.3
Total top five:	80.8

Principal Agricultural Exports: 1990

(percent of total Agricultural exports)

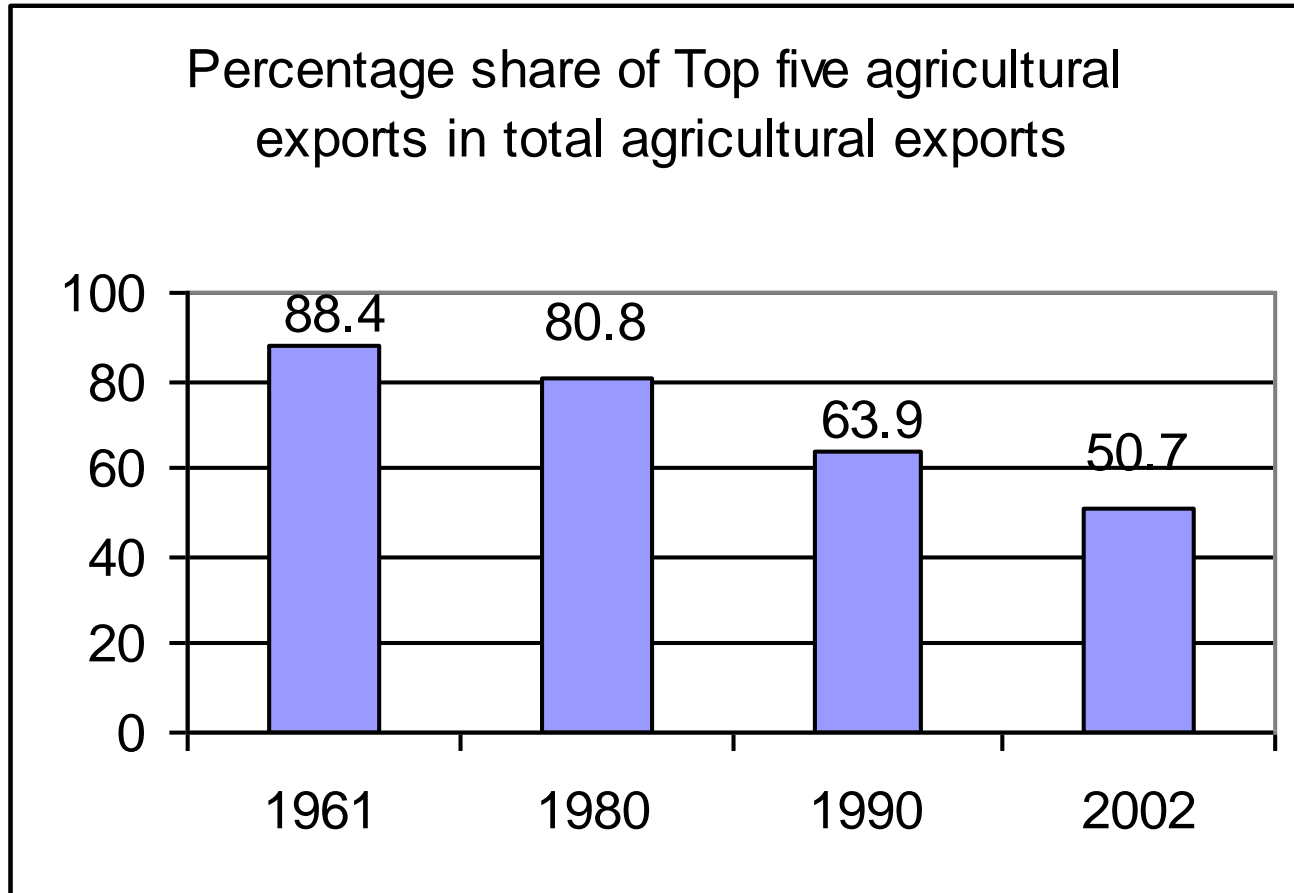
	Share
Milled Paddy Rice	18.5
Rubber Natural Dry	16.2
Cassava Dried	14.7
Sugar (centrifugal raw)	9
Chicken Meat	5.5
Total sum of top five:	63.9

Principal Agricultural Exports: 2002

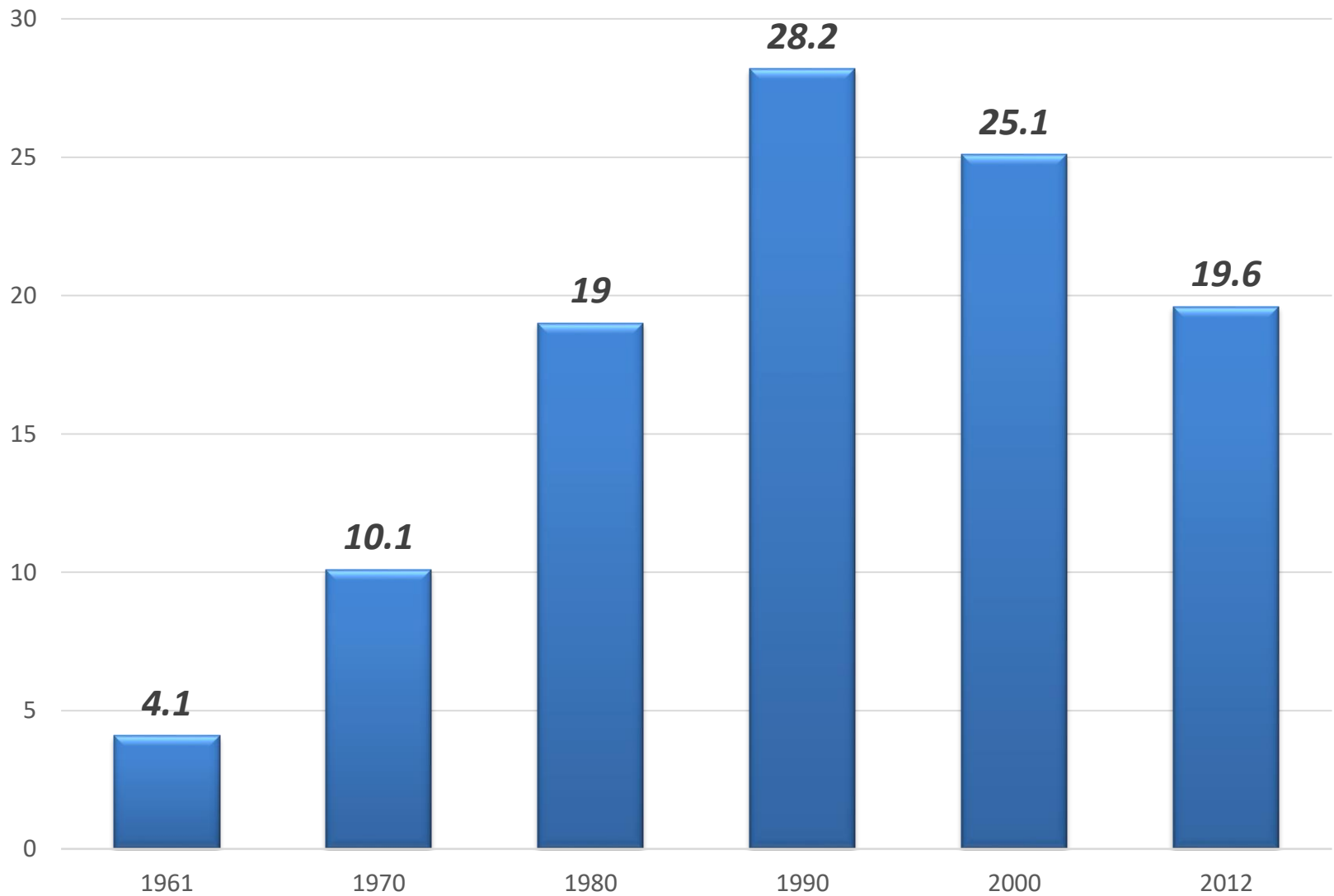
(percent of total Agricultural exports)

Items	Share
Rubber Natural Dry	17.3
Milled Paddy Rice	17.1
Chicken Meat	6.5
Meat Canned chicken	5.2
Sugar refined	4.6
Total share	50.7

Diversification of agricultural exports implies less concentration of principal exports

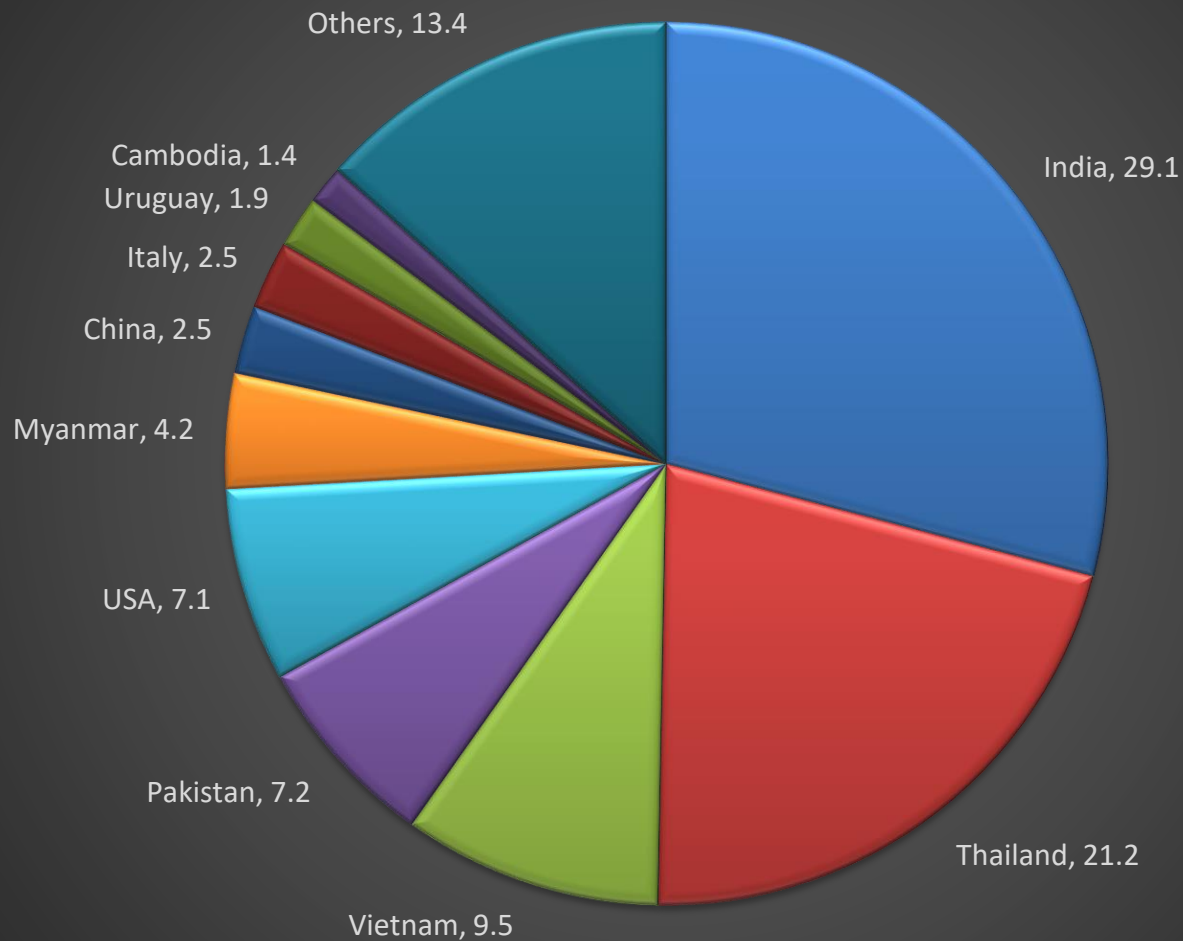


World Market Share of Thailand's rice exports (%)



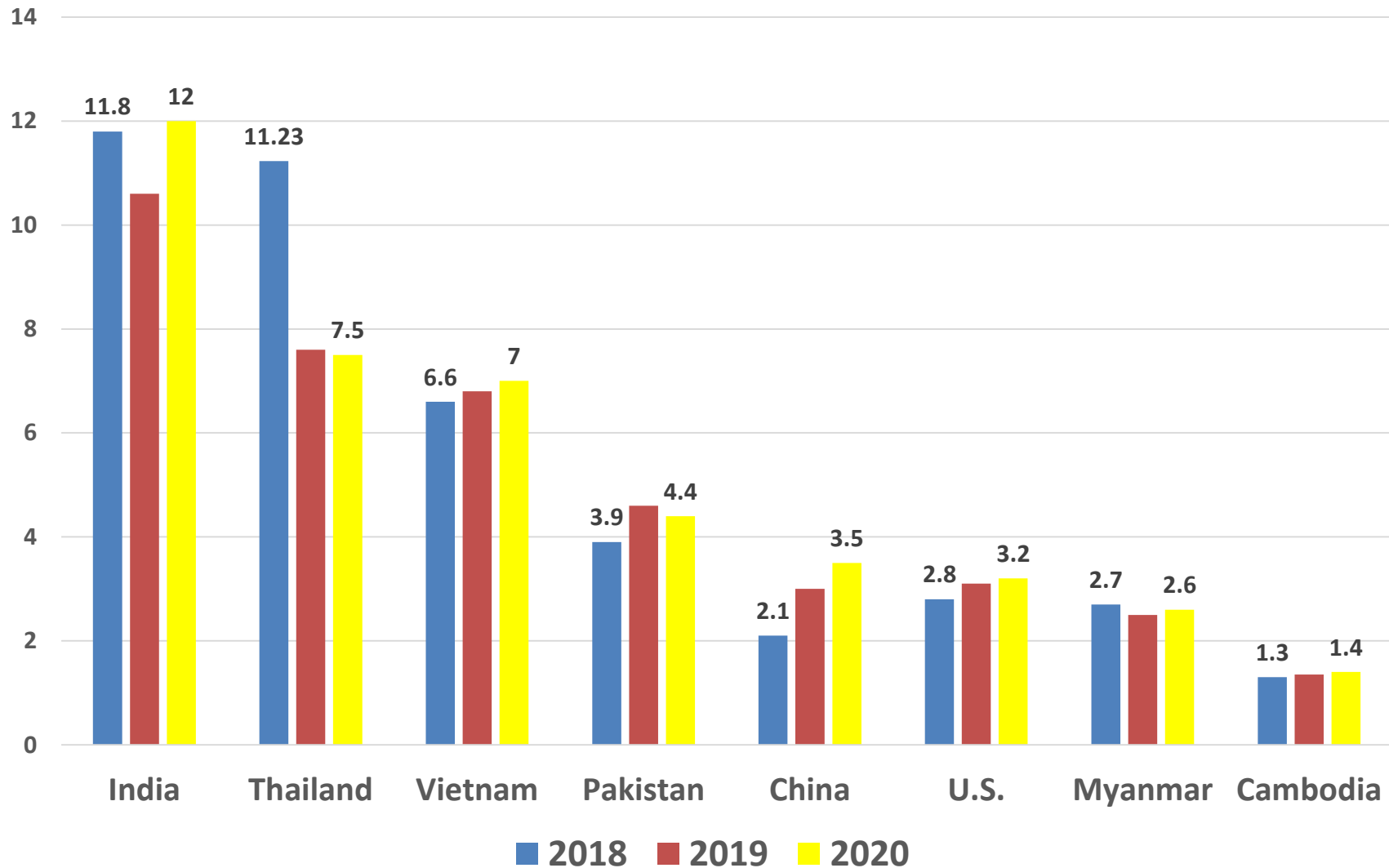
“Success is not final; failure is not fatal”

Share in world exports of rice (2017)



India Thailand Vietnam Pakistan USA Myanmar China Italy Uruguay Cambodia Others

Rice exports of major exporting countries (million tons of milled rice)



Conclusion

- Being resilient requires adaptability to market demand and production flexibility.
- Minimizing export instability can be done through product and market diversification.
- what commodities and which markets where the country exports matter.
- Dynamisms is demonstrated by creating new products to suit changing demand pattern.

The role of infrastructure development

The role of the government is crucial in providing investment in infrastructure and agricultural research in order to make sure that farm productivity can be enhanced continuously. The government must reduce distortions in markets of farm output and factor inputs. Agricultural credit, an important factor input, has been provided to Thai farmers by the Bank of Agriculture and Agricultural Cooperatives. The current support of the rural sector has gone too far in injecting money into rural areas without considering the basic cost-benefit principle and without concern about alternative uses of limited financial resources. Intervention by the government has already gone to the point of guaranteeing prices of rice and rubber. As experiences of Japan and Taiwan indicate, the decline in agriculture's terms of trade induced resource flows and encouraged industrial development (Hondai, 1985). However, there must be continuous technological change in agriculture to offset the terms of trade that continuously move against agriculture. When productivity in agriculture increases, it will allow labor to shift to non-agricultural sectors rapidly without having to distort the terms of trade in favor of agriculture.

The decline in agriculture's terms of trade induced resource outflows and discouraged agriculture development.

There must be continuous technological improvement in agriculture to offset declining terms of trade.

Water shortage is a perennial problem of Thai agriculture.

Weather permitting, abundant supply leads to falling prices.

Drying up Chee River



“The only thing you learn from history is that no one learns anything from history.”

Otto von Habsburg