

# Vulnerability, Resilience, and Dynamism of Thailand's Agriculture

Bhanupong  
Lecture 11

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

# Key words

- Vulnerability and Resilience
- Supply responses to price changes
- 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

# 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.

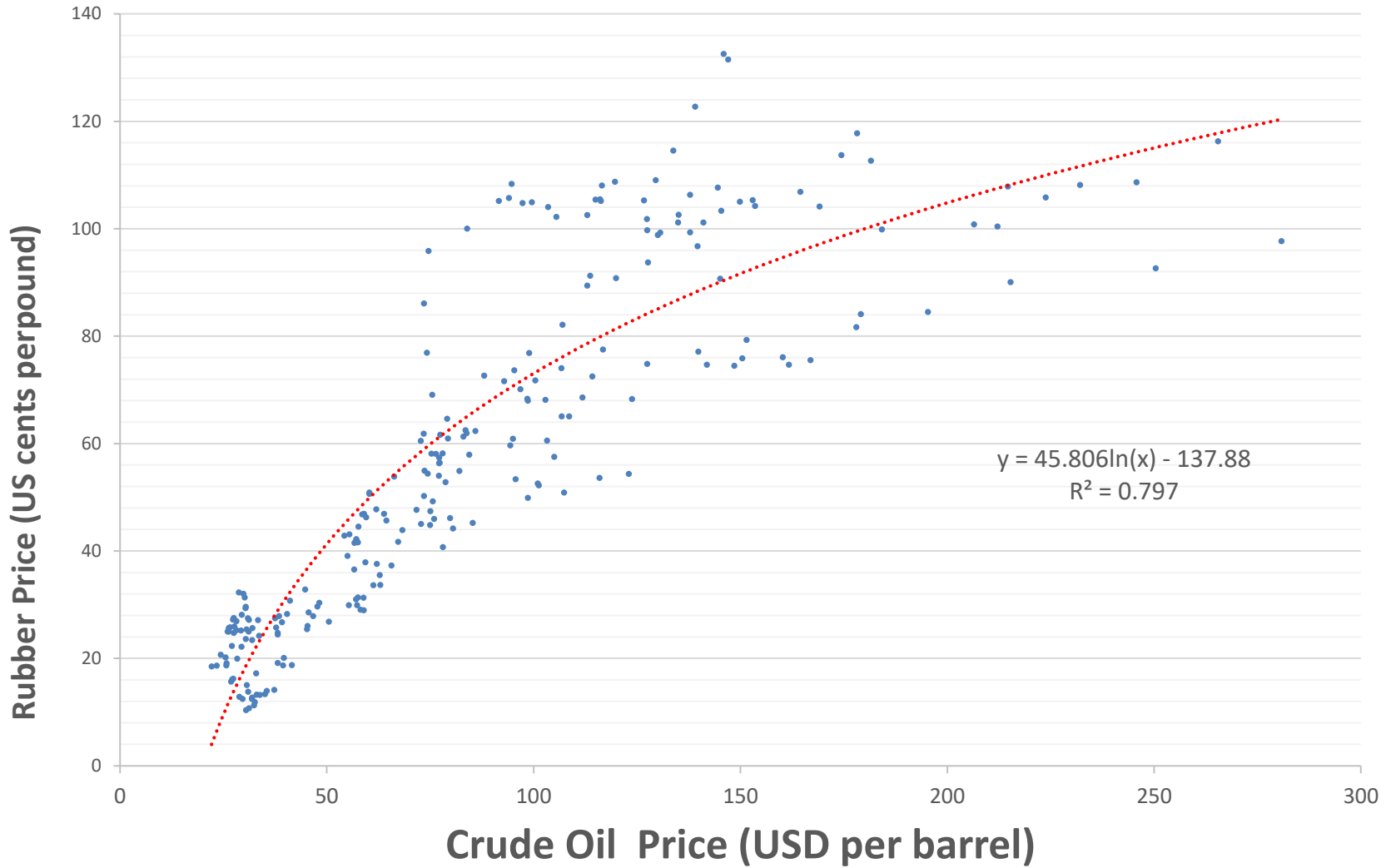


The viscous white liquid slowly drips into a cup attached to the tree for about **four hours**, until the cut has healed itself.

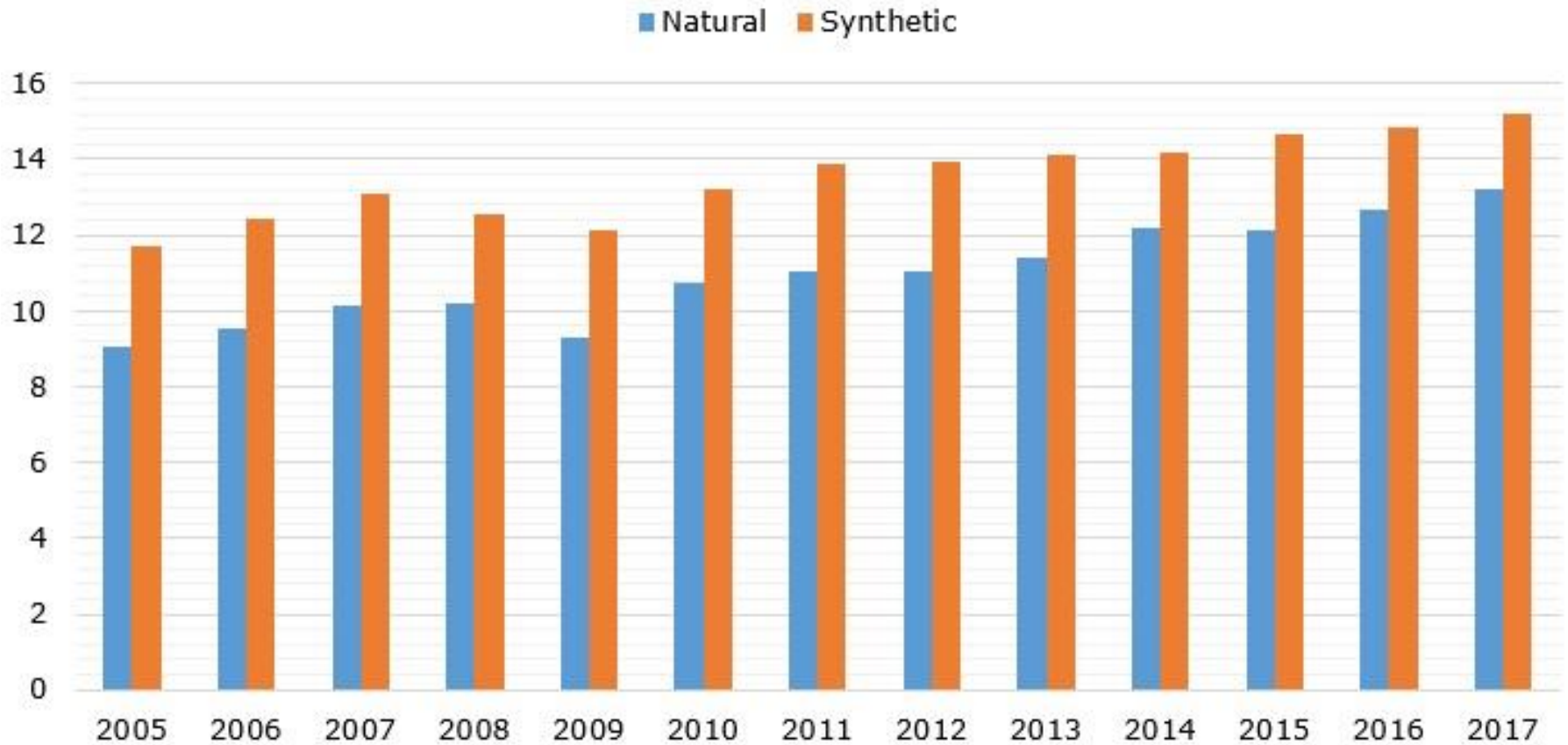
The prices for natural rubber have decreased dramatically, affecting about two million Thai people, who struggle to make a living.



# Crude Oil and Natural Rubber Prices January 1997- September 2017



# Natural vs. Synthetic Rubber



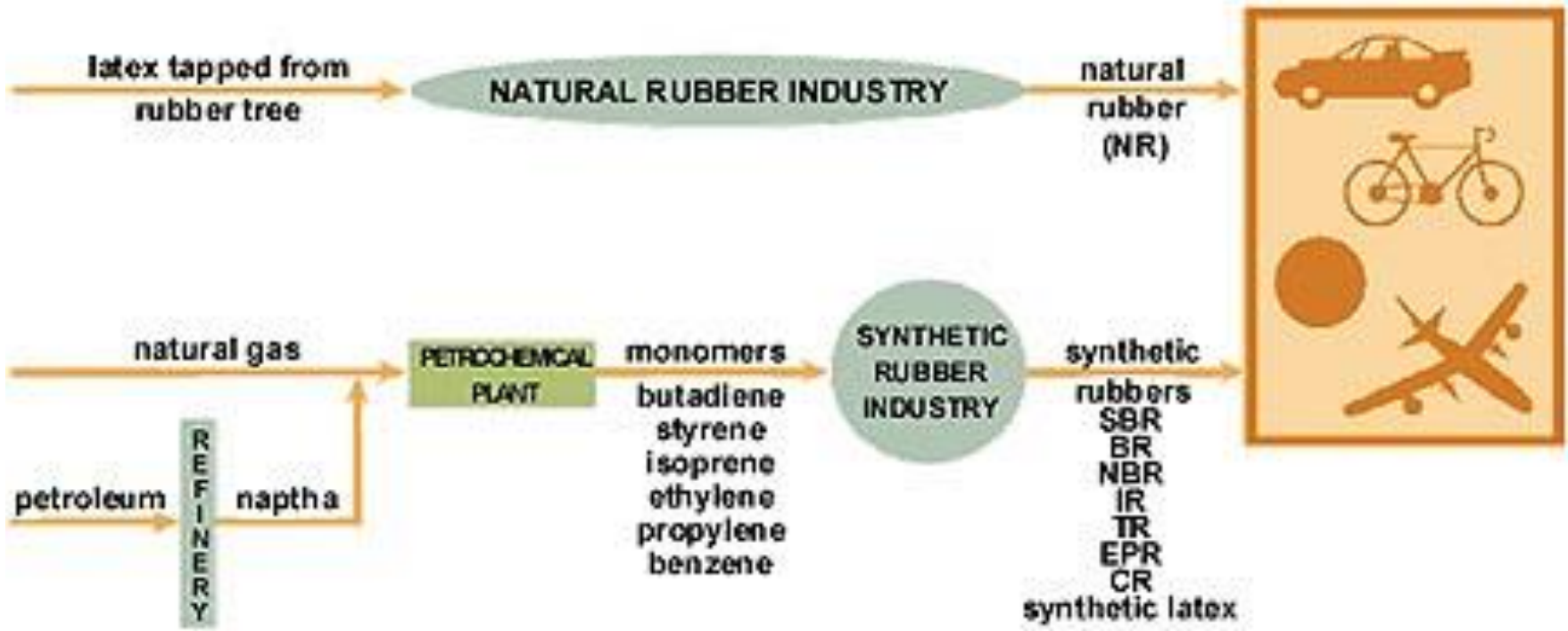
# They are not perfect substitutes

- Unlike natural rubber, the properties of these rubbers can be fabricated according to the final requirement by applying various polymer chemistry techniques.
- For example, we can develop synthetic rubbers with excellent weather, chemical, temperature and solvent resistance.

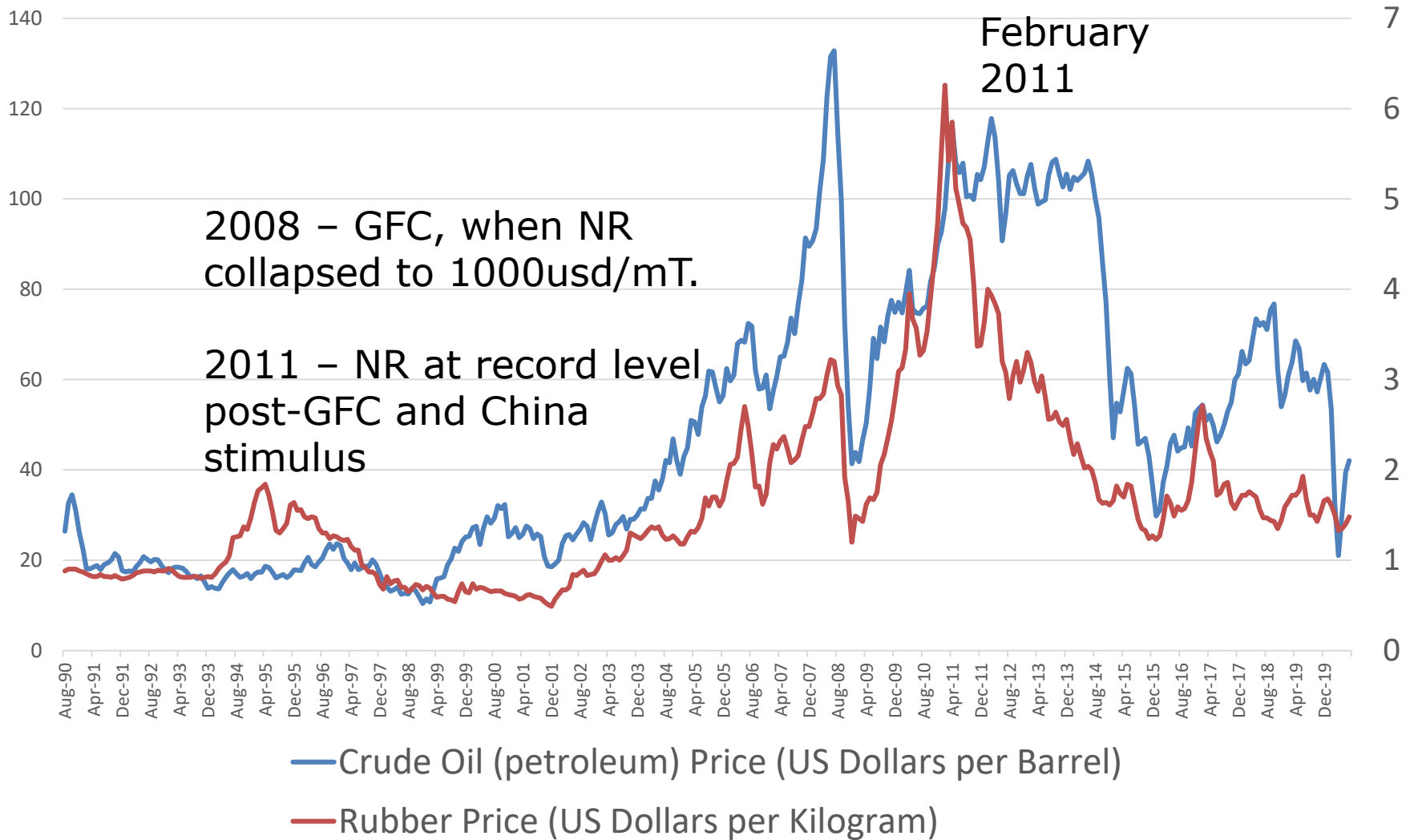
# Different usages

- Synthetic rubber, just like natural rubber , has many uses in the car industry for tires, door and window profiles, seals such as O-rings and gaskets, hoses, belts, matting and flooring.
- Synthetic and natural rubbers offer a different range of physical and chemical properties, so can improve the reliability of a given product or application.

Synthetic rubbers are the man-made rubbers. The raw materials for the production of synthetic rubbers are mainly obtained as the by-products of crude oil production.

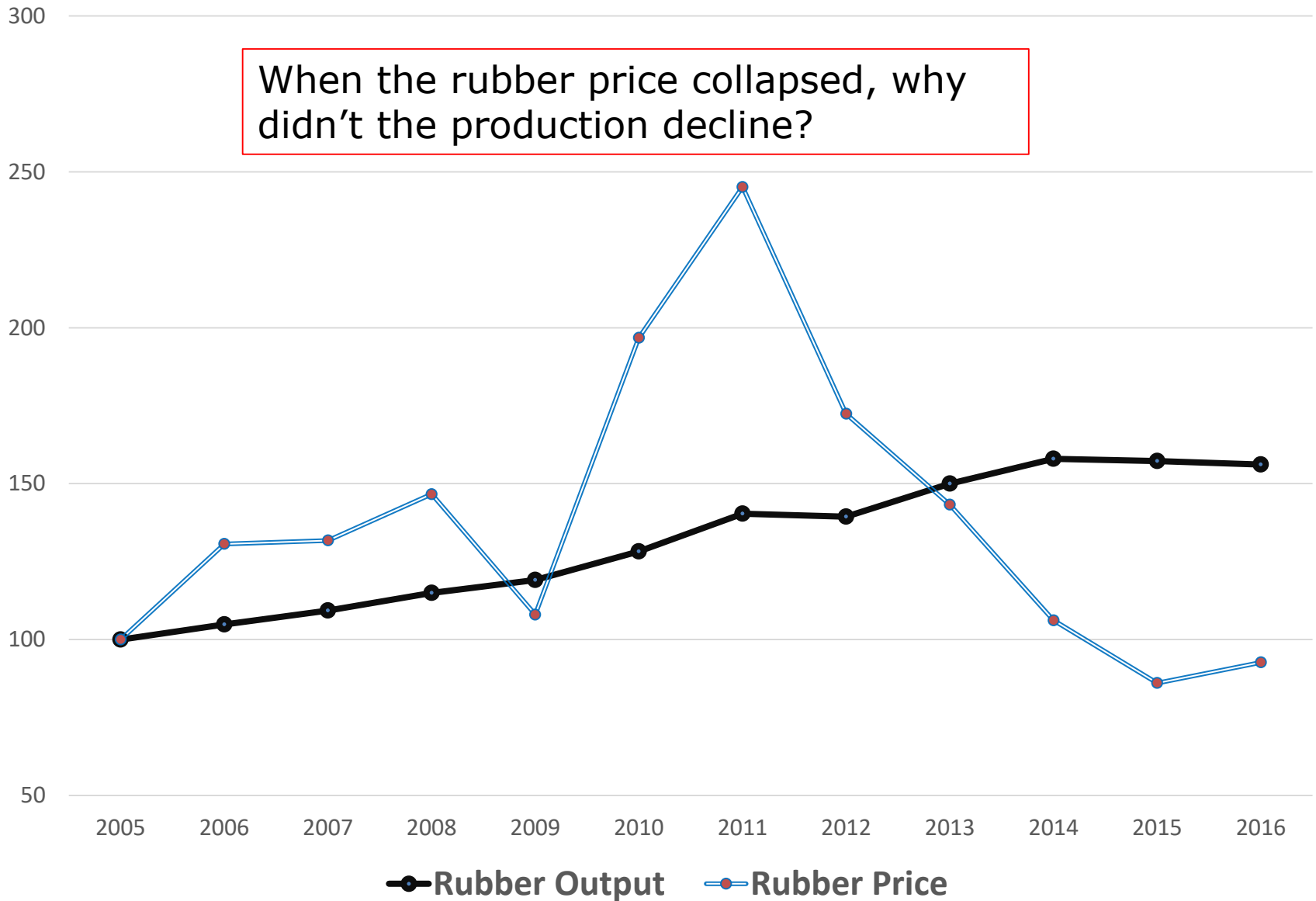


# Rubber and Crude Prices



# Rubber Farmers in Trouble

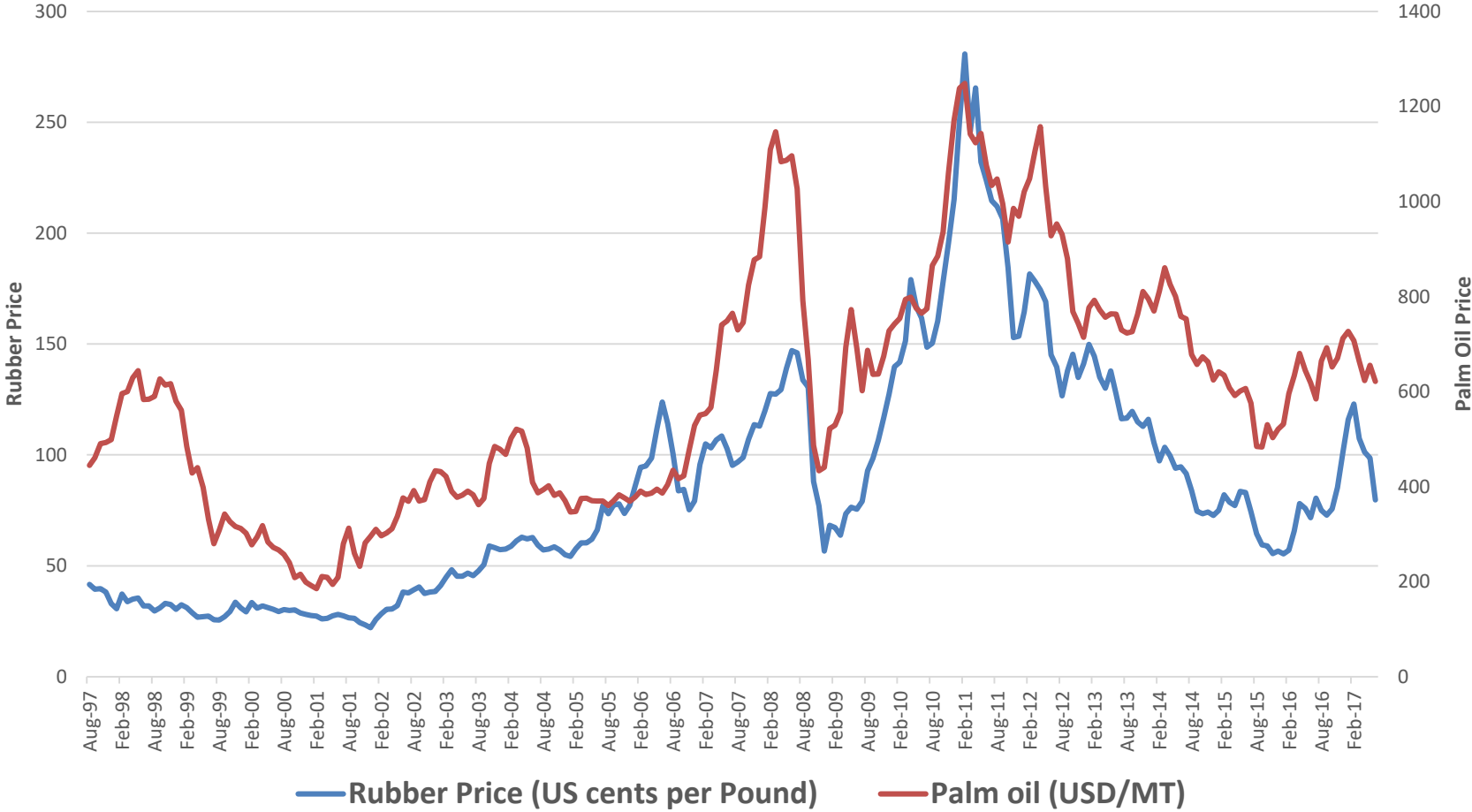
When the rubber price collapsed, why didn't the production decline?



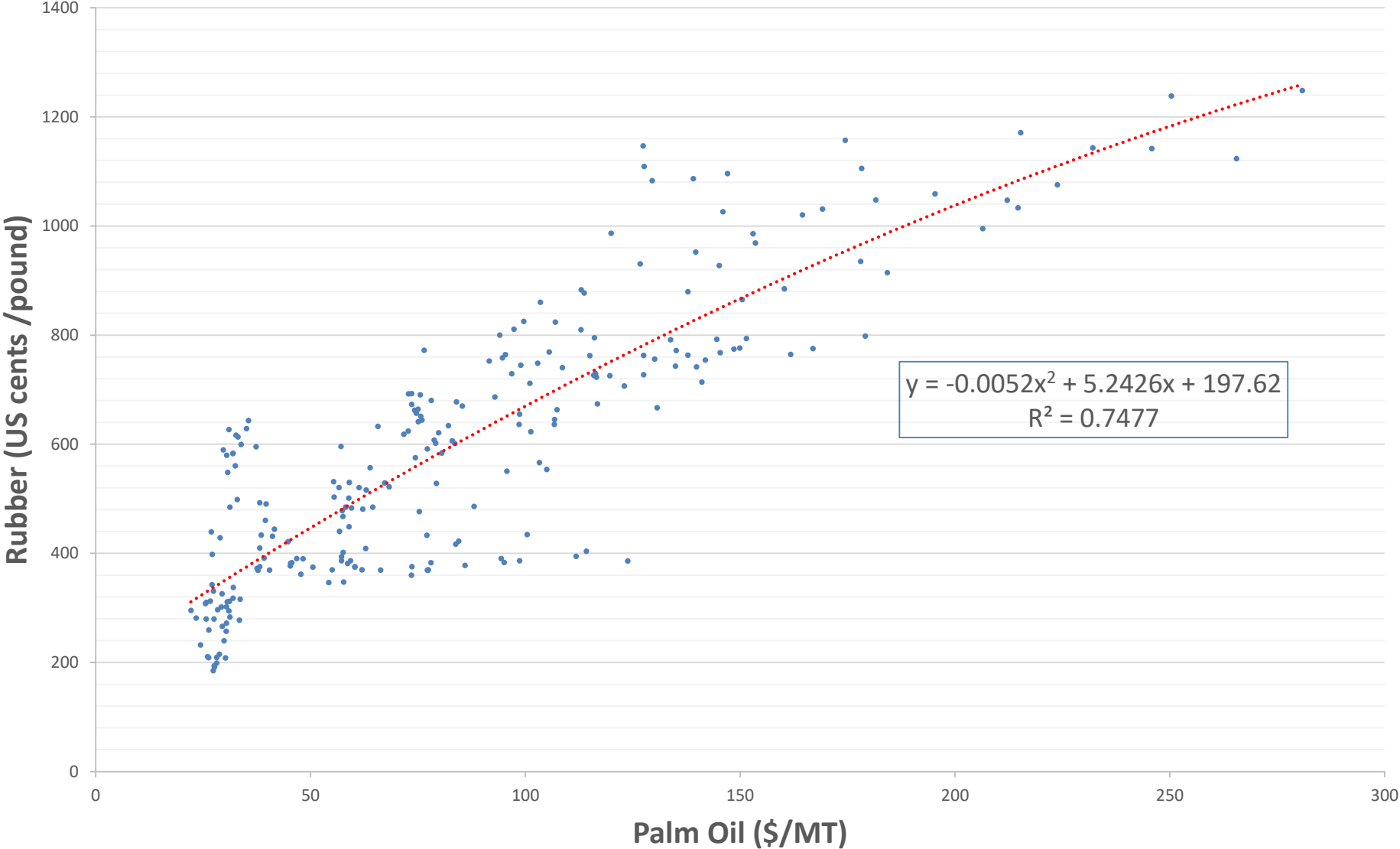
Due to the oversupply of natural rubber and the rising demand for **synthetic petroleum-based rubbers**, many rubber farmers expand into the more profitable palm tree business to produce palm oil.

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

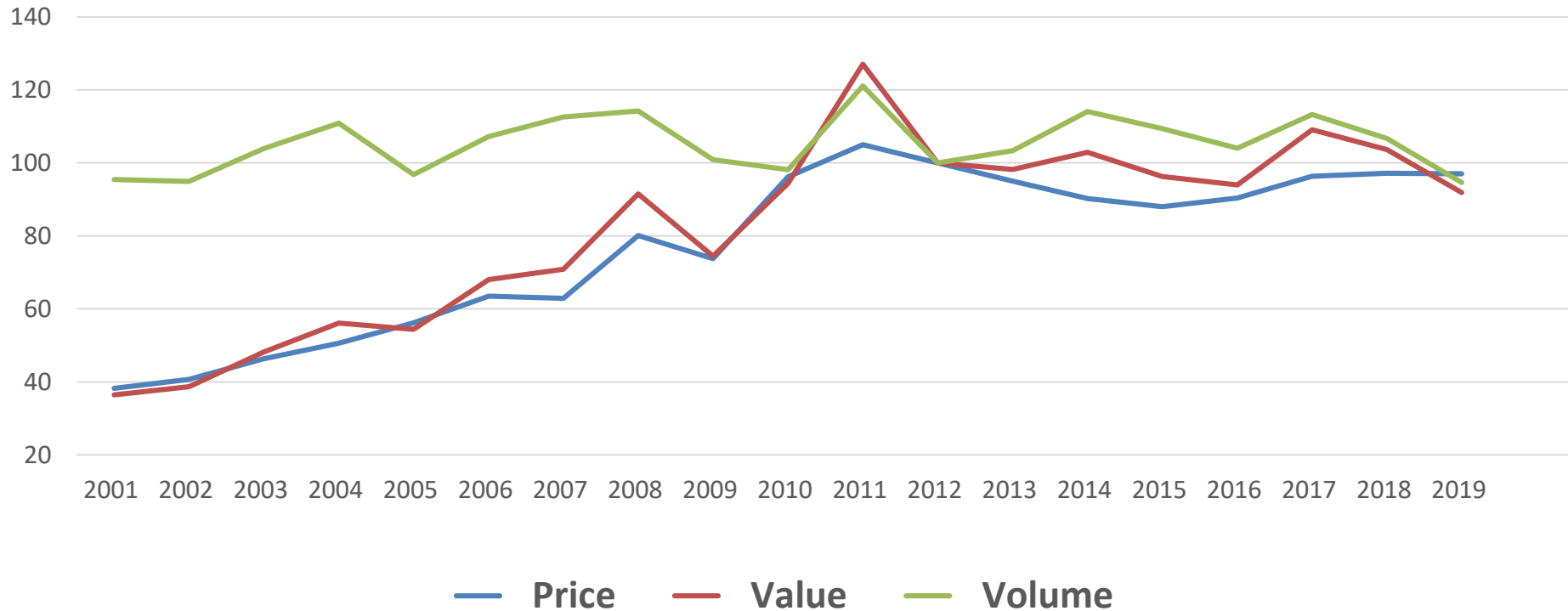


# Diversification is not the way out

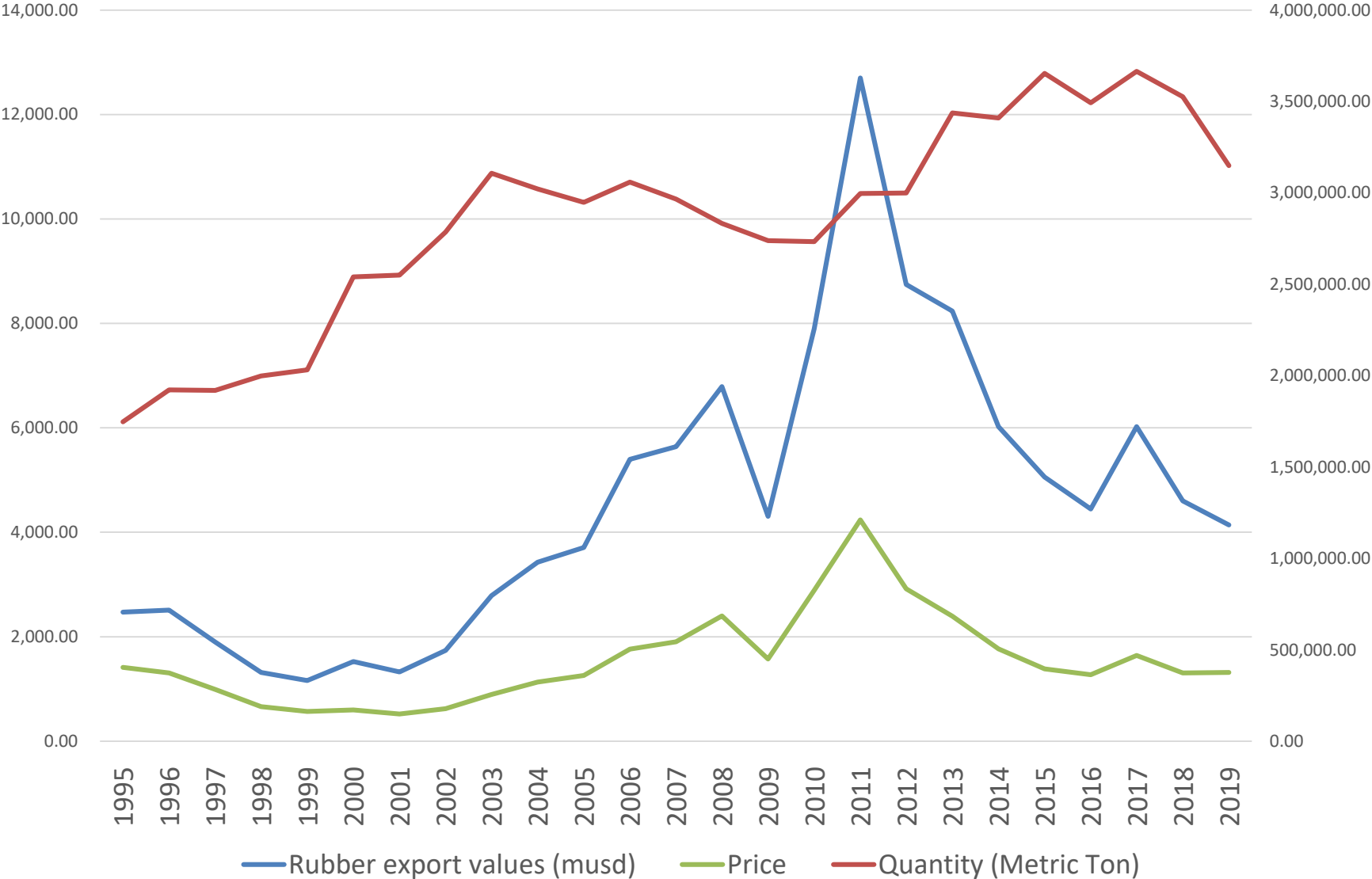


# The importance of agricultural prices

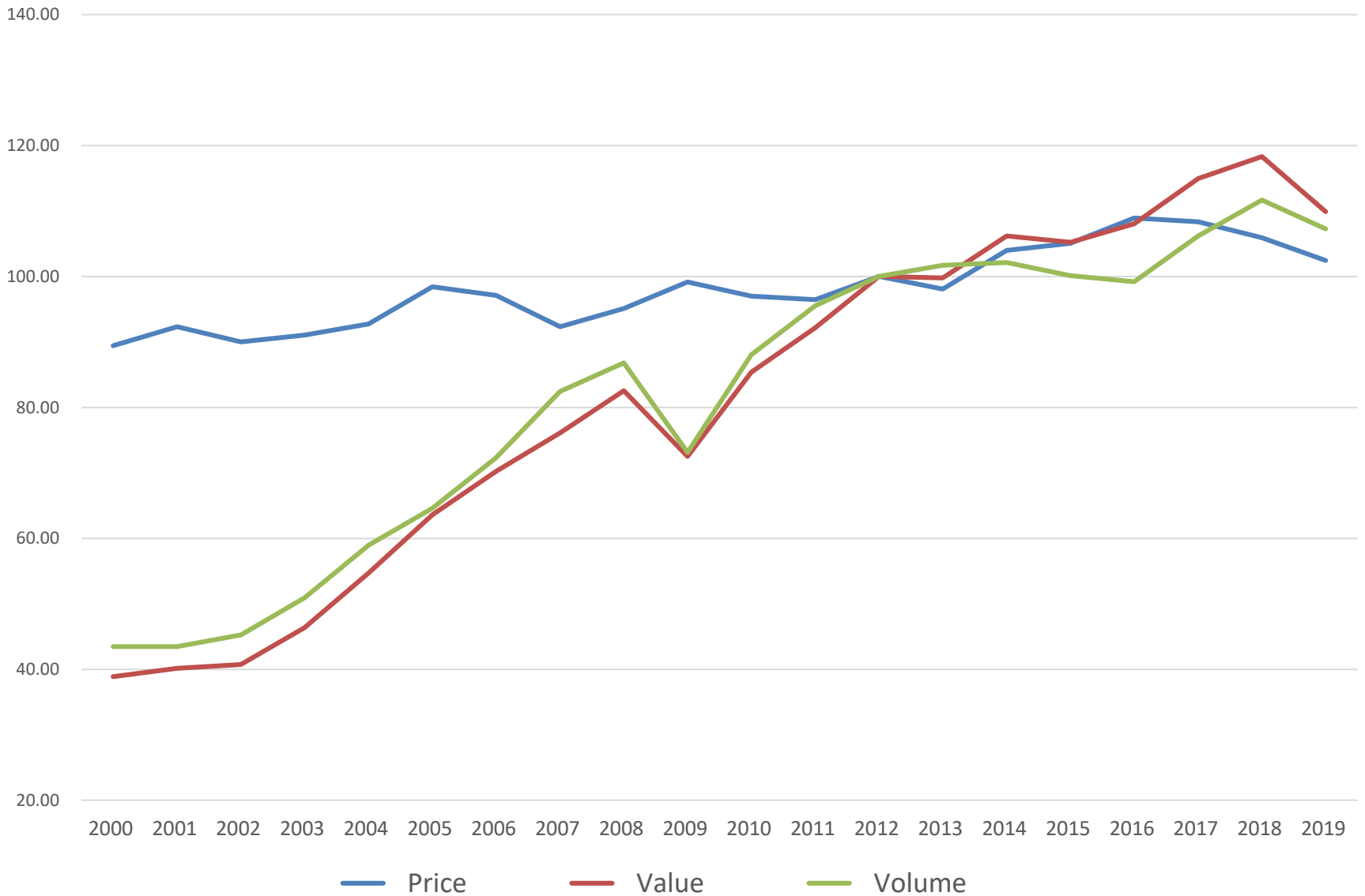
## Agricultural Export Indices



# Rubber exports



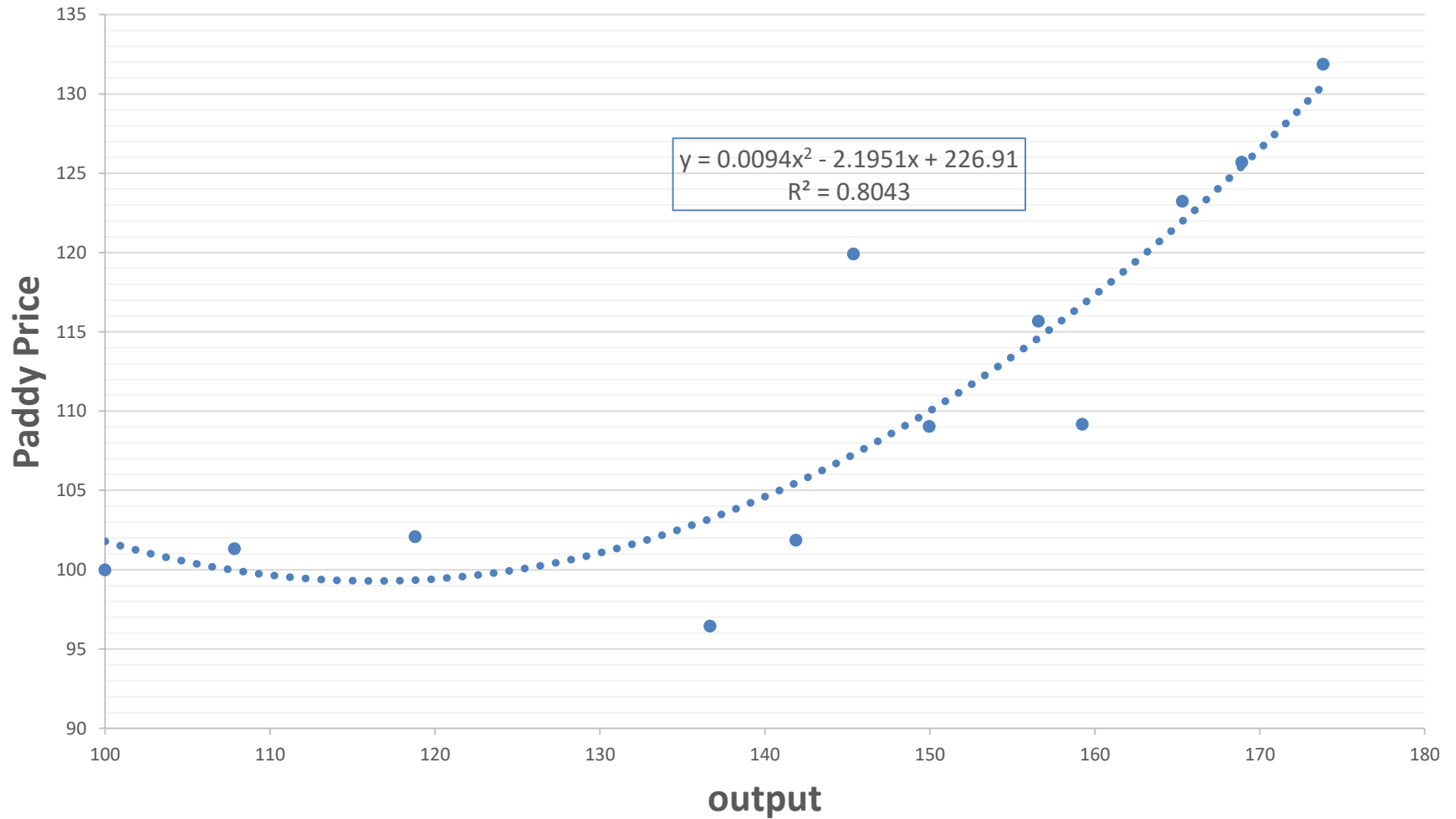
# Manufacturing Export Indices



## *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?

# Paddy supply responses to prices 2005-2016

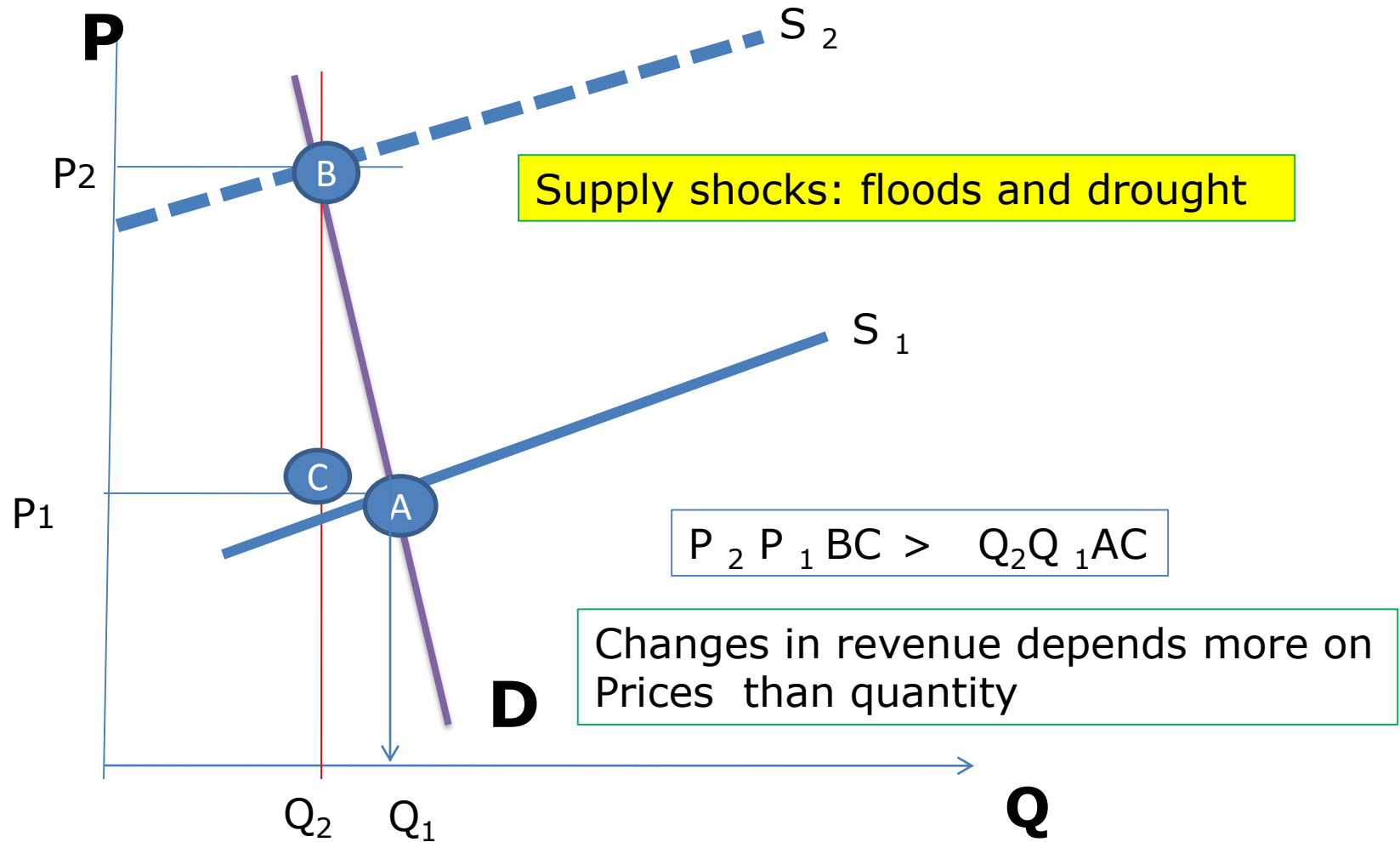


October 30<sup>th</sup>, 2019

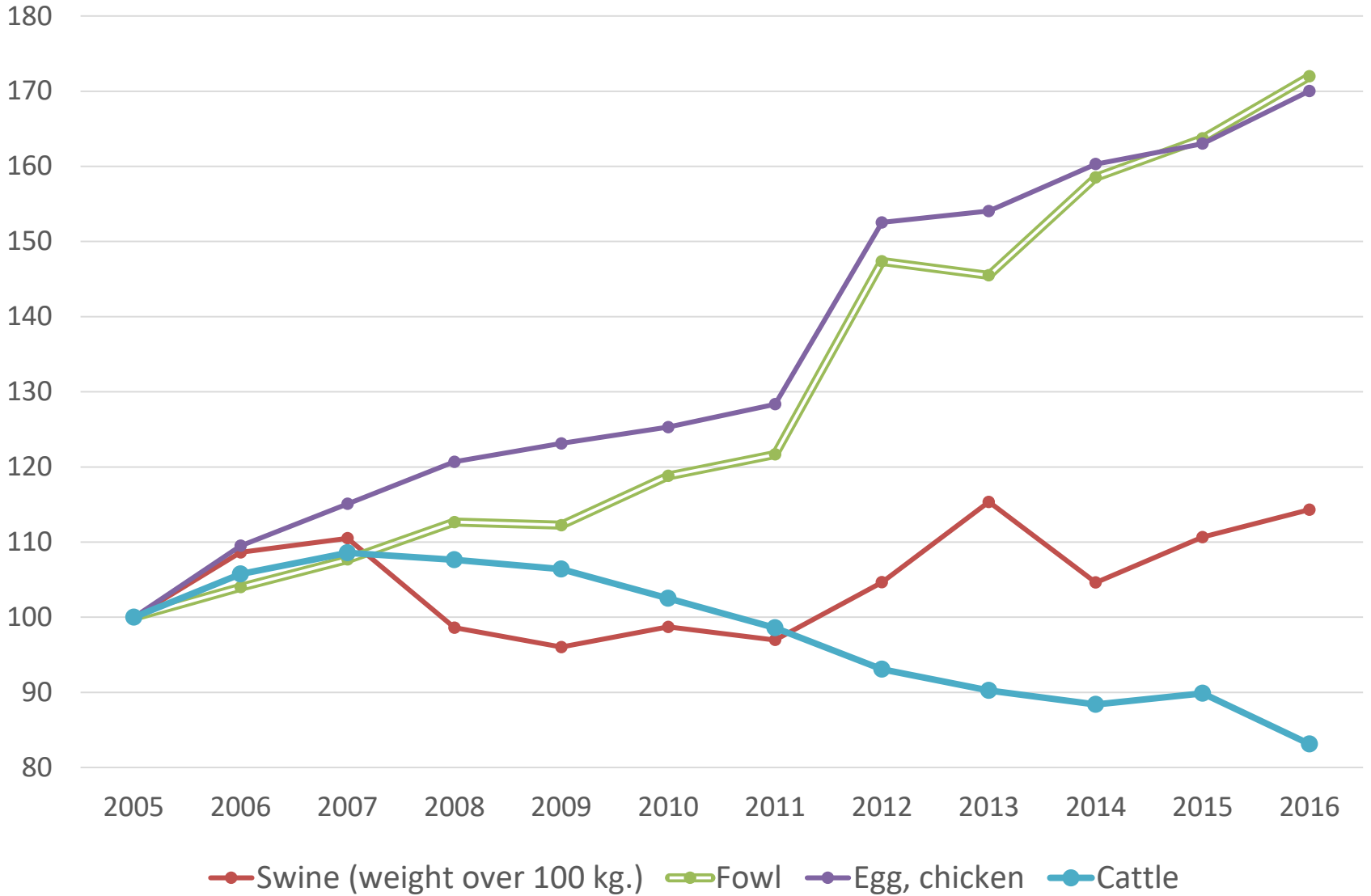


# Nature of agricultural products

## When the demand is *inelastic*

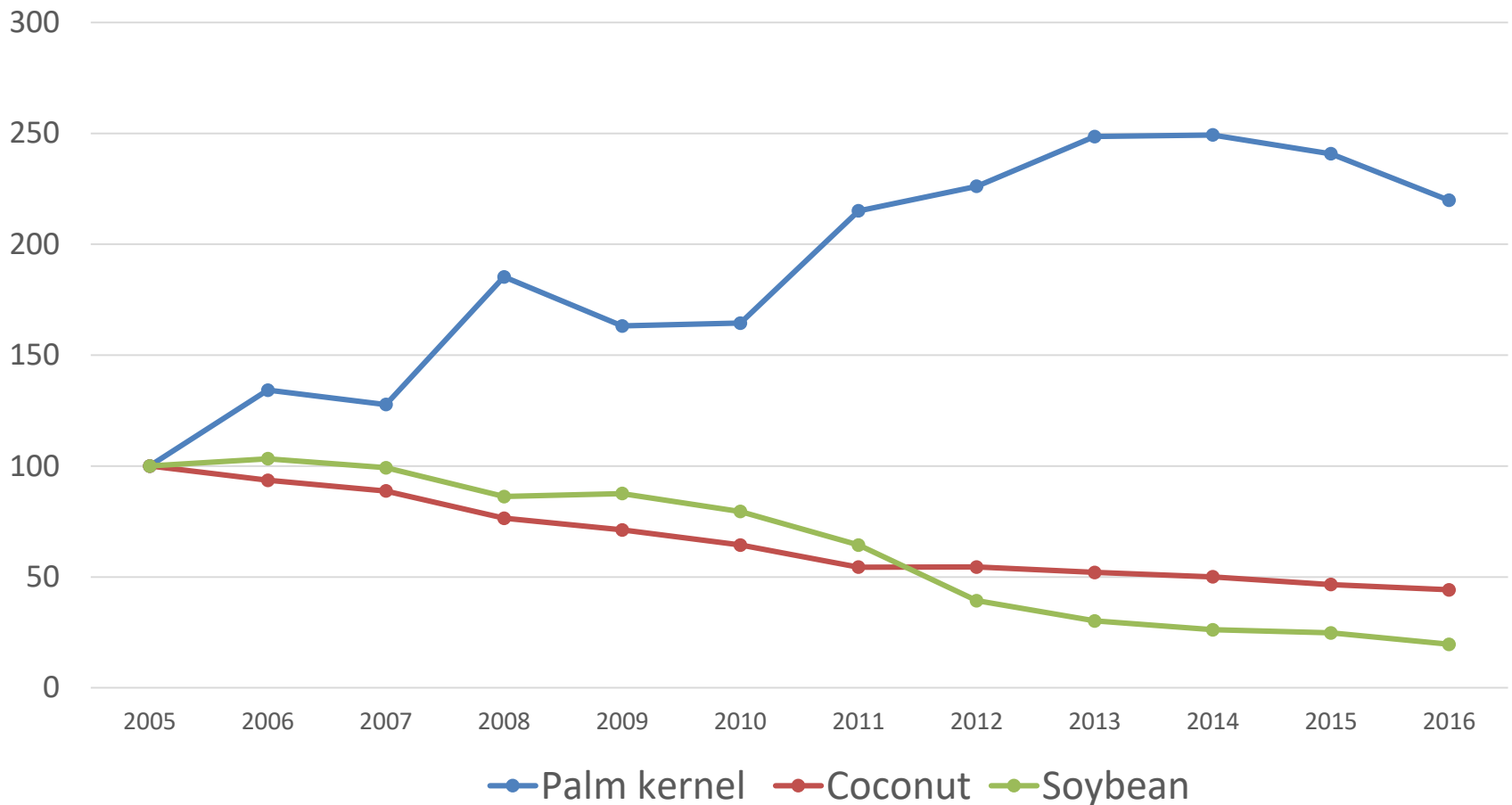


# Livestocks Production



# Changing Agricultural Production since 2005

## Production of oil seeds



Falling palm price:  
Two baht per kg



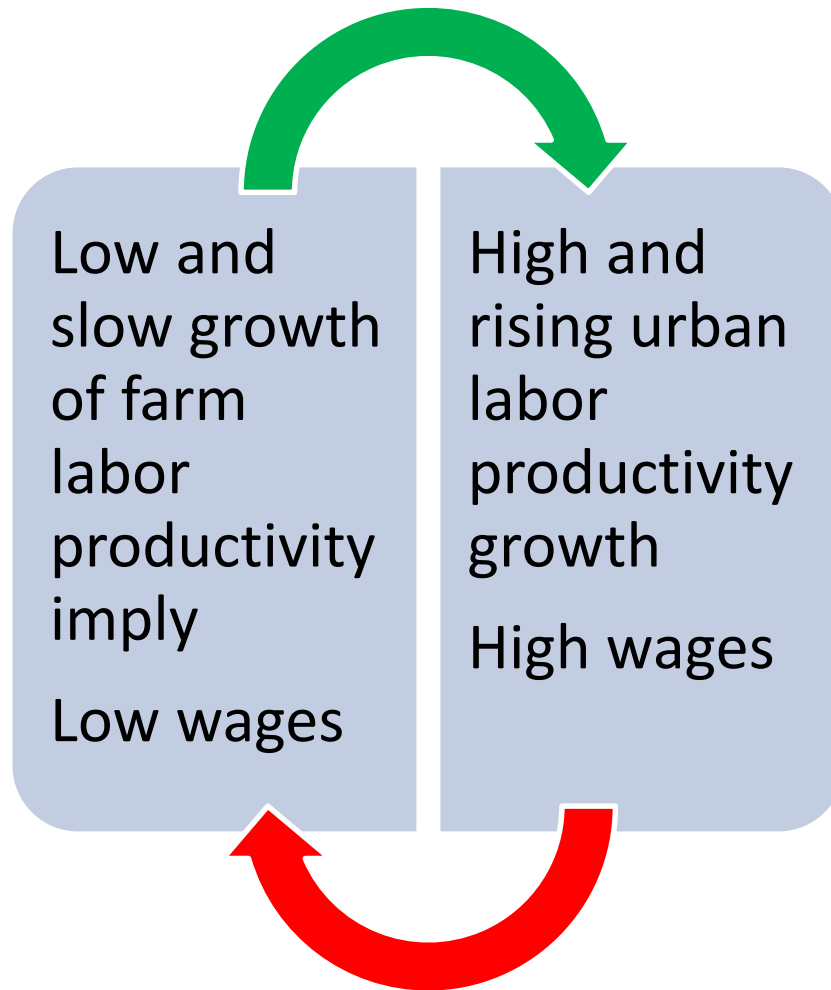
# Cost disease

- 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 costs in sectors that lag behind in productivity improvement.***
- ***Live performing arts*** belong to a ***stable productivity*** sector of the economy.

# FÜR ELISE

SOLO FOR LEAD PAN

Ludwig van Beethoven  
Arr. Angeline Moore

Poco Moto

1  
pp p

7  
mf

16

23  
p

30  
mf p

37

41

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• 1 •

"Für Elise" by Ludwig van Beethoven (1810) lasts 3 minutes  
A pianist in 2020 still spends the same time just like 210 years ago.

# For agricultural to survive and thrive, dynamism is required

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 between rural and urban areas.

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



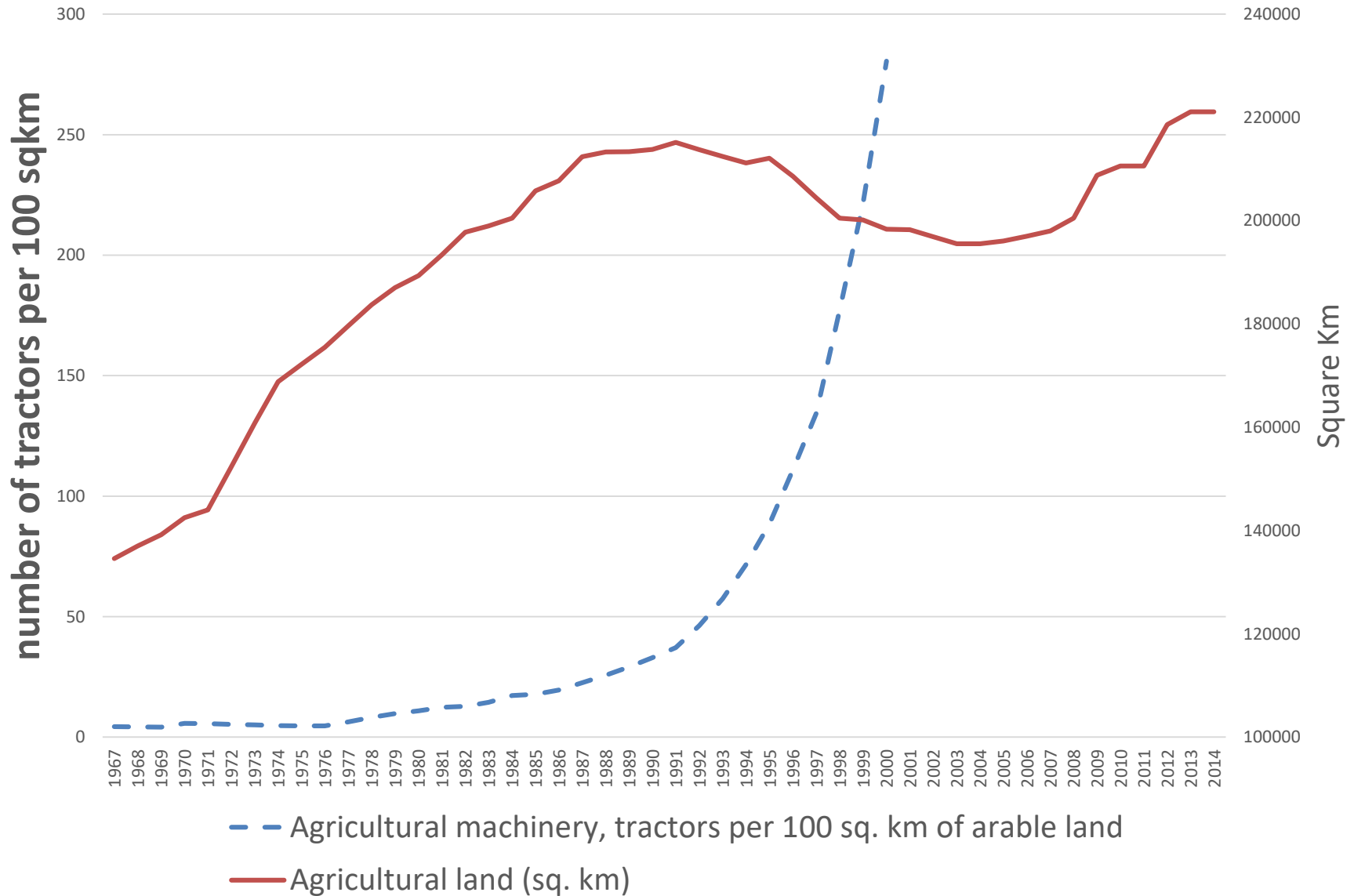
Rice ***transplanting*** (and opposed to broadcasting) method has remained unchanged over centuries.

# 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 [Twitter/@wassananam](#))

# Agricultural inputs: Land and machine

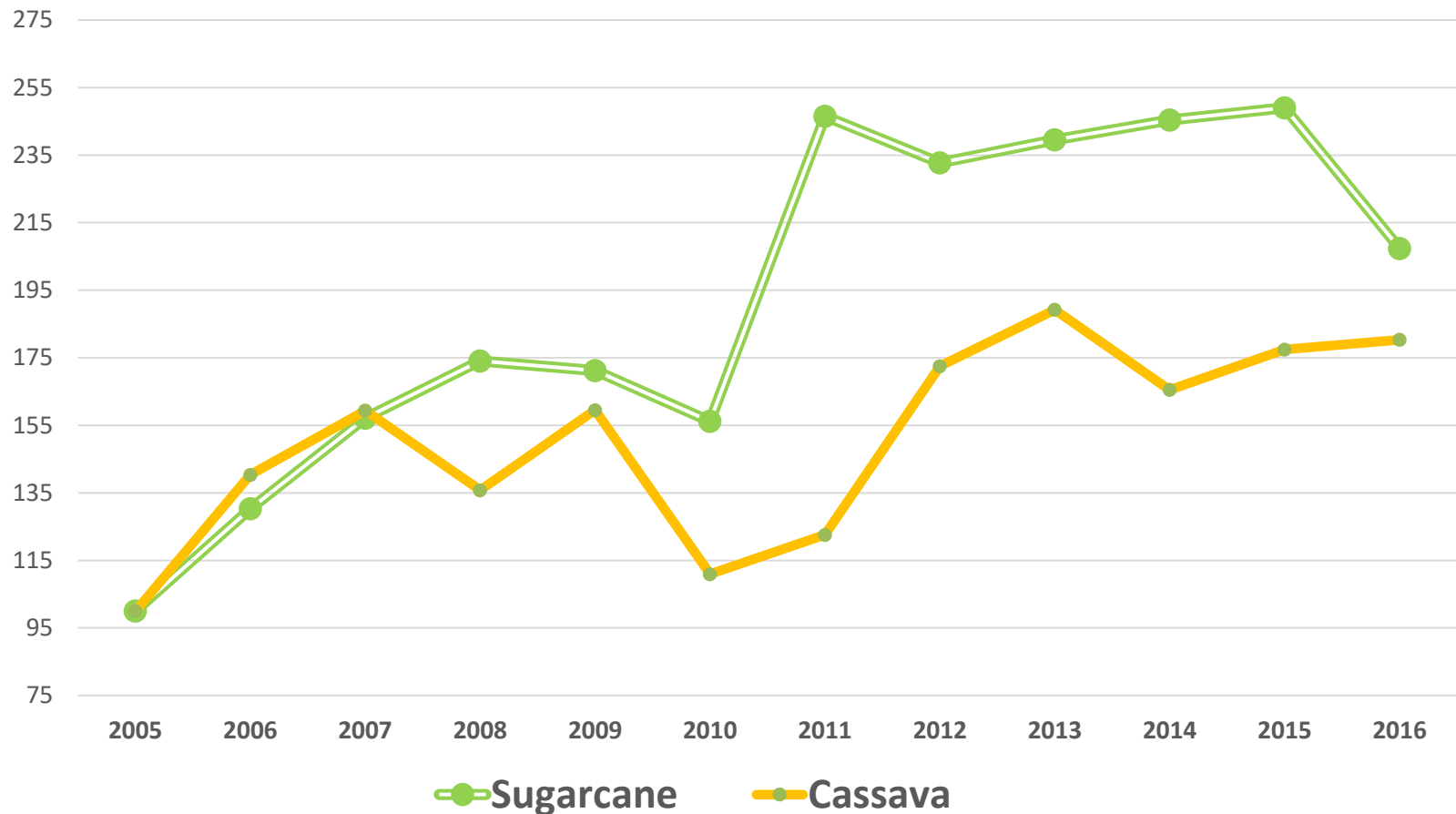


# Kubota tractor in a rubber plantation

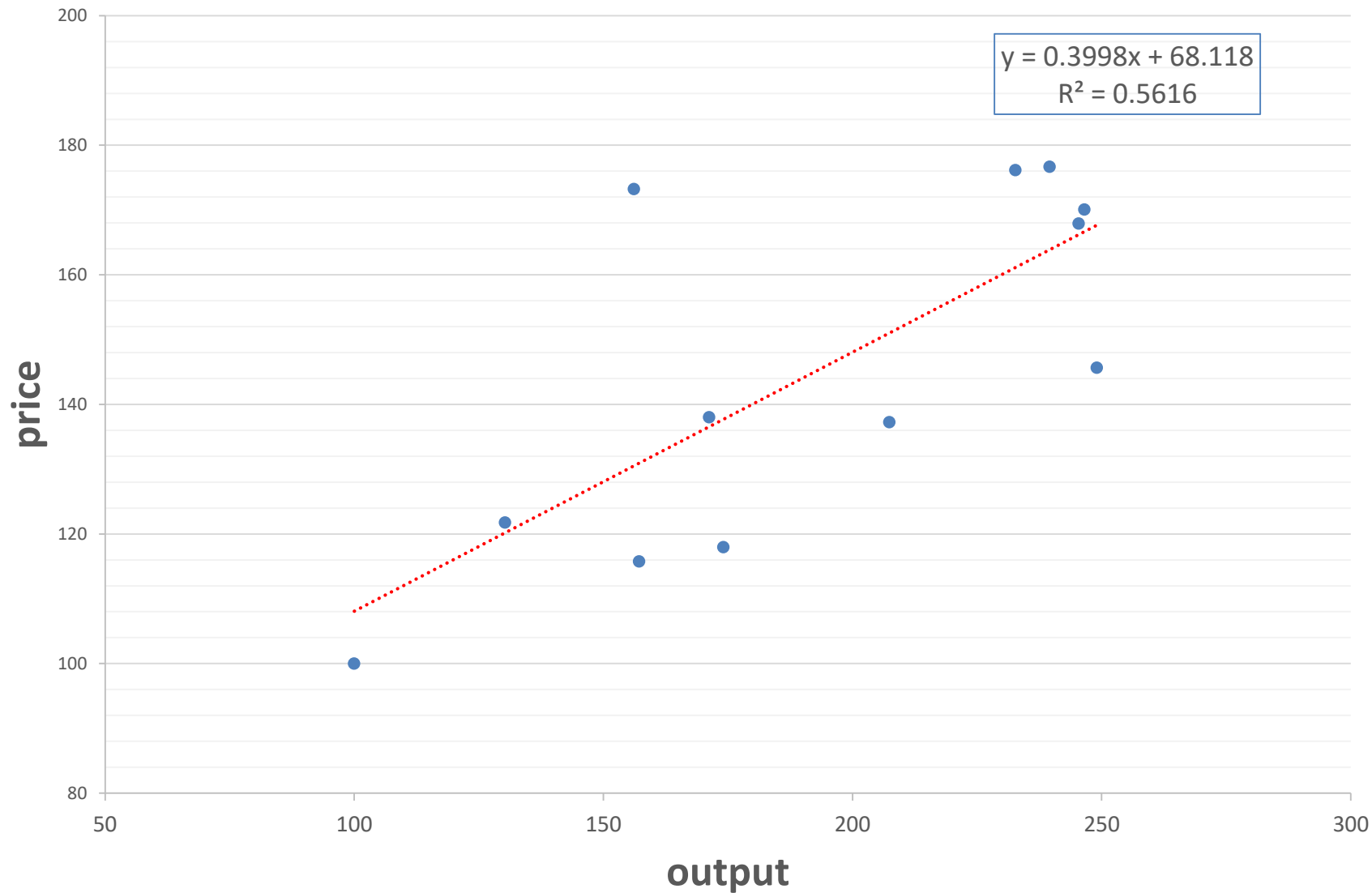


# Emerging crops in the early 2000s

## Crop Production Index



# Supply response of sugarcane to sugar prices



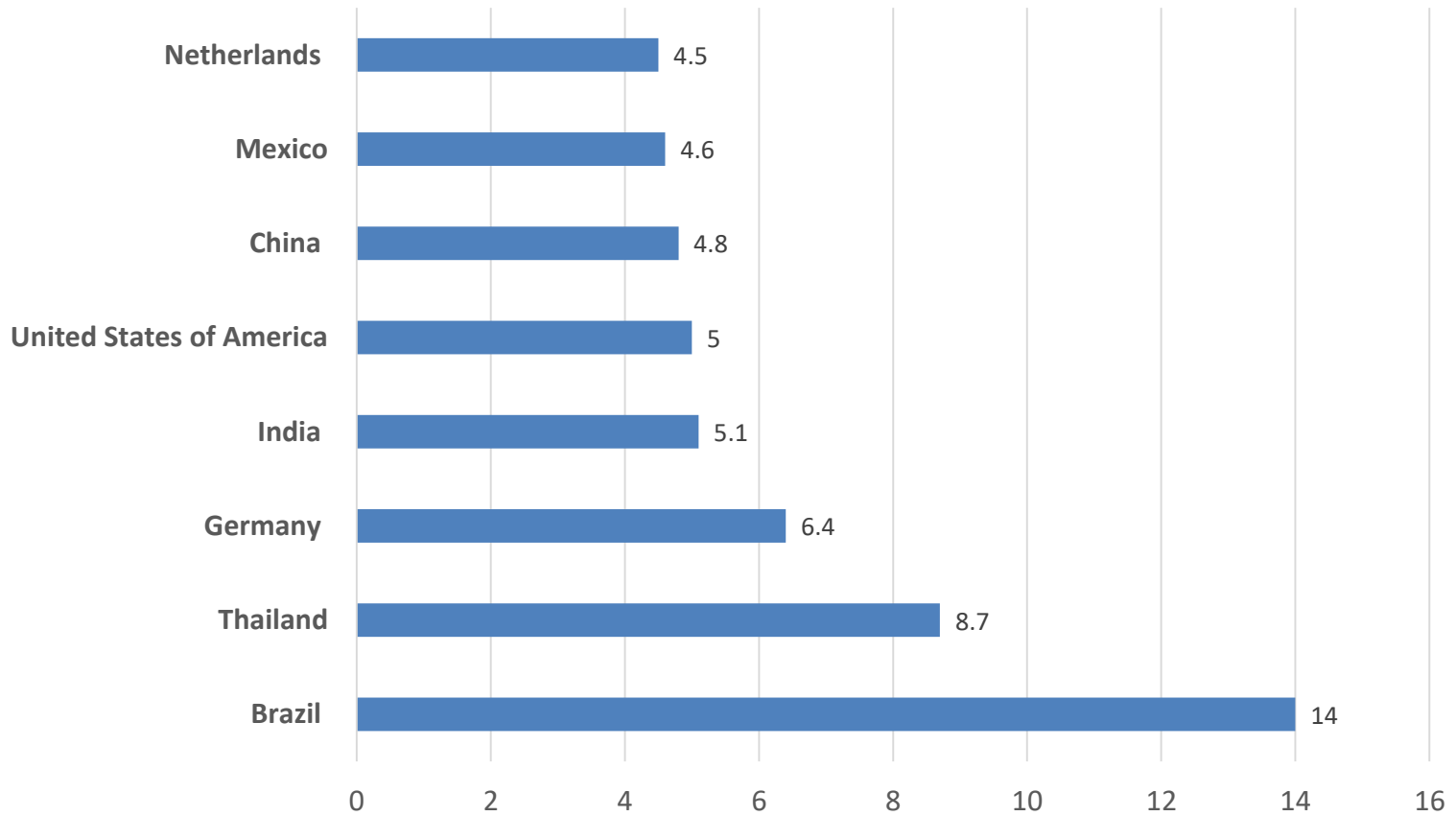
# John Deer Sugarcane harvester



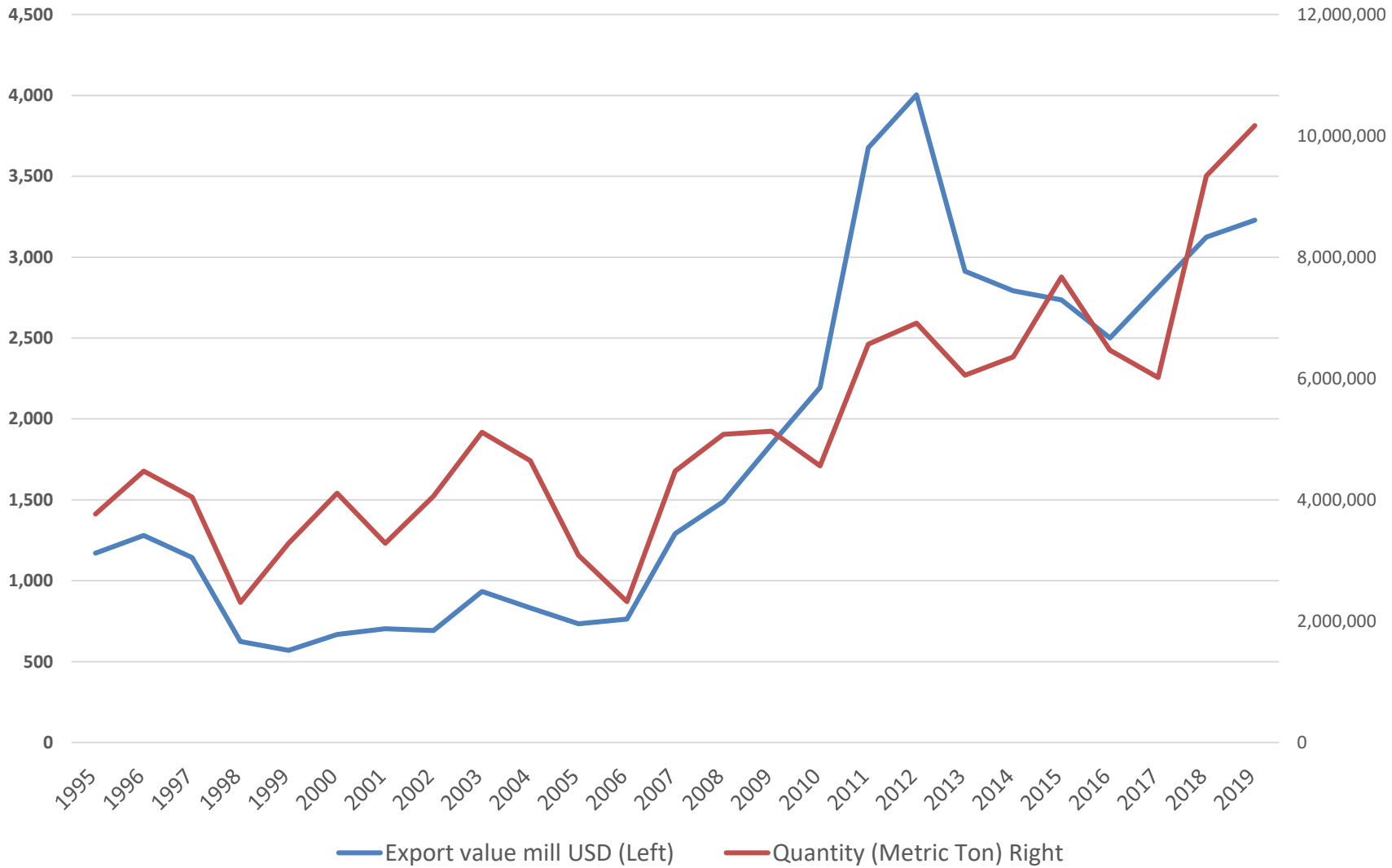
# John Deer's Speed and fuel efficiency

- 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).

## Sugar exports in 2019: world market share of top exporters

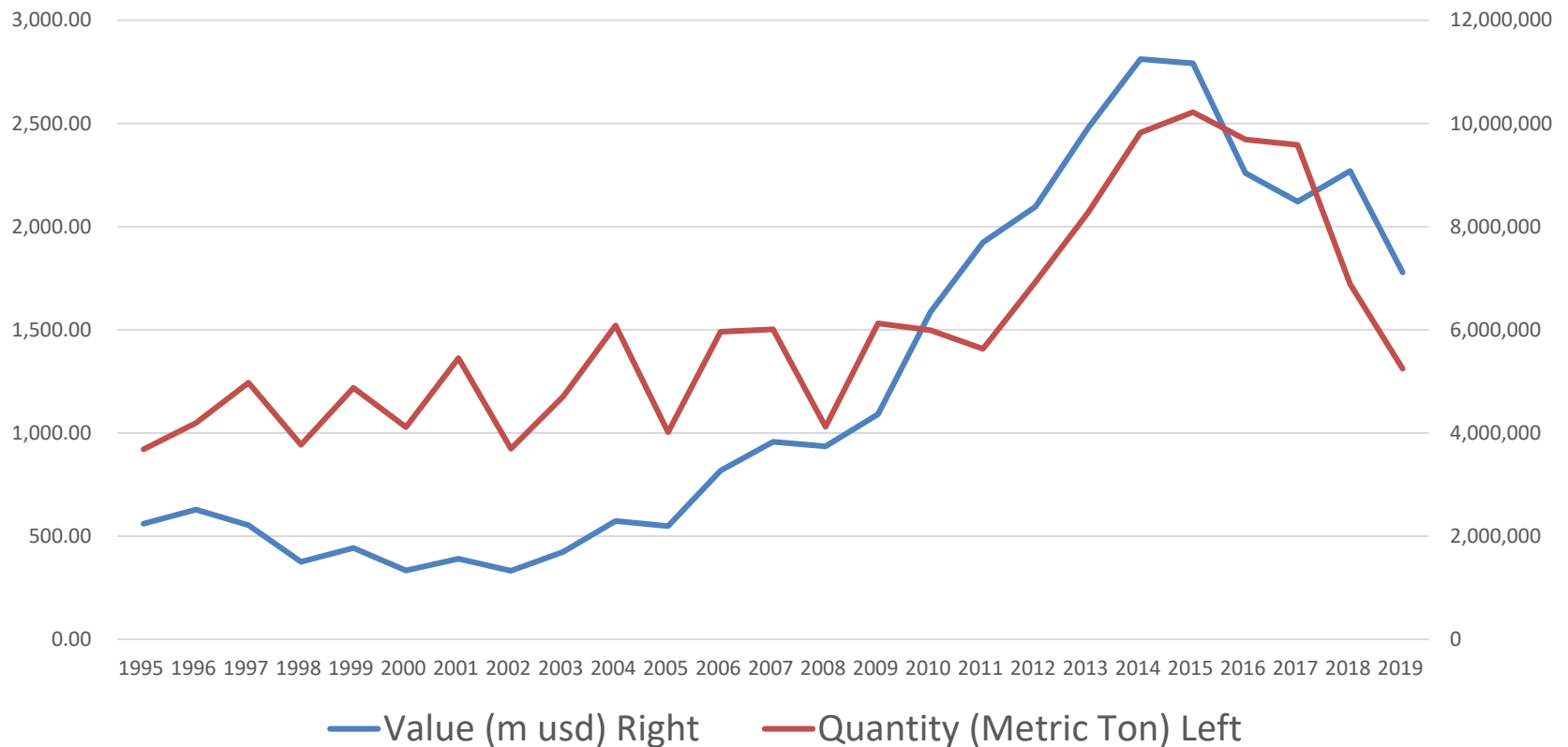


# Sugar exports



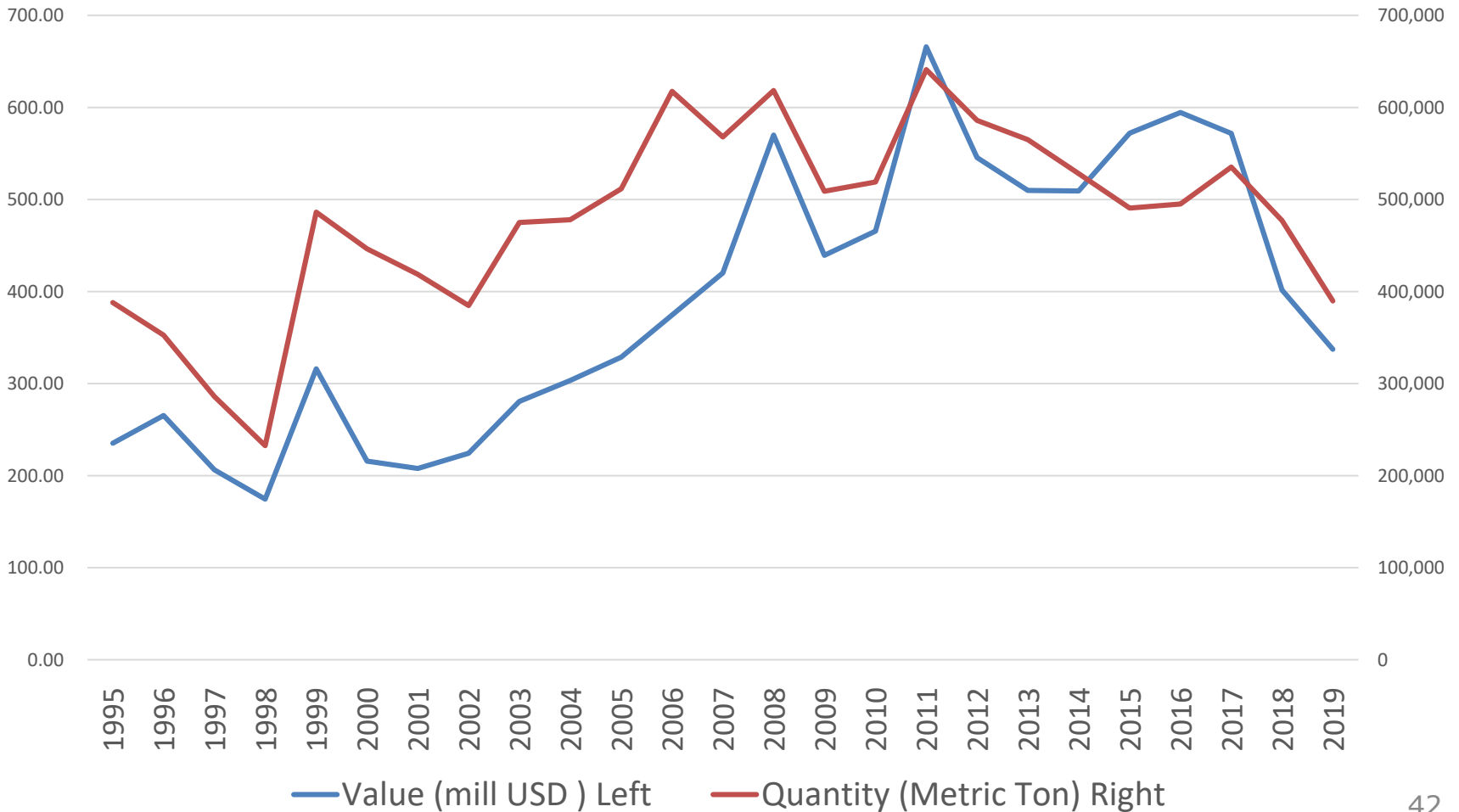
Cassava also turned from being a rising star in the period 1961-1980 into retreat later on, Thailand's exports of cassava also adjusted accordingly to the negative price incentives and the decline in the world market.

## Exports of Tapioca



Canned pineapple exports of Thailand also adjusted its position from rising stars into falling stars.

### Canned Pineapple Exports



# 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:	<b>88.4</b>

# 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
<b>Total Share</b>	<b>80.7</b>

# 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:	<b>80.8</b>

# Principal Agricultural Exports: 1990

(percent of total Agricultural exports)

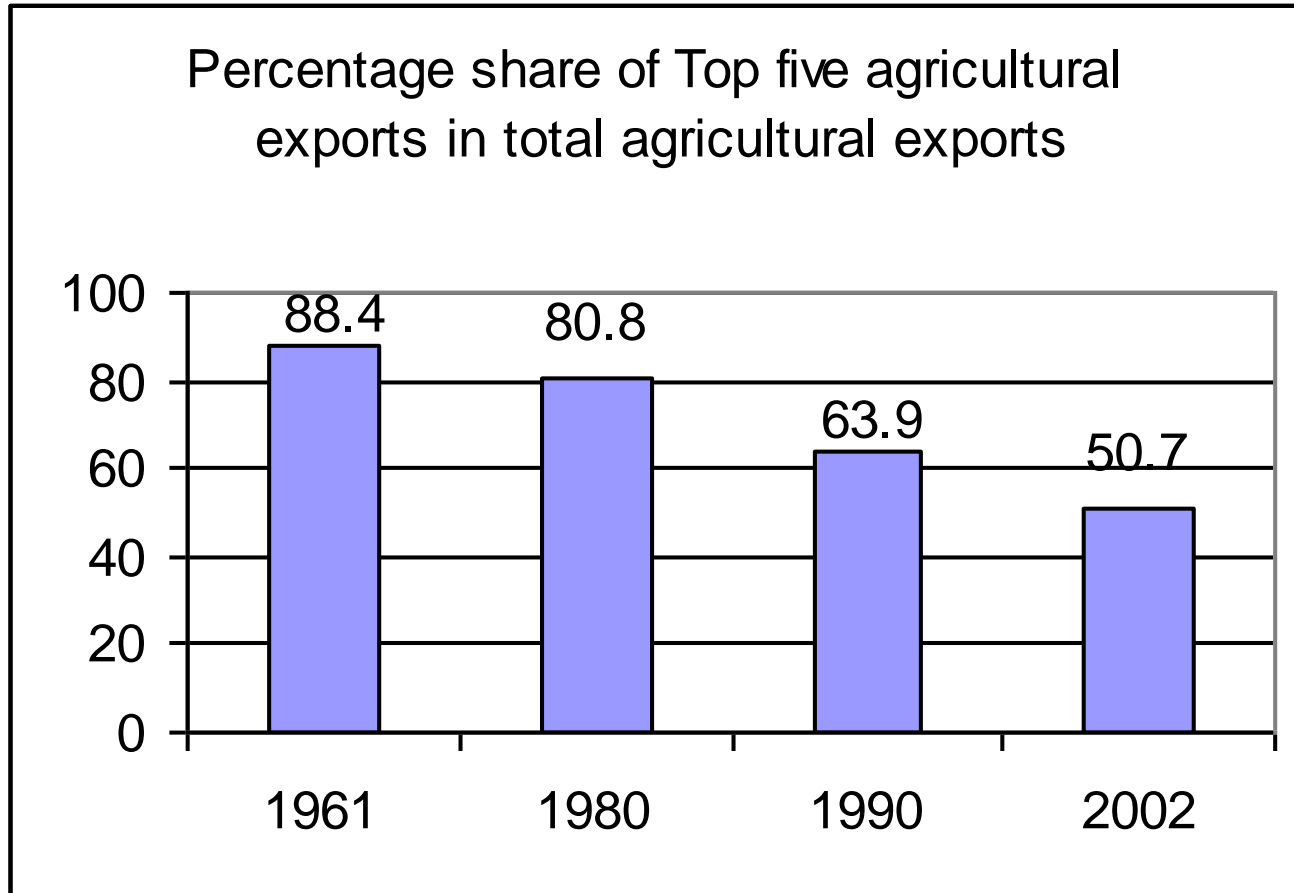
	Share
Milled Paddy Rice	18.5
Rubber Natural Dry	16.2
Cassava Dried	14.7
Sugar (centrifugal raw)	9
Chicken Meat	5.5
Total sum of top five:	<b>63.9</b>

# Principal Agricultural Exports: 2002

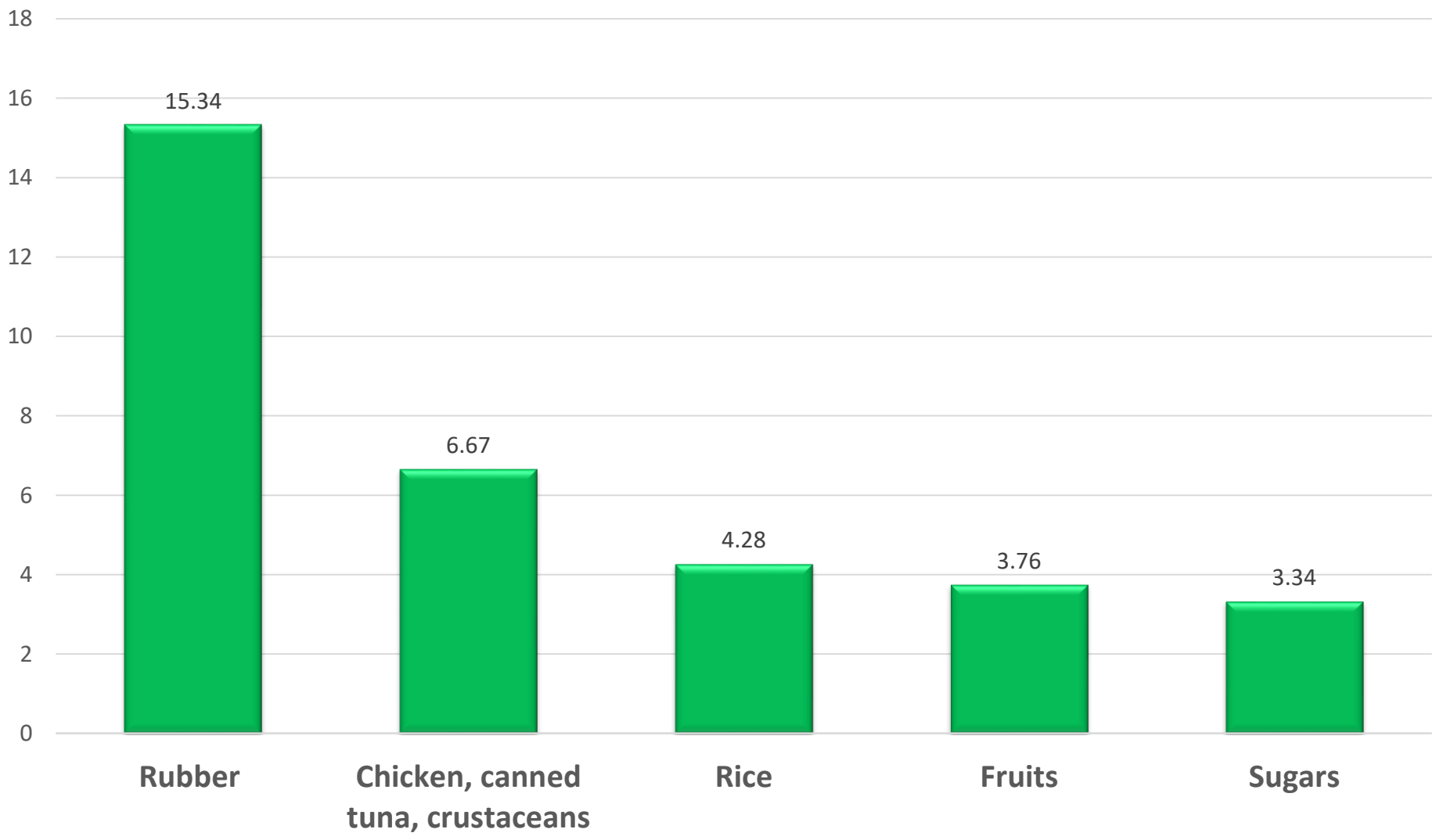
(percent of total Agricultural exports)

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
<b>Total share</b>	<b>50.7</b>

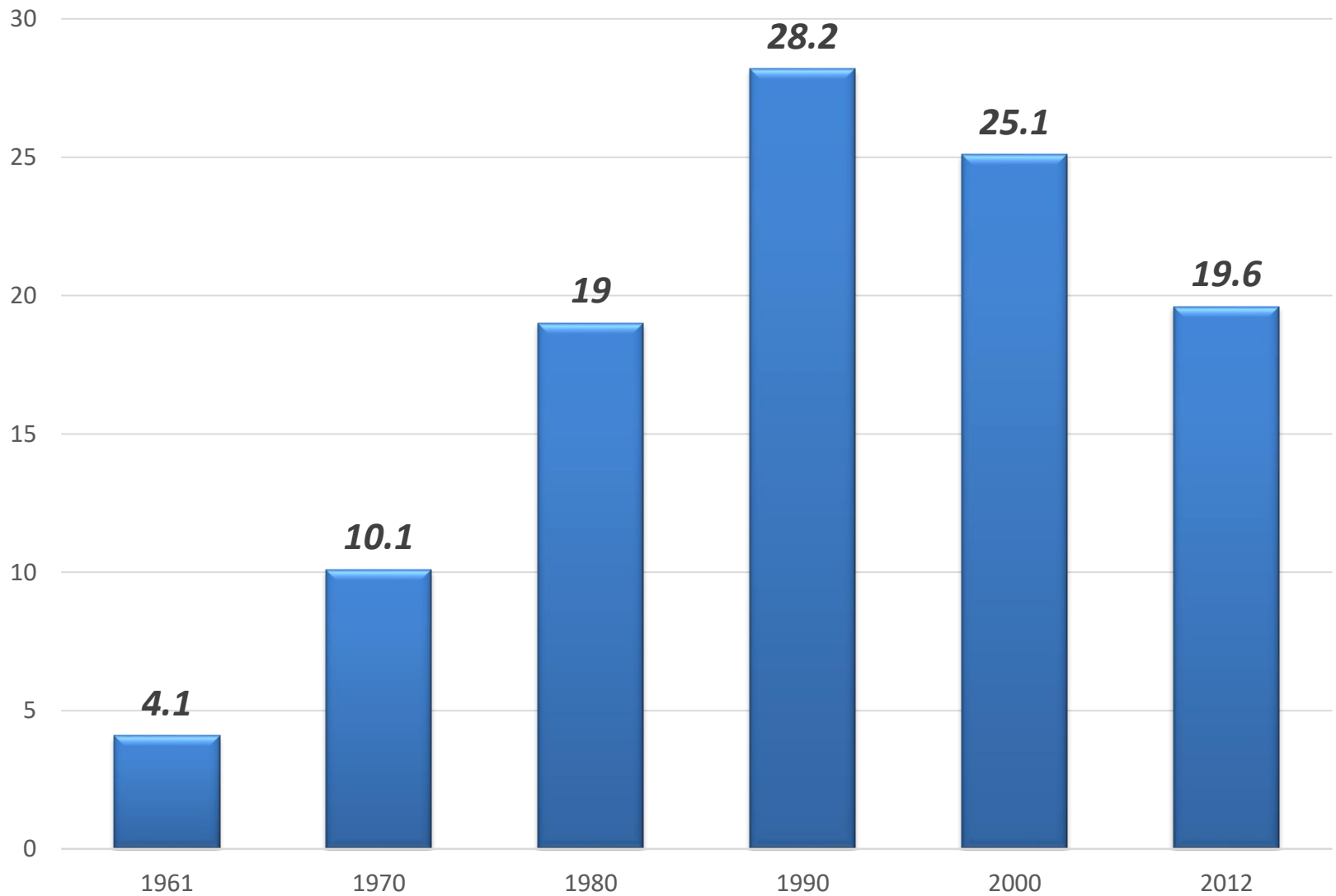
# Diversification of agricultural exports implies less concentration of principal exports



# Top-five agricultural exports in 2019 billion \$

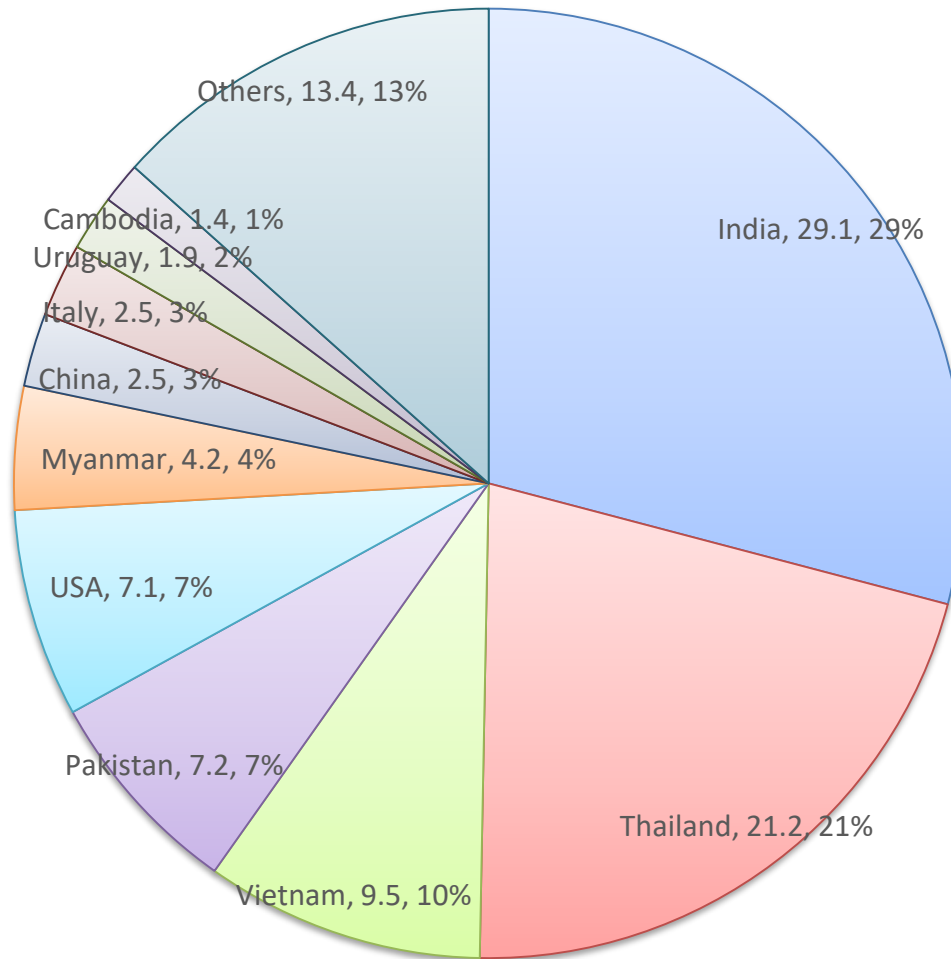


## World Market Share of Thailand's rice exports (%)



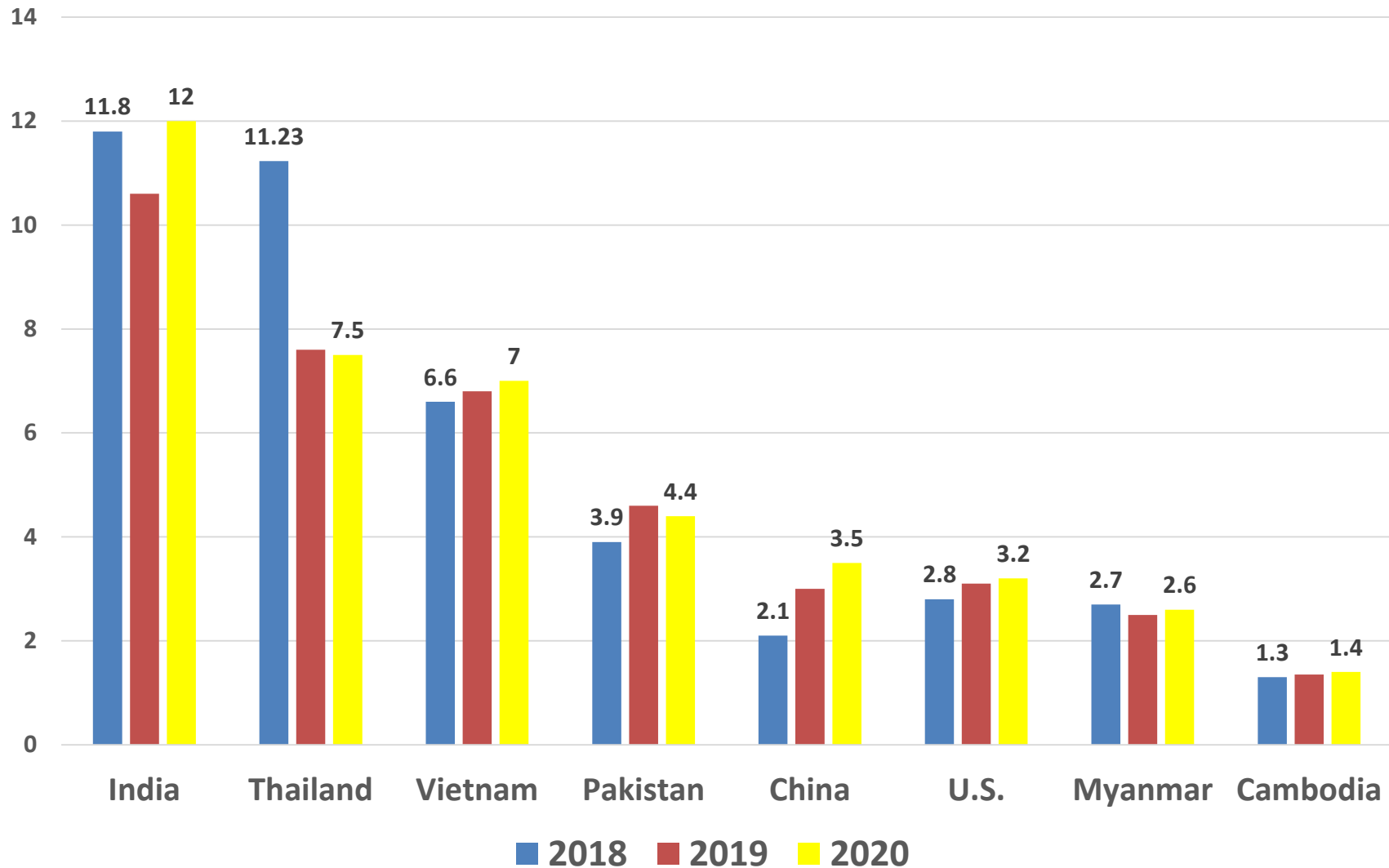
“Success is not final; failure is not fatal”

# world exports share 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)



# 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



History repeats itself, first as  
tragedy, second as farce.

*Karl Marx*



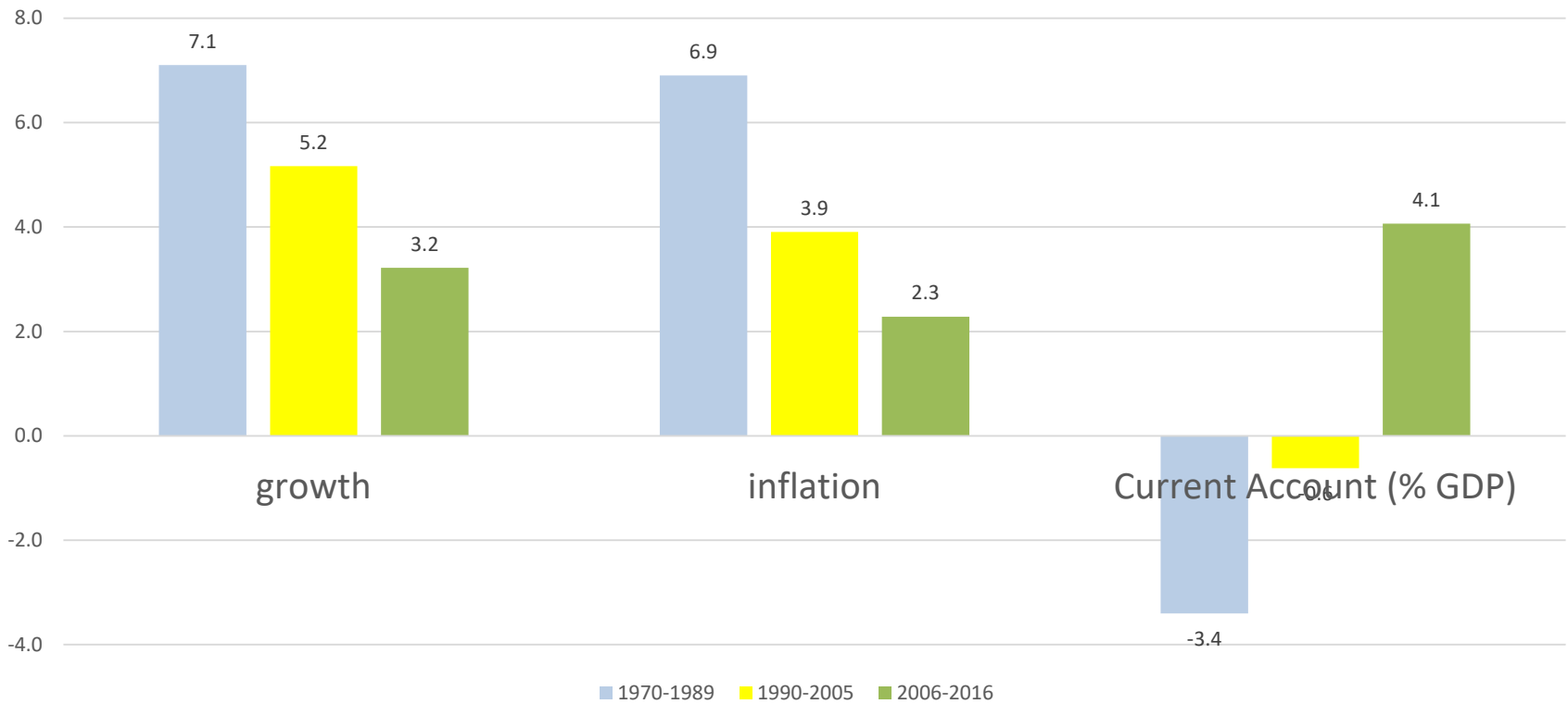
# Conclusion

- 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.

1. Discuss the causes of the declining growth rates during the three periods shown in Figure 1.

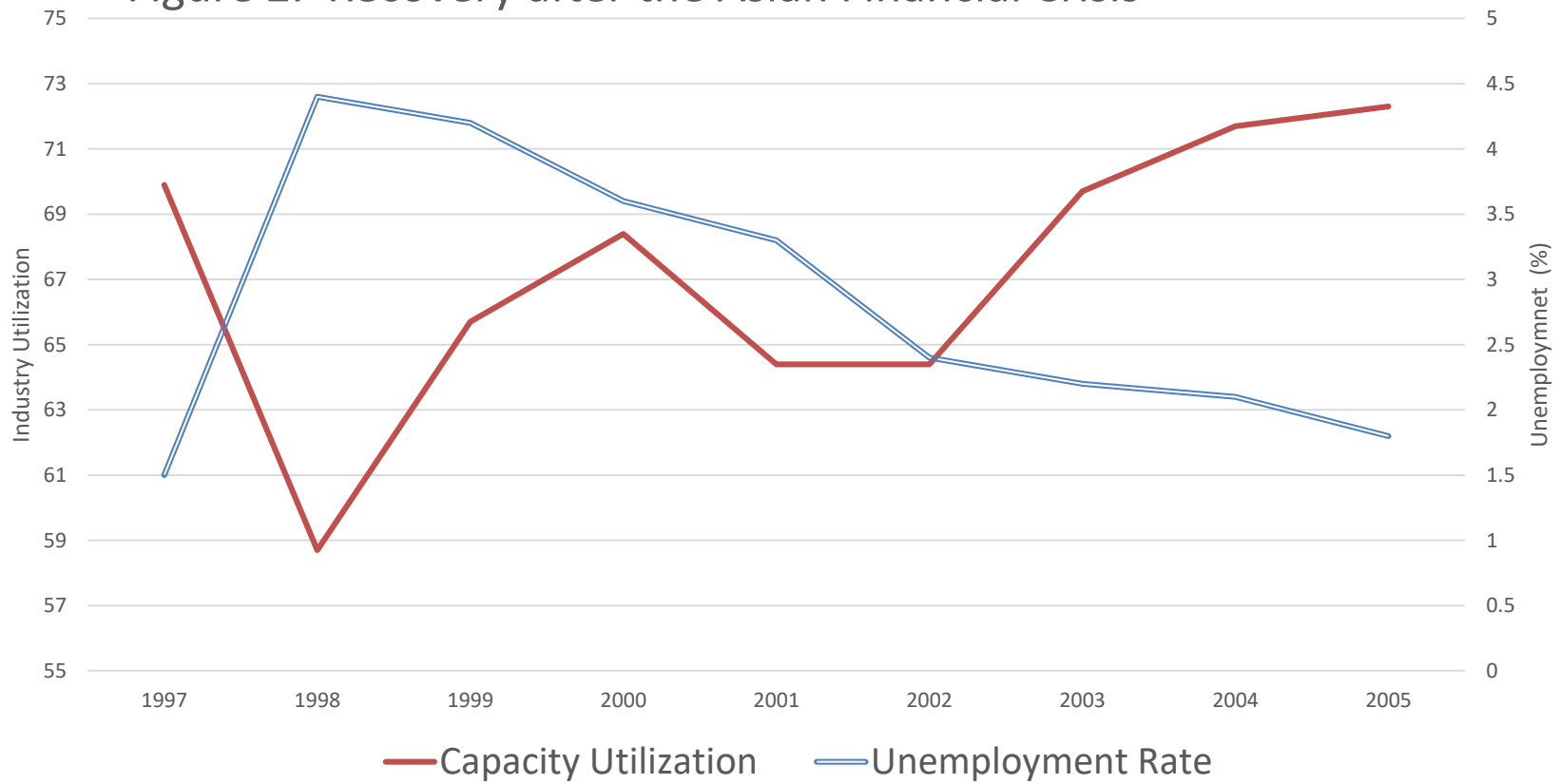
Explain why GDP growth is related to the other two macroeconomic goals.

Figure 1. Macroeconomic indicators  
(percent)



2.The Thai economy recovered quickly after the Asian Financial Crisis in 1998, as shown in Figure 2, similar to the rebound after the Global Financial Crisis in 2008. Compare and contrast the factors responsible for the V-shape recoveries.

Figure 2. Recovery after the Asian Financial Crisis



- 3. Utilize Dani Rodrick's theory of growth to analyze the divergence of development paths between Thailand and Japan since 1850.
- 1. Examine whether the Prebisch hypothesis and the theory of economic backwardness have ever been relevant to for Thailand.

## 2. Discuss the difficulty of Thailand's macroeconomic management after the year 2006, as shown in Figure 1.

Figure 1. Standard Deviation of Growth, inflation, and Business Sentiment

