Agricultural Economics

Tith Seyla, Master in Economics, France
seyla.tith@gmail.com
Introduction

- Pictures & ideas in your mind when you hear the word **economics**?

- Pictures & ideas in your mind when you hear the word **agriculture**?

- What is agricultural economics all about?
Course organization

This course is divided into 4 chapters:

- Chapter 1: Important Concepts in Agricultural Economics
- Chapter 2: Demand & Supply – Market Mechanisms for Agricultural Products
- Chapter 3: Government Intervention in Agriculture – An Economic View
- Chapter 4: Agriculture – Challenges and Opportunities for Cambodia
1. Important Concepts in Agricultural Economics

Objectives of this chapter

- To introduce the basic concepts necessary for the understanding of the sphere of agricultural economics.
- To review the major trends in agricultural supply at the world level.
- To study the role of agriculture in economic development.
1.A. Definition and scope of the field of agricultural economics

Economics is the science of the administration of scarce resources (land, labor, capital and management), which are needed in order to produce goods and services that satisfy human wants.

The field of agricultural economics is delineated by the application of economic science tools to the agricultural sector.

Agricultural economics refers to all economic activities connected with the control of living organisms, such as plants and animals.

These economic activities gravitate around the production of food, and they involve many different economic actors at different production and transformation stages.
1.A. Definition and scope of the field of agricultural economics

**Modern vision of agricultural system:**

- The farm sub-sector: includes all the farm-firms that grow crops and raise livestock, usually for sales.
  - Small sized when compared with other production units in the manufacturing sector.
  - Little power in influencing prices in the market >> Cooperatives >> politically organized farmers’ association.
  - High level of uncertainty: quasi-unpredictable climatic condition, and diseases. >> patterns of seasonality
  - Part-time working: very important employment in the farm sub-sector

- The agribusiness sub-sector:
  - The input sub-sector: all the firms and industries that produce and sell goods and services that are used as inputs by the farms. (Fertilizers, pesticides, machinery, animal foodstuff)
  - The processing and marketing sub-sector: all the firms and industries that purchase, store, process, and distribute farm product either on the domestic or on export markets. (Food-drink-tobacco, large international trading company, transport, distribution chains, supermarkets, etc.)
1.A. Definition and scope of the field of agricultural economics

➢ The public sub-sector:
  ▪ Government agencies that provide services such as sanitary regulations, food inspection, and market information and supervision.
  ▪ The educational and research group: schools, universities and other state financed research centers, which provide education, training, and research exclusively to the agricultural sector. These services support farmers through the dissemination of knowledge and research results.
  ▪ The government as a whole: support policies, aid for foreign trade, special credit concessions and grants of all kinds. (Influence on the determination of agricultural prices)
  ▪ The farm lobby: national farmers’ associations which have a decisive impact in terms of national agricultural policy.

➢ The financial sub-sector:
  ▪ Exclusively connected with agricultural activities
  ▪ Fuel the growth of the farm-firms
1.A. Definition and scope of the field of agricultural economics

The agri-food filière:

- The upstream pole which includes farming and fisheries activities, agricultural machinery and animal feed producers.
- The downstream pole which comprises catering services, and distribution of finished products.
- The core consists of the food processing industry.

The upstream pole is a set of industries supplying to the core industries of the filière. The downstream pole consists of the industries that buy from the core industries. The core comprises all the industries involved in the transformation of inputs such as raw materials and primary products into finished goods.
1.B. Global trends in supply

World food producers:

1. Asia 45%
2. North and Central America 16.1%
3. Europe 15%
4. Africa 8.6%
5. South America 7.8%
6. Oceania 1.6%
7. Others 5.9%
1.B. Global trends in supply

World food production has exceeded population growth since the 1970s.

1990-1999: The population of the world has increased by 13.5 per cent, but world food production has grown even faster, by 20 per cent.

The developing world is gradually catching up with richer countries, where food supply has developed into costly surpluses. The world produces enough food for the entire growing population of our planet. (against the thesis of Robert Malthus)

The green revolution in the 1960s: chemical fertilizers and pesticides, biotechnology and high-yielding hybrid varieties of cereals.

The problem of distribution: more than 800 million people still suffers from severe malnutrition today.
1.B. Global trends in supply

**Table 1.4** Major world producers in 1999 – breakdown by product category (in %)

<table>
<thead>
<tr>
<th>Product</th>
<th>North and Central America</th>
<th>Europe</th>
<th>Oceania</th>
<th>Africa</th>
<th>Asia</th>
<th>South America</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cereals</td>
<td>20.5</td>
<td>14.0</td>
<td>1.6</td>
<td>5.5</td>
<td>48.3</td>
<td>4.8</td>
<td>5.3</td>
</tr>
<tr>
<td>Root crops</td>
<td>4.7</td>
<td>12.0</td>
<td>0.6</td>
<td>24.1</td>
<td>42.0</td>
<td>7.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Pulses</td>
<td>12.0</td>
<td>10.7</td>
<td>3.9</td>
<td>13.3</td>
<td>50.2</td>
<td>6.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Vegetables</td>
<td>7.9</td>
<td>11.7</td>
<td>0.5</td>
<td>6.6</td>
<td>66.2</td>
<td>2.7</td>
<td>4.4</td>
</tr>
<tr>
<td>Fruits</td>
<td>11.9</td>
<td>15.8</td>
<td>1.3</td>
<td>13.4</td>
<td>39.9</td>
<td>15.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Nuts</td>
<td>19.1</td>
<td>14.9</td>
<td>0.6</td>
<td>11.7</td>
<td>47.3</td>
<td>3.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Oil crops</td>
<td>29.6</td>
<td>8.0</td>
<td>1.3</td>
<td>4.8</td>
<td>33.5</td>
<td>19.6</td>
<td>3.2</td>
</tr>
<tr>
<td>Sugar</td>
<td>15.3</td>
<td>16.5</td>
<td>4.7</td>
<td>6.7</td>
<td>32.7</td>
<td>21.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Cocoa beans</td>
<td>2.9</td>
<td>–</td>
<td>1.6</td>
<td>66.1</td>
<td>16.1</td>
<td>13.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Coffee</td>
<td>17.5</td>
<td>–</td>
<td>1.0</td>
<td>19.0</td>
<td>22.6</td>
<td>39.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Tea</td>
<td>0.0</td>
<td>–</td>
<td>0.2</td>
<td>12.6</td>
<td>82.4</td>
<td>2.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Vegetable fibers</td>
<td>20.2</td>
<td>2.8</td>
<td>3.0</td>
<td>7.5</td>
<td>53.5</td>
<td>5.3</td>
<td>7.7</td>
</tr>
<tr>
<td>Tobacco</td>
<td>11.0</td>
<td>7.4</td>
<td>0.1</td>
<td>6.6</td>
<td>61.8</td>
<td>11.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Natural rubber</td>
<td>0.8</td>
<td>–</td>
<td>0.1</td>
<td>5.0</td>
<td>93.1</td>
<td>0.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Total meat</td>
<td>20.8</td>
<td>20.0</td>
<td>2.2</td>
<td>4.7</td>
<td>38.3</td>
<td>10.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Total milk</td>
<td>16.8</td>
<td>28.5</td>
<td>3.8</td>
<td>4.7</td>
<td>26.3</td>
<td>8.2</td>
<td>11.7</td>
</tr>
<tr>
<td>Eggs</td>
<td>14.9</td>
<td>14.2</td>
<td>0.5</td>
<td>4.4</td>
<td>54.6</td>
<td>5.6</td>
<td>5.8</td>
</tr>
<tr>
<td>Wool</td>
<td>1.2</td>
<td>9.8</td>
<td>39.4</td>
<td>8.9</td>
<td>26.2</td>
<td>8.3</td>
<td>6.2</td>
</tr>
<tr>
<td>Total</td>
<td>16.1</td>
<td>15.0</td>
<td>1.6</td>
<td>8.6</td>
<td>45.0</td>
<td>7.8</td>
<td>5.9</td>
</tr>
</tbody>
</table>

*Source: FAO (2001). Author’s volume based calculations.*
1.B. Global trends in supply

Regional specialization in a country’s agricultural production:

\[
\left( \frac{AGVA}{TGVA} \right)_r \geq \left( \frac{AGVA}{TGVA} \right)_n
\]

where:

\[
\left( \frac{AGVA}{TGVA} \right)_r \text{ corresponds to the share of the region’s agricultural gross value added in one specific product } i \text{ as a percentage of the region’s total agricultural value added, and}
\]

\[
\left( \frac{AGVA}{TGVA} \right)_n \text{ corresponds to the share of the nation’s agricultural gross value added in the same specific product } i \text{ as a percentage of the nation’s total agricultural value added.}
\]
1.C. The role of agriculture in economic development

**Economic development and economic growth**

Economic growth: the increase in the size of a country’s national production in relation to the number of its population.

Economic growth can be understood as the improvement of the standard of living of a given population in a given country.

Economic development results from high growth rates sustained over a long period of time.

Note: Growth can take place without development.
- Developing countries: economic activity is concentrated around branches of foreign firms.
- Developed countries: unevenly distribution of the benefits of development.
1.C. The role of agriculture in economic development

**Sustainable development**

1980s: the economic development has been reviewed to incorporate one of the most visible and lasting effects of economic growth: *environmental degradation.*

*Increasing pollution, desertification, poisoning of water supplies, soil erosion, etc.* >> if we want the development acceptable, this development must be **sustainable**

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Increasing per capita incomes, minimization of externalities, poverty eradication, reduction in social and geographical inequalities.
1.C. The role of agriculture in economic development

**Agricultural development theories**
Agricultural development theories are aimed at explaining how the basic sources of growth – labor, capital, natural resources – can be best combined and optimized to generate broad-based agricultural growth.

**The location and diffusion theory**
Location theory in general is about the search of the firm’s best location at a particular point in time, given a certain set of circumstances.

It study the intensity of agricultural production in relation to the distance from urban centers and to the nature of transportation systems.

Agricultural development on a regional basis is a function of the proximity to urban markets and of available transportation systems.
1.C. The role of agriculture in economic development

The distance from cities >> transport and marketing costs
The availability of transport network >> ease of obtaining more productive input and quality services.

The notion of linkages: the diffusion theory stresses the importance of backward and forward linkages involving tangible (factor inputs) and intangible (services, information) assets among farmers and between farmers and other units situated in a given geographical area.

The transfer of information from the most advanced farmers to the laggards.
The diffusion of an innovation.
Synergies between manufacturing firms facilitate the process of technical innovation.
1.C. The role of agriculture in economic development

**Technology-related theories**

Natural factors: natural resources + unskilled labor
Acquired factors: use of capital + technology + skilled labor.

The demand-induced technical change hypothesis:

- Markets with relatively high demand >> signal that profitable opportunities for investment in innovation exist.
- Depressed markets >> sluggish demand creates a pressure for firms to innovate and to invest.

The demand of new products increases with the increase in income and with the consumer’s understanding of the product.
1.D. Trends in agricultural activity

Agricultural activity is a declining portion of the economies of all countries in the world.

The importance of agricultural production and employment declines with economic development, whereas the demand for manufactured goods and services expands.

At the beginning, the primary needs to be fulfilled are food. Food is a commodity for which the income elasticity of demand is less than unity.

Then comparative advantages in labor-intensive industries, such as clothing-textiles. With the rising standard of living, these labor-intensive activities will be replaced by capital and skill intensive activities.
2. Demand and Supply – Market Mechanisms for Agricultural Products

Objectives of this Chapter

- To explain the mechanism of demand and supply interactions on agricultural markets and to highlight the specificity of demand and supply in the case of agricultural products.

- To provide a brief analysis of agricultural prices and to discuss the relationship between prices and incomes.
2. A. The Demand function – price and income elasticity of demand

Knowledge about the characteristics of the market demand for a particular agricultural product is useful to:

- Producers as it helps them determine their supply schedules.
- Policy makers as the information relating to the market demand to influence on the market.
- Government to determine the subsidy for the consumption of a popular product or the penalty of a product that is detrimental to the health.
2. A. The Demand function – price and income elasticity of demand

*The Demand Function*

The demand function relates the quantity demanded for a product and its different influencing variables.

- Economic variables: prices
- Non-economic variables: tastes, structure of the population, etc.

Points of the demand schedule show the quantities demanded at each price, *ceteris paribus*. 

TITH Seyla, Master in Economics,
seyla.tith@gmail.com
2. A. The Demand function – price and income elasticity of demand

The Demand Function

The demand curve for beef of a household
2. A. The Demand function – price and income elasticity of demand

*The Demand Function*

- Changes in price
- Changes in other variables that influence demand

  Increase in the size of household
  Increase in the household’s disposal income

TITH Seyla, Master in Economics, seyla.tith@gmail.com
2. A. The Demand function – price and income elasticity of demand

*The Demand Function*

At macroeconomic level, the demand expressed by a large number of individual consumers is called “aggregate demand”.

The factors affecting the aggregate or market demand for a particular product can be expressed by the following demand function:

$$Q = f(P, P_1\ldots n, Y, G, N, T, A)$$
2. A. The Demand function – price and income elasticity of demand

**The Demand Function**

Q is the quantity demanded per time period,

P is the price of the product,

P₁…n refers to the price of n other competing products,

Y is the average income per head of the population,

G can refer to the distribution of income,

N is the population,

T refers to the tastes and preferences of the population,

A denotes the differentiating attributes of the product enhanced by advertising and technological change.
2. A. The Demand function – price and income elasticity of demand

**Price elasticity of demand**

The percentage change in the quantity demanded as a response to a percentage change in its price, all other things remaining unchanged.

\[
Ep = \frac{\Delta Q}{Q} / \frac{\Delta P}{P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}
\]

- The most price elastic commodities are those food products that are relative luxuries with close substitutes.
- The low price elasticity can characterize the food products with no close substitutes.

The more numerous the substitutes, the more elastic the demand.
2. A. The Demand function – price and income elasticity of demand

**Price elasticity of demand**

In developing countries, the price elasticity of demand for food tends to be extremely low, particularly in the case of an increase in price.

In fact, most calories intake in low-income countries originates already from cheap food such as cereals, and root crops.

Consumers have little scope of shifting to less expensive foods.

The inflationary impact of the rises in food prices would be stronger in developing countries than in developed countries. (predominant role of agriculture in their economy)
2. A. The Demand function – price and income elasticity of demand

**Income elasticity of demand**

The sensitiveness of demand to income changes.

\[ Ey = \frac{\Delta Q/Q}{\Delta Y/Y} \]

- Individual \( i1 \): low level of income so the desired and optimal level of food consumption is not reached.

- Individual \( i2 \): high level of income so the optimal level of food consumption is reached.

- What will happen to these two individuals when their income rises?
2. A. The Demand function – price and income elasticity of demand

**Income elasticity of demand**

Ernst Engel’s law: *food expenditure, as a proportion of total expenditure, declines as income increase ceteris paribus, or that the income elasticity of demand for food tends to decline as a country moves along the development path.*

In developing countries, the income elasticity of demand for food is, in general, higher than in the developed countries.

0.6 in developing countries
0.2 in developed countries

Ey < 1
Ey < 0 (inferior food products)
2. B. Supply function

**Characteristics of Supply**

Agricultural production: the process of converting certain inputs or factors of production into a final product, or outputs.

- *direct consumption*
- *Input for other firms (farms)*

Land, labor and capital are the farm’s input.
Capital: machinery, buildings, tools, fertilizers, and human capital (management skills and entrepreneurship)

Fixed factors of production (Short term): land and buildings, etc.
Variable factors of production (Short term): fertilizer, fuel, labor, etc.
2. B. Supply function

**Input-Output Relationship**

![Graph showing input-output relationship with points and labels: Δy = 26, Δx = 10, Δy = 65, Δx = 10.](image)
2. B. Supply function

*Law of diminishing returns*

Marginal physical product (MPP) = $\frac{\Delta Q}{\Delta X_i}$

MPP of an input $X_i$ refers to the change in the level of output associated with a change in the use of input $X_i$, ceteris paribus, that is assuming that all other remaining inputs remain fixed.

Level of input: 0 to 70: MPP positive: extra kg of fertilizer per hectare will have a positive impact on output, that is on rice yields.
Level of input: 0 to 30: MPP positive and increasing with constant growth of $X_i$
Level of input: 30 to 70: MPP positive and decreasing with constant growth of $X_i$
Level of input: > 70: MPP negative: soil exhaustion, pollution, etc.
2. B. Supply function

*Production and supply function*

\[ Q = f (L, K, I) \]

**Q:** output produced within a specified time period  
**L:** labor  
**K:** capital  
**I:** land

The production function describes the technological conditions of production in a farm-firm.
2. B. Supply function

*Production and supply function*

\[ Q = f (T, P_p, P_1...P_n, I_1...I_m, O, MS, W, G) \]

- **Q**: quantity of an agricultural product supplied to a market per time period \( t \),
- **T**: the production function of the product as described above
- **\( P_p \)**: is the price of the product
- **\( P_1...P_n \)**: the price of \( n \) other products, which could possibly be competing with product \( p \)
- **\( I_1...I_m \)**: the price of \( m \) inputs
- **O**: the objective of the firm
- **MS**: market structure relating to a specific agricultural industry
- **W**: weather
- **G**: government policy and institutional factors
2. C. The market mechanism for agricultural products

*The supply-demand interaction*

**Simple:** from producer to consumer

**Complex:** from producer to final consumer, via food companies, who process, package, store, transport and distribute the product

*The market equilibrium paradigm*

Pure and perfect competition

1. Atomicity
2. Fluidity
3. Homogeneity
4. Rationality
5. Liberty
2. C. The market mechanism for agricultural products

The demand and supply schedules and the equilibrium

<table>
<thead>
<tr>
<th>Price (€/kg)</th>
<th>Demand (kg per week)</th>
<th>Supply (kg per week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

![Graph showing demand and supply curves with equilibrium price and quantity]
2. C. The market mechanism for agricultural products

*The demand and supply schedules and the equilibrium*

Sticky price
Shift in demand and supply curve
The cobweb pattern
3. Government Intervention in Agriculture

Objectives:

- Economic rationale for government intervention in Agriculture
- Main economic policy affecting the agricultural sector
3. A. Why government intervenes in agriculture?

**Agricultural policy as an Economic Policy**

- Objectives
- Instruments

**Agricultural policy**

- Agricultural Support Policy
- Structural Policy
3. A. Why government intervenes in agriculture?

Purpose of agricultural policy

- Stabilize farmers’ income
- Slowdown the migration out of the sector
- Lessen the perceived instability of international market
3. B. Agricultural Support Policies

Deficiency Payment System
3. B. Agricultural Support Policies

Import Quotas
3. B. Agricultural Support Policies

**Tariffs**
3. B. Agricultural Support Policies

**Variable Levies**

![Graph showing variable levies with supply and demand curves](image)
Thank you for your attention and hard work so far.

Good luck to everyone!