

Worlds of Agricultural Economics

EE390 Part I

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- **Agriculture is a meeting between nature and human society**
 - “Getting food and fibre to all people in the world in the right form at the right time is an extremely complex process”

(Cramer *et al.* 2001: 9)

Agriculture

- **Agriculture is necessary for human survival**

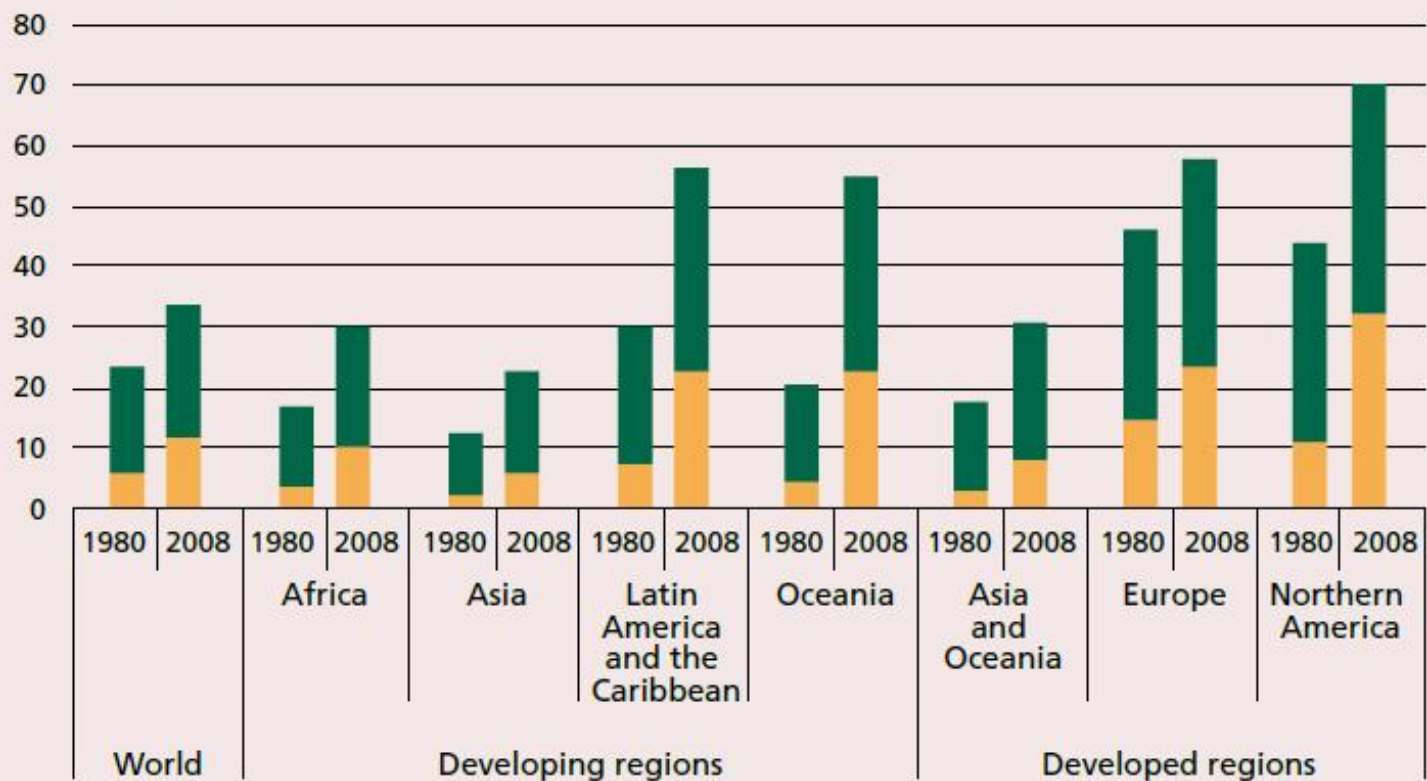
- There are correlations between farming and the number of mouths that can be fed..
- But it might not be proportional to the distribution of the world population..
- “With a child dying every six seconds because of undernourishment-related problems, hunger remains the world’s largest tragedy and scandal.”

(Jacques Diouf, FAO Director General, 2010)

Agriculture

Prevalence of overweight and obesity among adults, by region

Percentage



Obesity



Overweight, excluding obesity

FAO (2013)

- **Agriculture is a matter of economizing with resources**
 - Land, labour, crop nutrients, animal feed, energy, water, ...
- **Agriculture is conducted by large numbers of farmers**

Agriculture

- **Agriculture is ruled by weather, seasons, and biological rhythm**
 - Most farming are outdoor
 - Husbandry also greatly dependent on the season
- **Agriculture is both predictable and unpredictable**
 - Nature can be cruel: drought, flooding, hurricanes, frost..
 - Farmers have to act on the assumption that things will be normal..

Agriculture

- **Agriculture is found on almost every continent**
 - Agriculture is characterized by geographical spread..
- **Agriculture is influenced by social and cultural factors..**
 - Some farm decisions are beyond economic rationality.
 - Traditional views → modern views

Agriculture

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- **Agriculture could create externalities..**
 - As we need more food, production has to take into account of problems such as climate change, environmental impact, and sustainable use of limited resources..

Agriculture

- **Numbers of people engaged in farming**

Table 5.7 Total number of economically active people in the world and the proportion active in farming in 2010

	<i>Countries in developing regions</i>	<i>Countries in developed regions</i>	<i>World</i>
Total labour force, millions of people	2,657	625	3,282
Proportion in farming, %	48.2	4.2	39.9
Numbers in farming, millions of people	1,282	26	1,308

Source: FAO 2011: Table A4 (accessed 27 September 2012).

Agriculture

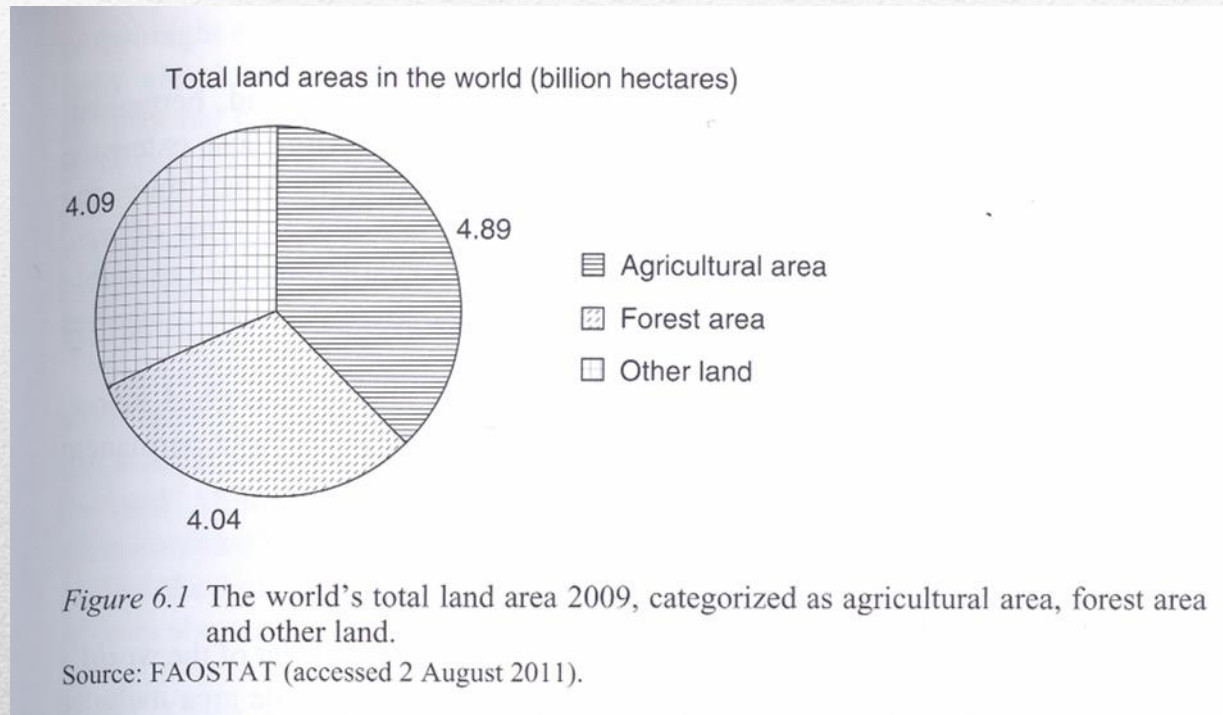
Table 5.8 Number of people in world farming and as a proportion of all economically active people in the world in 1980, 1995 and 2010

	<i>1980</i>	<i>1995</i>	<i>2010</i>
Economically active persons in the world, millions	1,895	2,575	3,282
Economically active persons in world agriculture, millions	955	1,187	1,308
Economically active persons in world agriculture, %	50.4	46.1	39.9

Source: FAO 2011: Table A4 (accessed 27 September 2012).

Agriculture

- **Classification of Land Areas**



Agriculture

- **Agricultural Areas**

- Arable lands
- Land used for permanent crops
- Permanent meadows and pastures

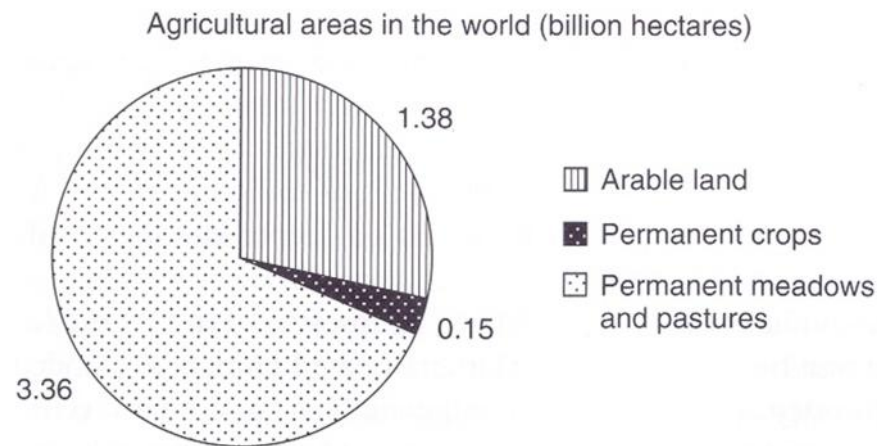


Figure 6.2 Proportions of the three main categories of agricultural areas, 2009: permanent meadows and pastures, arable land and land with permanent crops.

Source: FAOSTAT (accessed 2 August 2011).

Agriculture



1. Arable lands

- Arable fields with temporary agricultural crops
 - Particularly be sown and harvested more than once a year
 - Characterized by seasonal changes between open land, fresh green sprouts, and mature crops
 - Rice, potatoes, barley, cotton, ...
- Other forms:
 - Large-scale greenhouse horticultures

Agriculture

2. Land used for permanent crops

- For crops that occupy arable lands for many years
 - Cocoa, tea, coffee, grapes, fruit trees, ...
- Require long-term planning

3. Permanent meadows and pastures

- Could be both cultivated or naturally grown: grazing pasture/ hay cultivation/ herbaceous plants
- Particularly low-productive and not possible to irrigate
- Cannot be ploughed up and turned into arable lands

Agriculture

Agricultural areas in some of the world's largest countries by total land area in 2009

Country	Total land area, million hectares	Agricultural area			
		Arable land and permanent crops		Meadows and pastures	
		Million hectares	% of the country's total land area	Million hectares	% of the country's total land area
Russia	1,638	124	8	92	6
China	933	124	13	400	43
US	915	165	18	238	26
Canada	909	52	6	15	2
Brazil	846	69	8	196	23
Australia	768	48	6	362	47
India	297	170	57	10	3
Argentina	274	32	12	109	40
World	13,003	1,533	12	3,356	26

Source: FAOSTAT (accessed 5 August 2011).

Agriculture

Major Crop Categories

- **Cereals:** maize (corn), wheat, rice, barley, sorghum, millet, oats, rye, ...
 - **Oil crops:** palm fruit, soybean, coconut, rapeseed, cottonseed, olives, sunflower seed, ...
 - **Sugar crops:** sugar canes, sugar beets, ...
 - **Pulses (leguminous plants):** soybeans, groundnuts, ...
 - **Roots and tubers:** potato, cassava, sweet potato,/yam, taro, ...
 - **Vegetables:** tomato, asparagus, cucumber, cauliflower, eggplant, pumpkin, squash, spinach, lettuce, garlic, onions, mushrooms, ...
 - **Fruits:** “....”
 - **Nuts:** cashew nuts, walnuts, almonds, ...
 - **Coffee, cocoa, and tea**
 - **Cut flowers**
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The growing seasons in general

- Four different stages
 - Preparation before seeding
 - *Soil tillage*: ploughing and harrowing, slash-and-burn, reduced tillage strategies
 - *Fertilizing*
 - Seeding and emergence
 - Seed and plant breeding
 - Seeding methods
 - Germination and emerging seedlings
 - Vegetative and productive development
 - Ripening and harvest

Agriculture

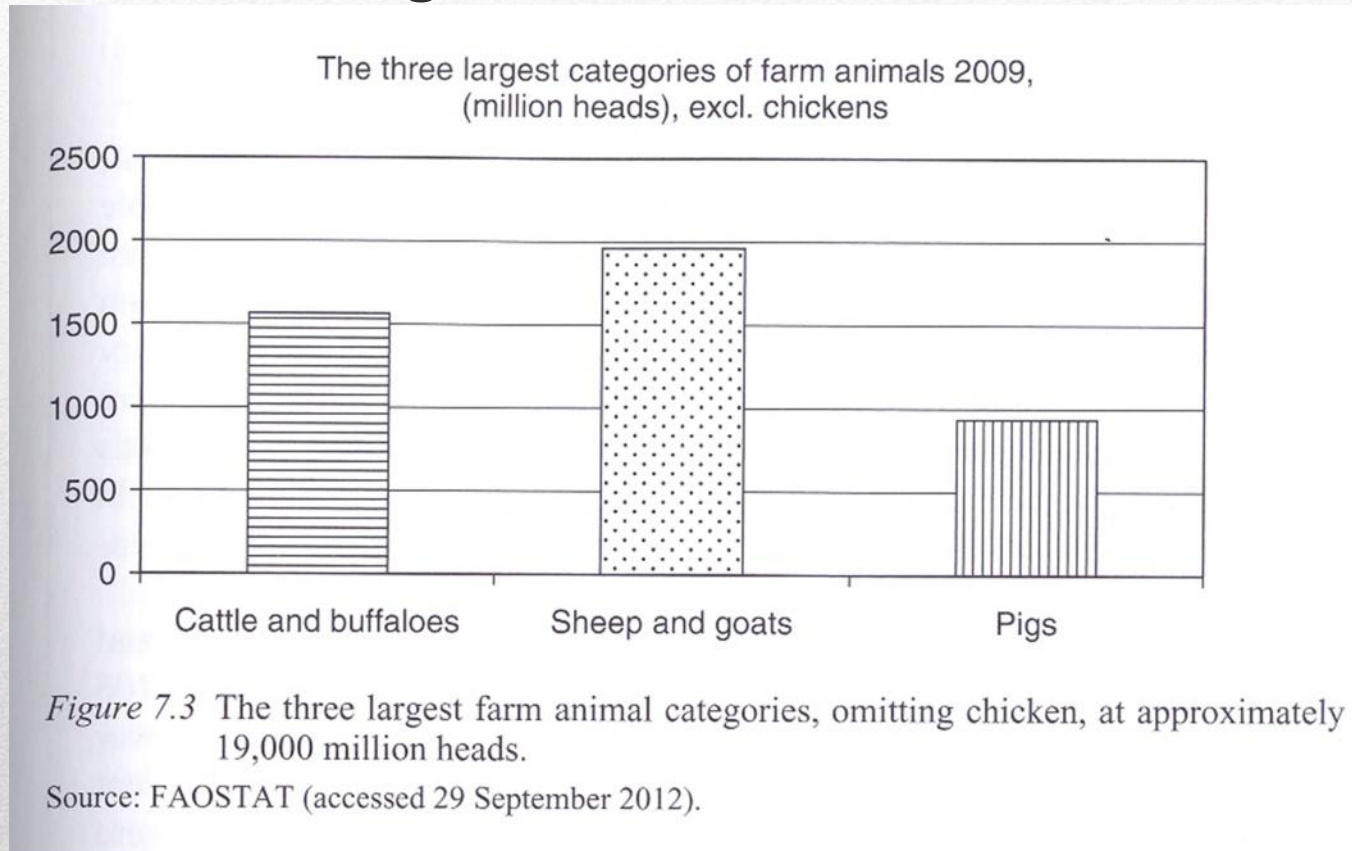


Livestock Farming

- Cattle and buffaloes, sheep and goats, pigs, poultry, camels, horses, ...
- **Direct benefits:** meat, milk, eggs, ...
- **Indirect benefits:** savings, capital, serving as social and economic safety net, income diversification
- Continuous or one-time use of farm animals
- Output and input driven strategies
- Extensive system (grazing animals) vs. Intensive system
- The global average consumption of animal protein was 30 grams a day or 39% of the total average protein consumption of 77 grams per day.

Agriculture

Livestock Farming



Agriculture

Table 7.1 Numbers of farm animals in 2009

<i>Animal species</i>	<i>Number of animals</i>
	<i>Million heads</i>
Cattle	1,419
Buffaloes	190
Camels	24
Other camelids	8
Sheep	1,080
Goats	898
Pigs	955
Horses	60
Asses and mules	53
	<i>1,000 million heads</i>
Chickens	19
Other poultry	2

Source: FAOSTAT 2009 (accessed 29 September 2012).

Agriculture

Table 7.2 The distribution of farm animals between the continents in 2009

	<i>Cattle, %</i>	<i>Sheep, %</i>	<i>Goats, %</i>	<i>Pigs, %</i>	<i>Chickens, %</i>
Africa	19	27	33	3	8
Asia	33	42	59	60	53
Europe	9	12	2	20	10
North America	8	1	1	8	12
Latin America and Caribbean	28	8	4	8	16
Oceania	3	10	1	1	1
World	100	100	100	100	100

Source: FAOSTAT 2009 (accessed 30 September 2012).

Agriculture

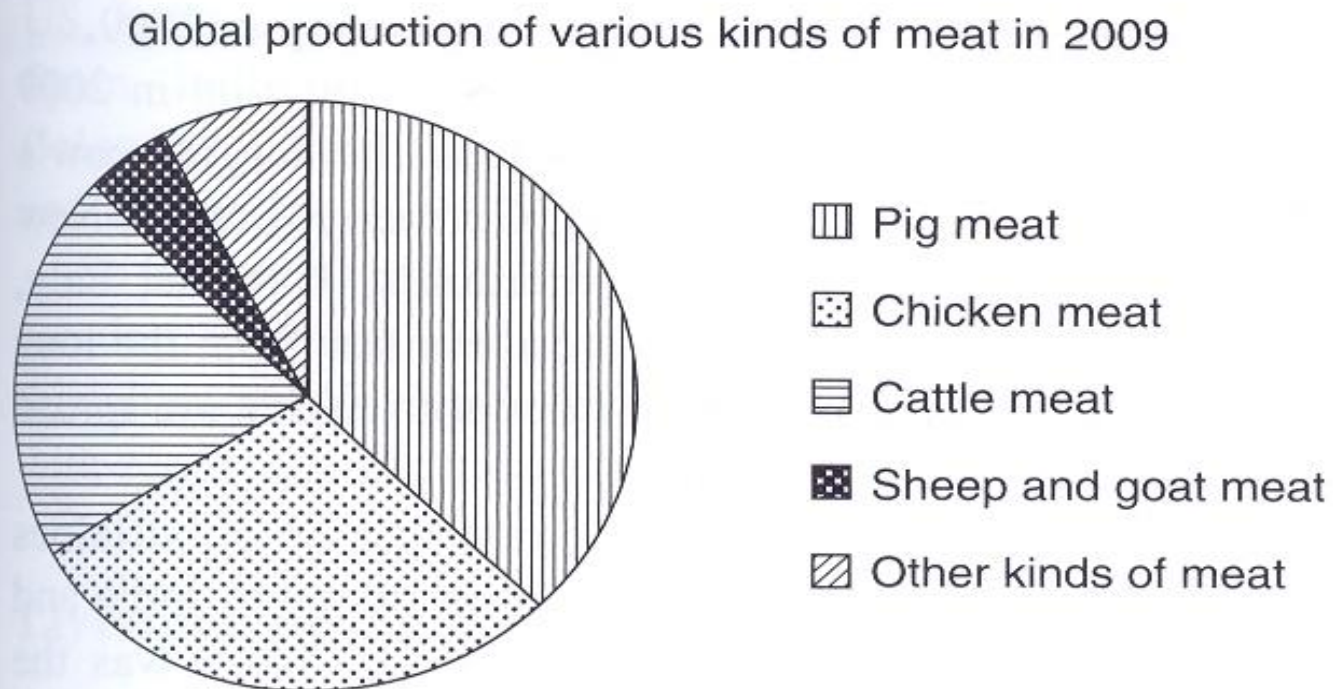


Figure 7.4 Global production of various kinds of meat in 2009.
Source: FAOSTAT (accessed 29 September 2012).

Table 7.3 Total global production of meat, milk and eggs in 2000 and 2009

<i>Production, million tonnes</i>	<i>2000</i>	<i>2009</i>
Meats, all kinds, incl. chicken	234	288
Milk, all kinds	579	708
Eggs, all kinds	55	68

Source: FAOSTAT 2009 (accessed 29 September 2012).

Table 7.4 Relative changes in production of meat, milk and eggs from 1970 to 2009, and in world population during the same time period. Index 100 = 1970

<i>Category</i>	<i>1970</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>2009</i>
Meats, all kinds, incl. chicken	100	136	179	232	282
Milk, all kinds	100	119	138	148	179
Eggs, all kinds	100	134	184	270	333
World population, index	100	121	144	166	185

Source: FAOSTAT (accessed 29 September 2012) and *World Population Prospects, the 2010 Revision* (accessed 26 September 2012).



Farming System

- A farming system is defined as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate.
- In East Asia and Pacific, eleven broad farming systems have been identified.

Agriculture

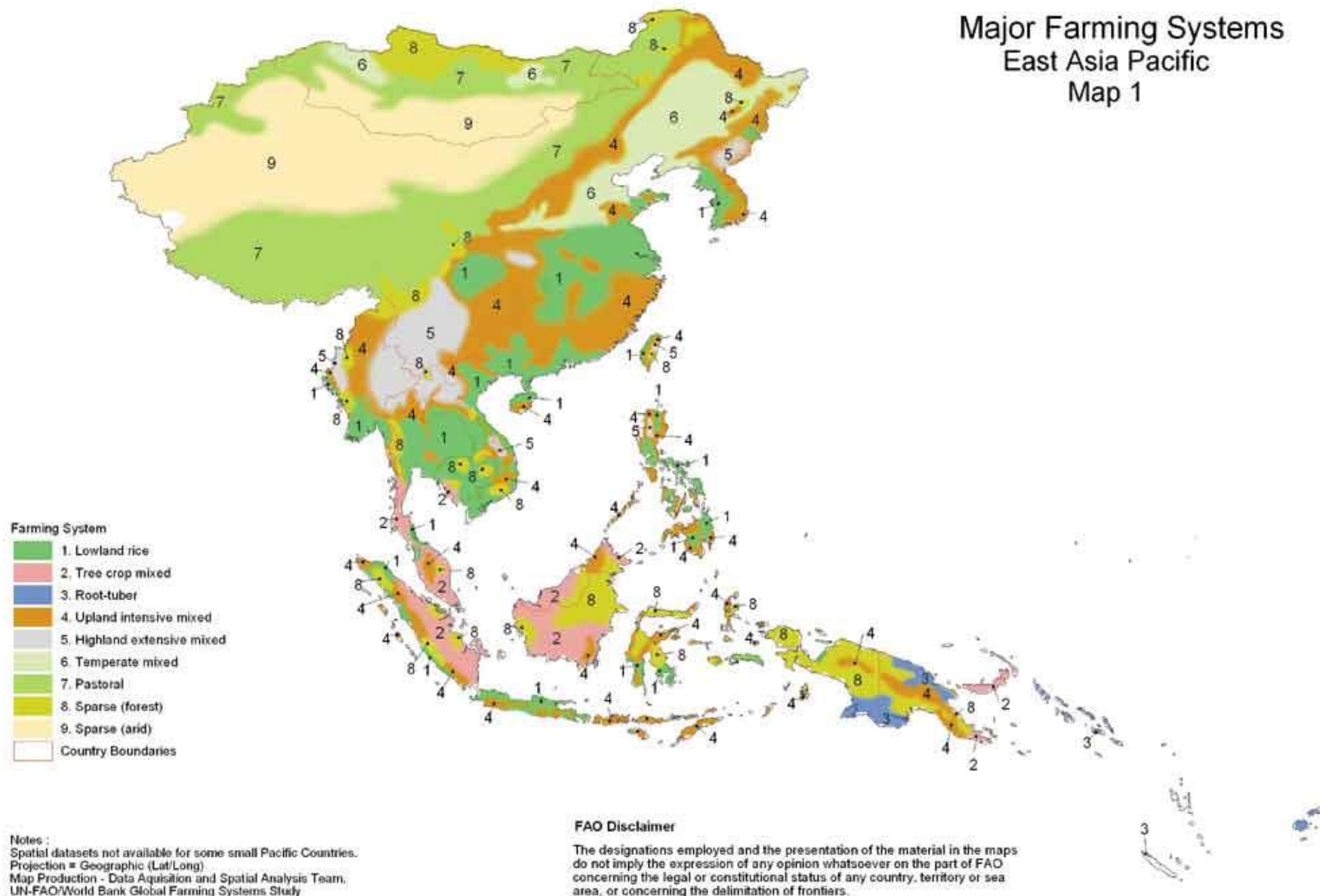
Farming System in Asia

Farming Systems	Land Area (% of region)	Agri. Population. (% of region)	Principal Livelihoods	Prevalence of Poverty
Lowland Rice	12	42	Rice, maize, pulses, sugarcane, oil seeds, vegetables, livestock, aquaculture, off-farm work	Moderate
Tree Crop Mixed	5	3	Rubber, oil palm, coconuts, coffee, tea, cocoa, spices, rice, livestock, off-farm work	Moderate
Root-Tuber	2	<1	Root crops (yam, taro, sweet potato), vegetables, fruits, livestock (pigs and cattle), off-farm work	Limited
Upland Intensive Mixed	19	27	Rice, pulses, maize, sugarcane, oil seeds, fruits, vegetables, livestock, off-farm work	Extensive
Highland Extensive Mixed	5	4	Upland rice, pulses, maize, oil seeds, fruits, forest products, livestock, off-farm work	Moderate

Farming System in Asia

Farming Systems	Land Area (% of region)	Agri. Populatio n. (% of region)	Principal Livelihoods	Prevalence of Poverty
Temperate Mixed	6	14	Wheat, maize, pulses, oil crops, livestock, off-farm work	Moderate
Pastoral	20	4	Livestock with irrigated crops in local suitable areas	Extensive, especially drought induced
Sparse (Forest)	10	1	Hunting, gathering, off-farm work	Moderate
Sparse (Arid)	20	2	Local grazing where water available, off-farm work	Extensive
Coastal Artisanal Fishing	1	2	Fishing, coconut, mixed cropping, off-farm work	Moderate
Urban Based	<1	1	Horticulture, dairy, poultry, other work	Limited

Major Farming Systems East Asia Pacific Map 1



Farm decisions

- Which crops are relevant, with respect to climate, soil, biology?
 - Which crops are needed, in terms of food and feed crops for internal use at the farm?
 - Which cash crops are demanded and relevant?
 - How about costs of production for various crops?
 - How about financing possibilities?
 - Do any of the relevant crops entail high risks of harvest failure?
 - Can the final use of the crop, as food, feed or cash crop, be decided later, when the outcome of the growing season is known?
 - What access is there to the seed that would be needed?
 - What are the peaks and needs for extra labour?
 - Is there a need for special farm machinery or other equipment?
 - Is there a need for special storage facilities?
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Farm decisions

- What to produce?
- How to produce?
- How much to produce, and of what quality?

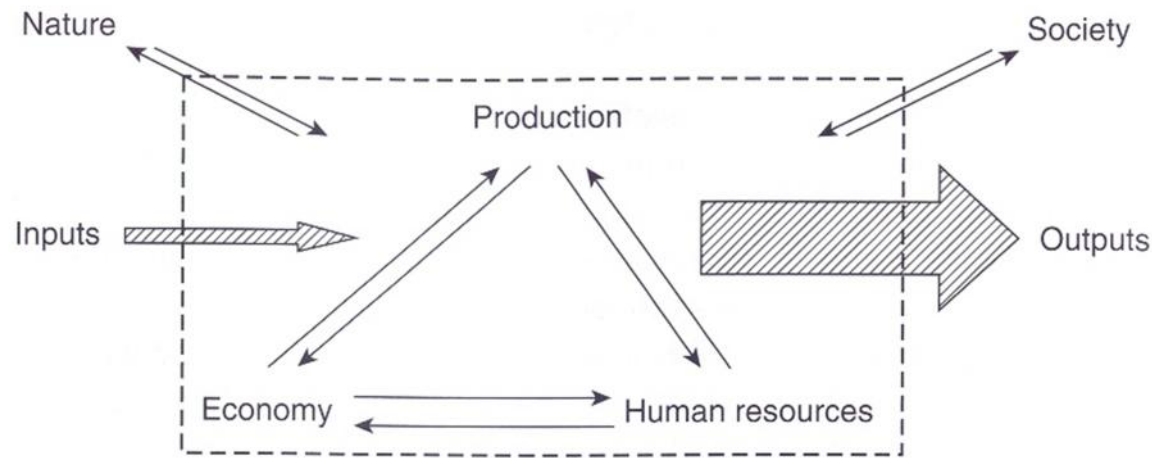


Figure 17.1 The farm, outlined as a system that is open to resource flows into and out of the system, and where farm production, economy and human resources interact under the influence of the forces of nature and local, national and international societies.



Farm decisions

- Uniqueness of agricultural decision
 - Millions of individuals and households are making these decisions themselves, not made by dozens of producers in market like in industrial decisions

Agricultural Economics



Farm works

- Farming requires a wide range of skills and responsibilities
- There are varied form of engagement
 - Self-employed farmers
 - Family farming
 - Year-round employees
 - Seasonal employees
 - Casual farmhands
 - Occasionally engaged neighbors and friends
 - Hired-in specialists (veterinarians, electricians, ...)

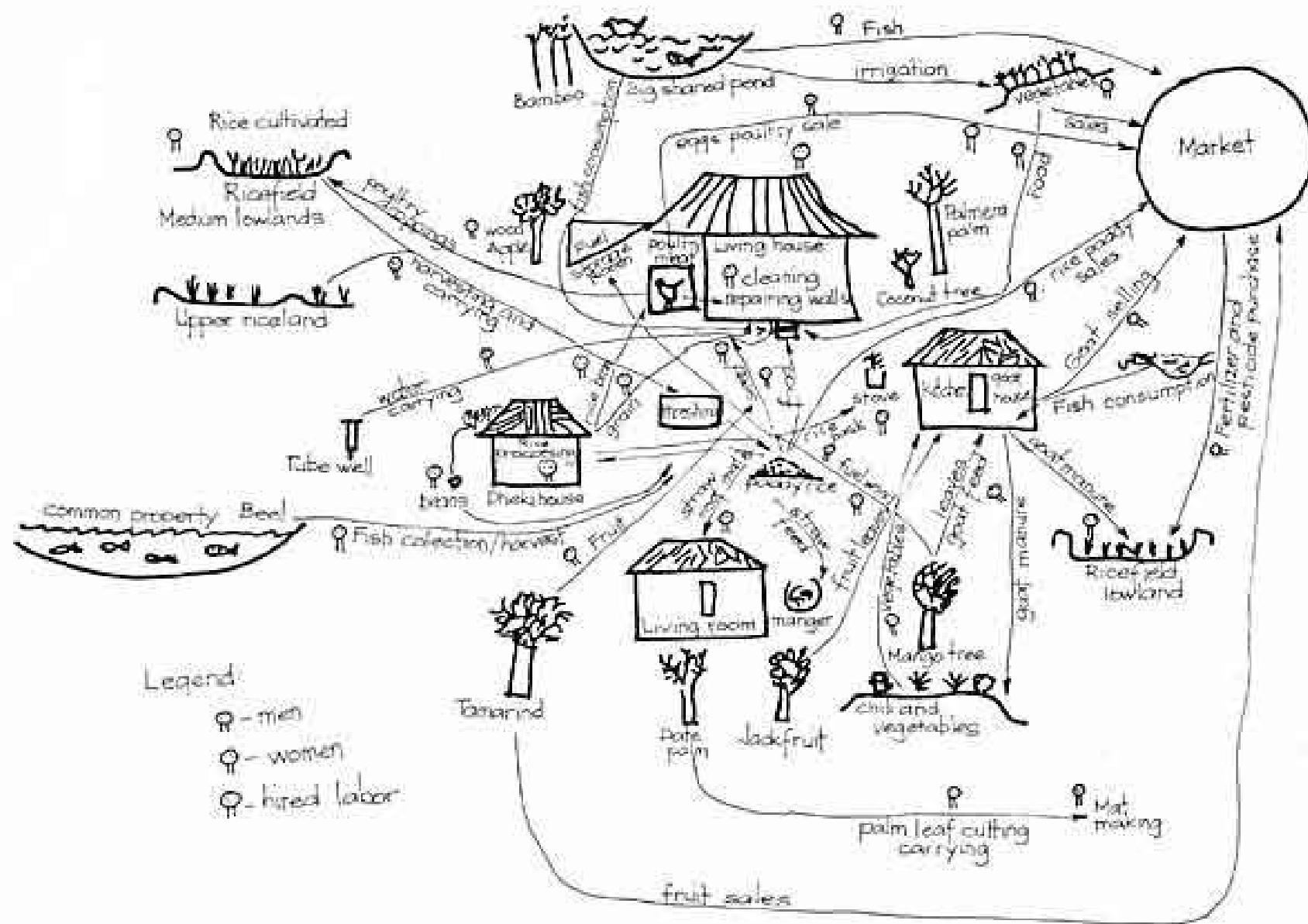
Agricultural Economics



Farm works

- Working time is not always regular
 - Varied from day to day and between seasons
 - Farm work vs. Off-farm work → Periodical unemployment
- Salaries and other kinds of compensation can take a variety of forms
 - Many family labors are unpaid/ underpaid
- Some kinds of farm works are less visible to the outer world than others; administrative works, animal husbandry, ...

Agricultural Economics





Farm works

- Farmers' collaboration:
 - Collaboration between individual farmers: on labours/ machinery
 - A joint company/cooperatives with a small groups of farmers
- Degrees of intensiveness and specialization

Agricultural Economics



Farm development strategies

- Intensification of existing production patterns;
- Diversification of production and processing;
- Expanded farm or herd size;
- Increased off-farm income, both agricultural and non-agricultural; and
- A complete exit from the agricultural sector within a particular farming system.

Agricultural Economics

Economics of Agriculture?

- **Physiocrat:** [Francois Quesnay (1694-1774)]
 - a group of economists who believed that the wealth of nations was derived solely from the value of "land agriculture" or "land development."
 - "Metayage" system: sharecropping between landowner & farmers
 - Corns → physical terms of economic surplus when values of outputs > inputs
 - Transformed to other goods through trades in the market
 - Diverted to government/Church in the form of taxes/tithes
 - A nation will prosper only if capital is allowed to accumulate in the hands of entrepreneurial farmers who will employ peasants as agricultural laborers
 - Growing wealth → population growth
 - Kingdom where revenues are growing attract the new habitats
-

Economics of Agriculture?

- **Physiocrat:** [Francois Quesnay (1694-1774)]
 - Cultivation with ox- vs. horse-drawn ploughs
 - ‘Oxen’: more common technique
 - work slowly, spent lots of time grazing, reduced land productivities
 - Farmers neglect its cultivation, only pulling carts for their own profits, most of the land stands fallow
 - ‘Horses’
 - More efficient, greater returns on capital
 - Growth of wealth increase the numbers of men in profitable occupations
 - Unable to find nearby skilled ploughmen capable of handling horse, they had to come from a distance at considerable expenses
 - Make the masters too much dependent on employees/too much control
-

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Economics of Agriculture?

- **Classical school**

- Adam Smith (1776) *The Wealth of Nations*

- *“It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages”*

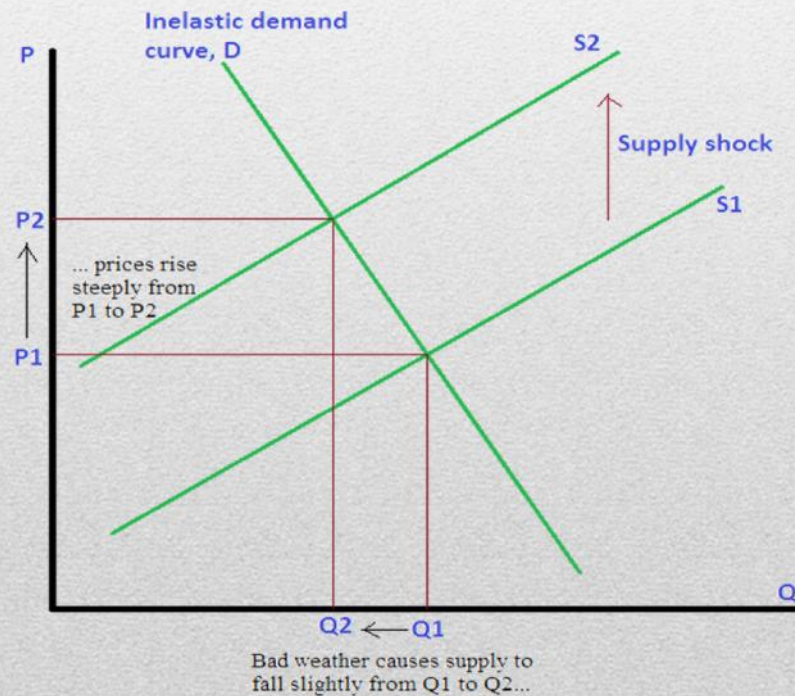
- David Ricardo defined a theory of rent in his *Principles of Political Economy* (1817).

- “Rent” as value in excess of real production—something caused by incident of ‘ownership’ rather than by fundamental economic value imparted by free and equal trade
 - Land scarcity → landlords could pull ‘rents’ out of the production of the land



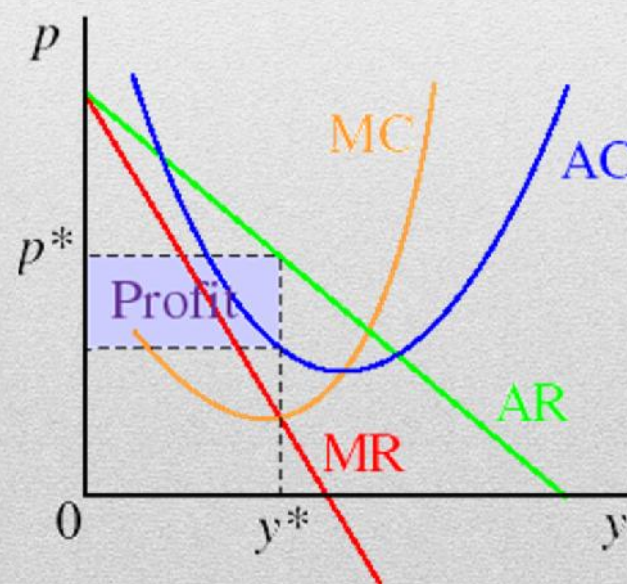
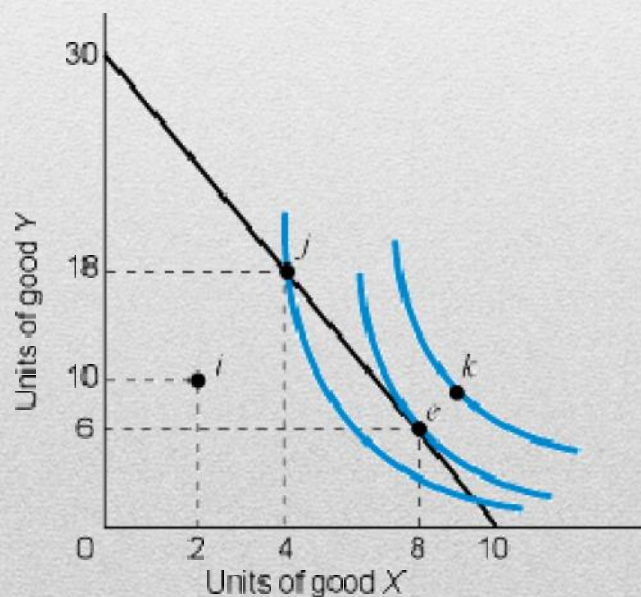
Economics of Agriculture?

- **Classical school**
 - Alfred Marshall (1842-1927) “*Principle of Economics*”
 - Demand & Supply, Marginal Utility, Cost of Production



Economics of Agriculture?

- **Neo-classical school** → “Marginal Revolutions”
 - Three assumptions:
 - People have rational preferences among outcomes that can be identified and associated with a value.
 - Individuals maximize utility and firms maximize profits.
 - People act independently on the basis of full and relevant information.



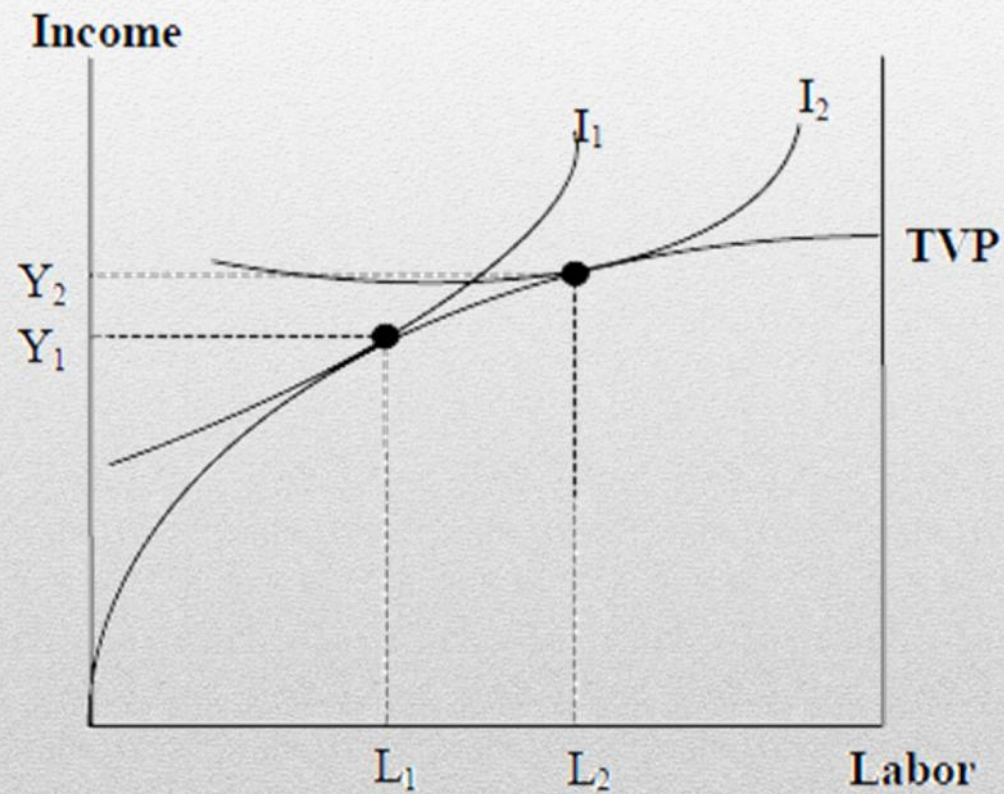
Economics of Agriculture?

- **Neo-classical school**

- Application to farm household decision-making
- “*Peasant household model*”: Alexander Chayanov (1888 – 1937)
 - Farmers’ production and consumption activities could be considered as ‘non-separable’. Most farm households retain some of their farm production for home consumption.
 - “Consumption-Labor-balance” principle
 - Peasants would work as hard as they needed in order to meet their subsistence needs,
 - Once they were met, they had no incentive beyond those needs and therefore would slow and stop working
 - The value of additional time spent on leisure (food preparation, time with children, ...) must be balanced with an additional time working on farm



“Peasant household model”: Alexander Chayanov (1888 –1937)





Economics of Agriculture?

- **Neo-classical school**
 - Application to farm household decision-making
 - “*Peasant household model*”: Alexander Chayanov (1888 – 1937)
 - Peasant farming will not develop into capitalism without some external, added factor
-



Economics of agricultural marketing

- Seasonal and geographical dispersion create the need for a marketing system
- From ‘farm’ to ‘table’

Agricultural Marketing
