

Chapter 9

Agricultural Transformation and Rural Development

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Economic Development

11th Edition

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↑ Photovoltaic agricultural planting in Luonan, Shaanxi

↓ Strawberry Farm in Shanghai



← Mechanized cotton collection, Xinjiang Uyghur Autonomous Region



↓ In 2014, cranberries were introduced to Fuyuan City, Heilongjiang Province, from North America.



➡ In 2022, Tianquan County in Ya'an, Sichuan, produced a total of 50 tons of caviar, accounting for 12% of the global market.



Unexpected Agricultural New Specialties

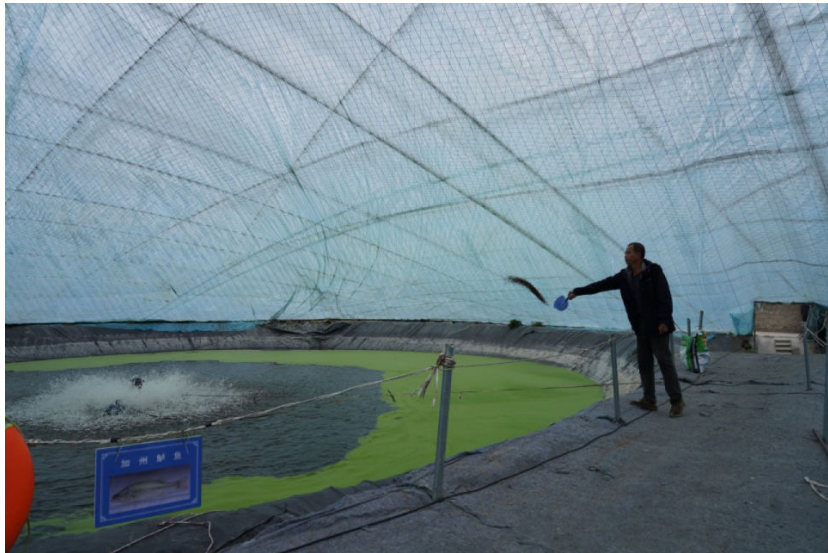


- Yuncheng, Shanxi is now famous for hairy crab and salmon.
- In Yili, Xinjiang, the local climate and water quality provide ideal breeding conditions for giant river prawn 罗氏沼虾.
- In the early 1980s, Shanghai began to introduce saffron 藏红花 cultivation. Chongming has become known as "the hometown of Chinese saffron."
- Huoqiu County in Lu'an City, Anhui Province, introduced the breed of Landes goose, which is specifically for foie gras production.



Fishery base in Nyingchi, Tibet Autonomous Region

The farm is located at the confluence of the Yarlung Tsangpo River and the Niyang River, with an average altitude of 2860 meters and a highly variable climate.



Since June 2022, when the tenth batch of Guangdong Province's support team for Tibet entered the region, a new "track" they have been exploring here is the high-altitude aquaculture industry.

9.1 The Imperative 必要的 of Agricultural Progress and Rural Development

- The heavy emphasis in the past on rapid industrialization may have been misplaced
- Agricultural development is now seen as an important part of any development strategy
- Three complementary elements of an agriculture- and employment-based strategy
 - Accelerated output growth
 - Rising domestic demand for agricultural output
 - Non-agricultural labor intensive rural development activities that are supported by the farming community

9.2 Agricultural Growth: Past Progress and Current Challenges

- Although agriculture employs the majority of the developing country labor force, it accounts for a much lower share of total output
- Agricultural production is rising but unevenly

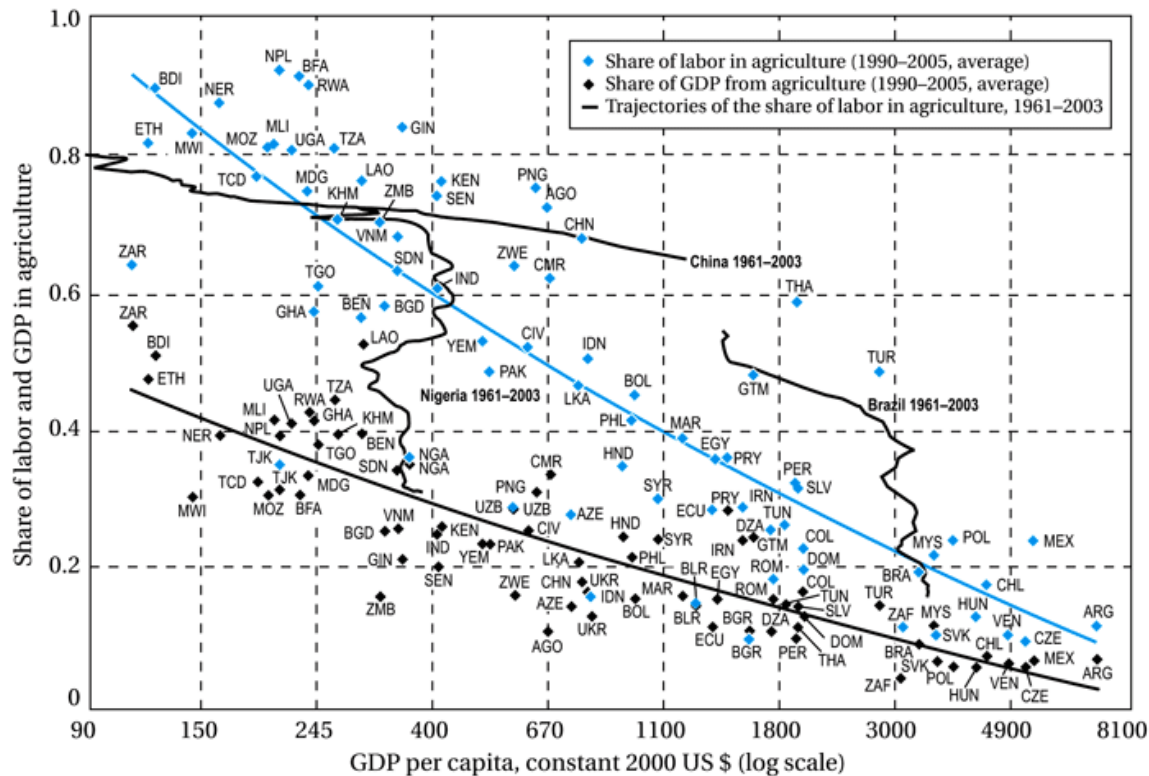
- The degree to which general agricultural output grew significantly faster in developing countries in the 40-year period from 1970 to 2010.
- Output also grew in OECD regions; the sole exception was the poor performance in the transition countries.

TABLE 9.1 Average Annual Growth Rates of Agriculture, by Region (%)

	1971–1980	1981–1990	1991–2000	2001–2010	1971–2010
High-income countries	1.83	0.97	1.25	0.47	1.14
Developing countries					
Latin America and Caribbean	2.93	2.35	3.09	3.21	2.89
Northeast Asia	3.23	5.04	5.04	3.39	4.19
South Asia	2.19	3.70	2.76	2.80	2.86
Southeast Asia	3.66	3.32	3.41	4.23	3.64
Sub-Saharan Africa	1.05	2.68	3.11	2.97	2.44
West Asia and North Africa	3.31	3.84	2.61	2.75	3.13
Transition countries	0.81	1.42	–4.03	2.28	0.04
World	2.08	2.42	2.09	2.42	2.25

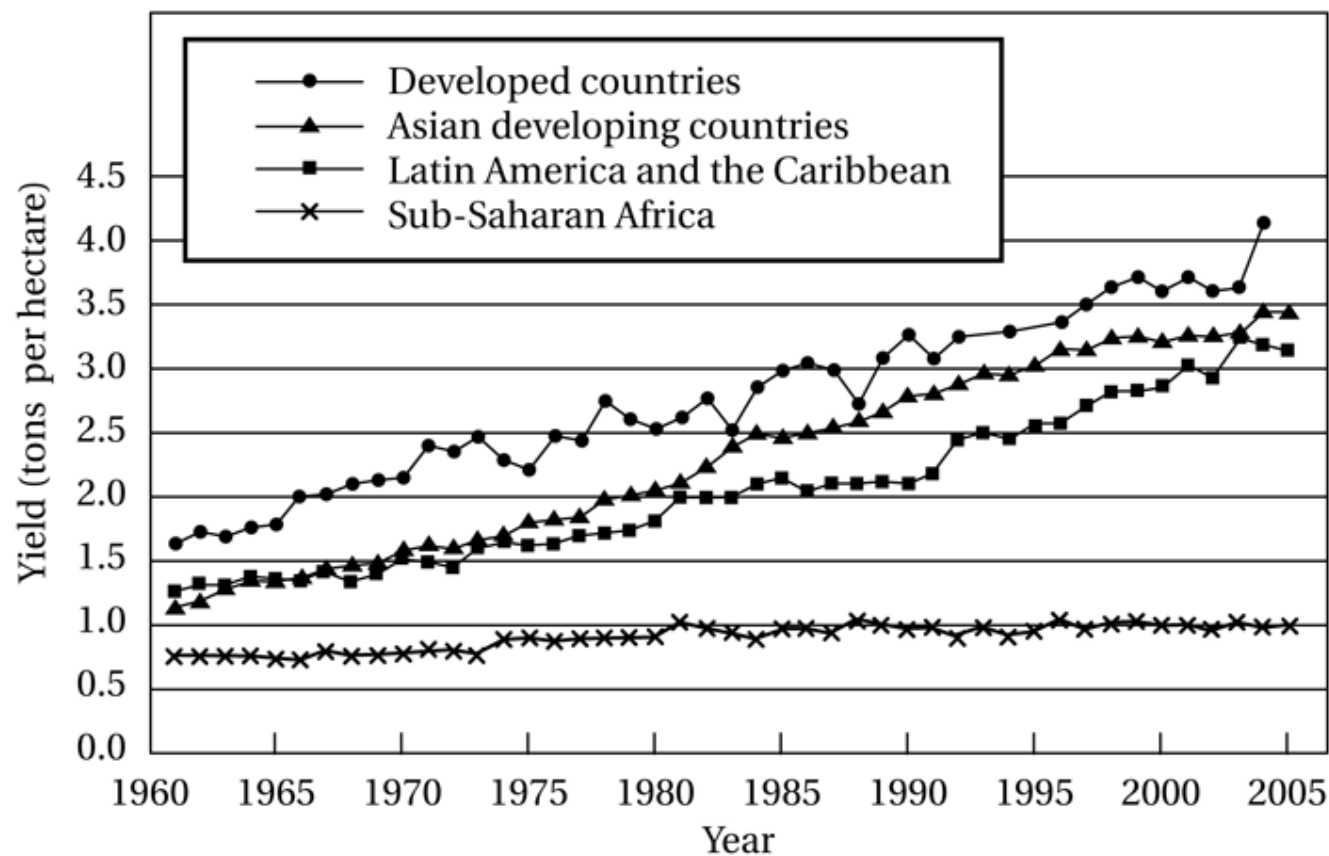
Source: IFPRI (International Food Policy Research Institute) (2013), 'Global Food Policy Report,' Table 1, Washington, D.C.

Figure 9.1 As Countries Develop, the Shares of GDP and Labor in Agriculture Tend to Decline, but with Many Idiosyncrasies 特殊性



Low-income countries tend to have the highest share of the labour force in agriculture, sometimes as much as 80 to 90%.

Figure 9.2 Cereal Yields by World Region, 1960-2005

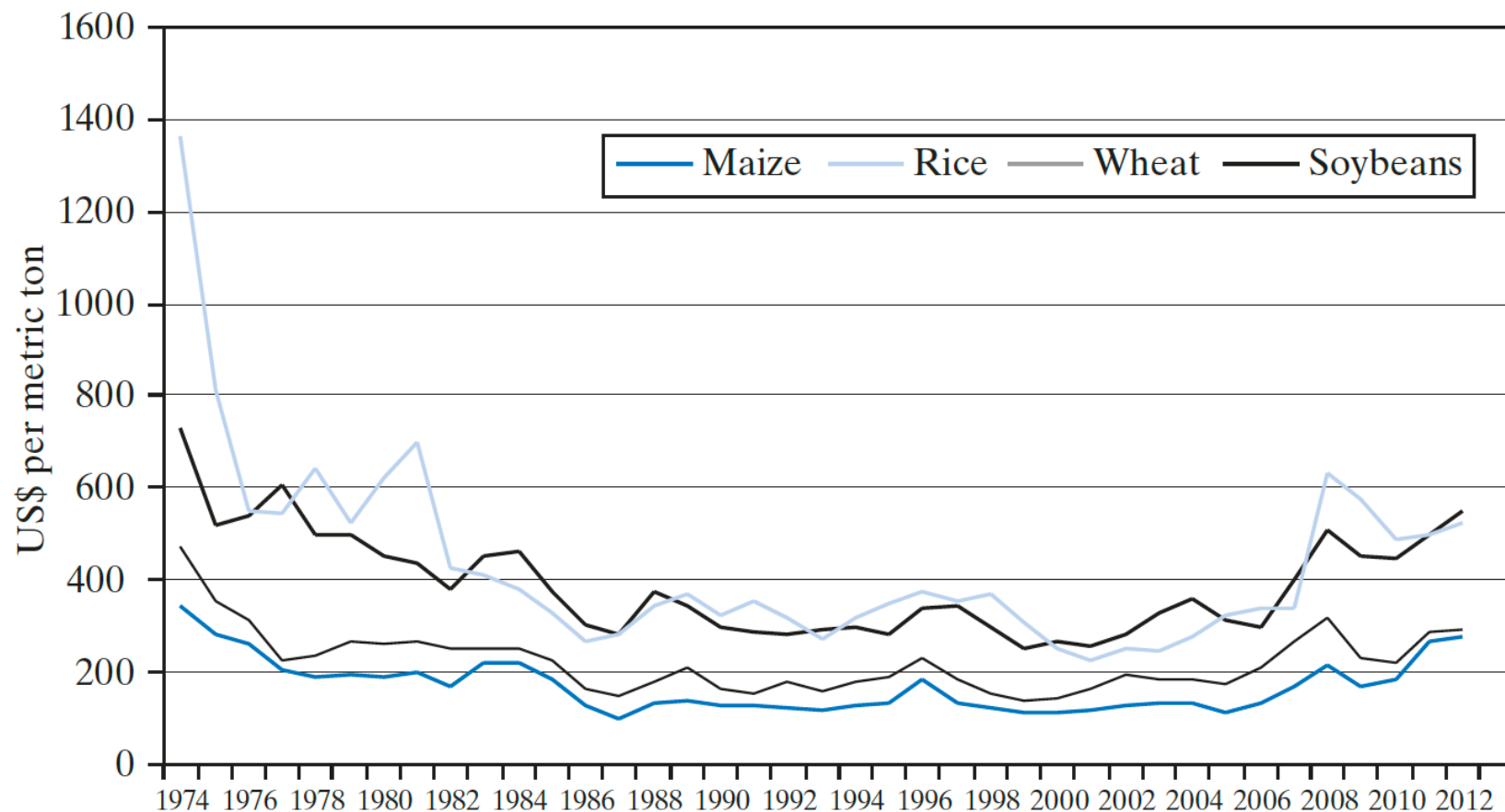


Source: International Bank for Reconstruction and Development/The World Bank, *World Development Report*, 2008. Reprinted with permission.

9.2 Agricultural Growth: Past Progress and Current Challenges (cont'd)

- Malnutrition and famine inspire calls for a new **green revolution** focused on Africa.
 - The boost in grain production associated with the scientific discovery of new hybrid seed varieties of wheat, rice, and corn that has resulted in high farm yields in many developing countries.
- Food price spike of 2007-2008 partly due to short term factors but long term factors may herald return to persistently higher food prices in the years ahead.
 - New upward spike of prices by early 2011
- The presence of market failures - and poverty alleviation goals - create need for constructive government role in agriculture

FIGURE 9.3 World Prices for Agricultural Commodities, 1974–2012



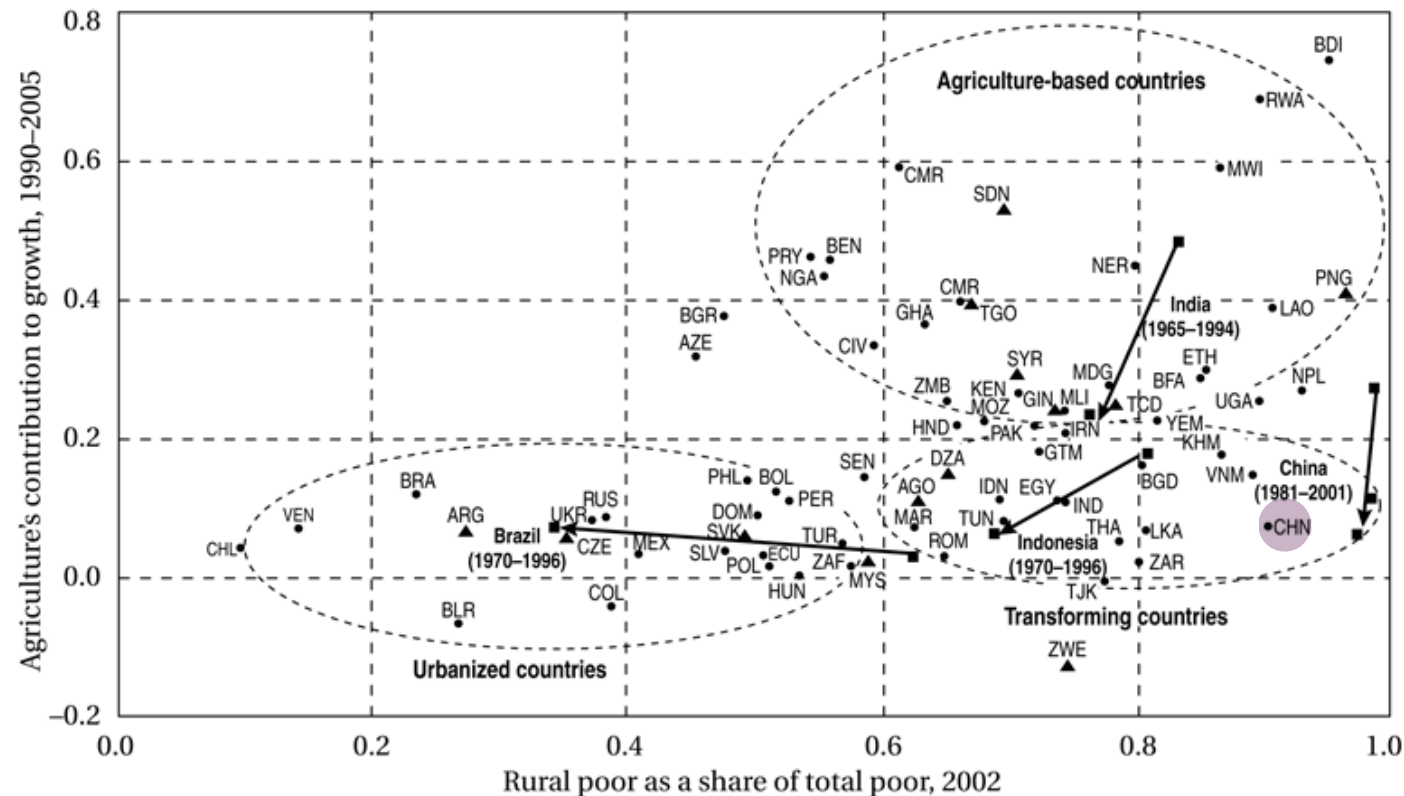
Roles for Government in Agricultural Development

- Environmental externalities 外部性
- Agricultural research and extension 推广服务 services
 - Demonstration and training services for improving agricultural practices and raising farm productivity
- Economies of scale in marketing 规模经济
- Informational asymmetries in product quality 对等子
- Providing institutions and infrastructure
- Ensure shared growth in agriculture sector
- Addressing poverty traps

9.3 The Structure of Agrarian Systems in the Developing World

- Three systems of agriculture 农业体系
 - Agriculture based countries, often subsistence, but agriculture makes up large part of growth
 - Transforming countries, most of world's rural people, large % of poverty incidence found there, low contribution of agriculture to growth
 - Urbanized countries, half or more even of the poor found in urban areas
- The trend is from agriculture-based, to transforming, to urbanized economies as illustrated with the cases of India, China, Indonesia, and Brazil in Fig. 9.3

Figure 9.3 Agriculture's Contribution to Growth and the Rural Share in Poverty in Three Types of Countries



Source: International Bank for Reconstruction and Development/The World Bank, *World Development Report*, 2008. Reprinted with permission.

Note: Arrows show paths for Brazil, China, India, and Indonesia in previous periods. A triangle denotes predicted poverty data used. Country letter codes are found in Table 2.1 on pp. 40–41.

TABLE 9.2 Labour and Land Productivity in Developed and Developing Countries

Country Group	Agricultural Productivity (Value added per worker, US\$, 2017)	Average Grain Yield (Kilograms per hectare, 2017)	
Low income	609	1542	
Middle income	3140 ↑↑↑↑↑	↑ 3889	• Dev
High income	40462 ↑↑↑↑↑	↑↑ 6062	more
Country			add
Burundi	205	1414	they
Congo, Dem. Rep.	322	770	and
Bangladesh	946	4411	• Dev
Kenya	1245	1474	more
India	1669	3161 公顷	hec
Bolivia	1961	1869	diffe
Senegal	2612	1275	mar
Ghana	2866	1873	per
Indonesia	3632	5166	cou
China	3653	6029	eve
Mexico	5694	3800	hav
Brazil	13230	5209	
Japan	23954	6049	
United States	79108	8281	
Canada	93110	4043	

- Developed countries are far more productive in value added per worker, because they have far more physical and human capital.
- Developed countries are more productive in output per hectare—but less so; a difference is that there are many more labourers working per hectare in developing countries, raising total yield—even if individual workers have low productivity.

9.3 The Structure of Agrarian Systems in the Developing World (cont'd)

亚洲农地的分散和小块分割。

- Transforming Economies: Problems of Fragmentation and Subdivision of Peasant Land in Asia
 - Impact of colonial rule in strengthening land tenure systems of private property rights and the consequent rise of moneylenders
 - Contemporary landlordism in India and Pakistan involves absentee landlordism and persistence of sharecroppers佃农 and tenant租户 farmers
 - Rapid population growth resulted in more fragmentation and peasant impoverishment贫困

Table 9.3 Changes in Farm Size and Land Distribution

		Land Distrib- ution Gini (percent)		Average Farm Size (hectares)		Change (%)		Farm Size Definition Used
Country	Period	Start	End	Start	End	Total Number of Farms	Total Area	
Smaller farm size, more inequality								
Bangladesh	1977–1996	43.1	48.3	1.4	0.6	103	−13	Total land area
Pakistan	1990–2000	53.5	54.0	3.8	3.1	31	6	Total land area
Thailand	1978–1993	43.5	46.7	3.8	3.4	42	27	Total land area
Ecuador	1974–2000	69.3	71.2	15.4	14.7	63	56	Total land area
Smaller farm size, less inequality								
India	1990–1995	46.6	44.8	1.6	1.4	8	−5	Total land area
Egypt	1990–2000	46.5	37.8	1.0	0.8	31	5	Total land area
Malawi	1981–1993	34.4	33.2 ^a	1.2	0.8	37	−8	Cultivated crop area
Tanzania	1971–1996	40.5	37.6	1.3	1.0	64	26	Cultivated crop area
Chile	1975–1997	60.7	58.2	10.7	7.0	6	−31	Arable land area
Panama	1990–2001	77.1	74.5	13.8	11.7	11	−6	Total land area
Larger farm size, more inequality								
Botswana	1982–1993	39.3	40.5	3.3	4.8	−1	43	Cultivated crop area
Brazil	1985–1996	76.5	76.6	64.6	72.8	−16	−6	Total land area
Larger farm size, less inequality								
Togo	1983–1996	47.8	42.1	1.6	2.0	64	105	Cultivated crop area
Algeria	1973–2001	64.9	60.2	5.8	8.3	14	63	Arable land area

Source: World Development Report, 2008: Agriculture and Development by World Bank. Copyright © 2008 by World Bank. Reproduced with permission.

^aFigure for 2004–2005.

9.3 The Structure of Agrarian Systems in the Developing World (cont'd)

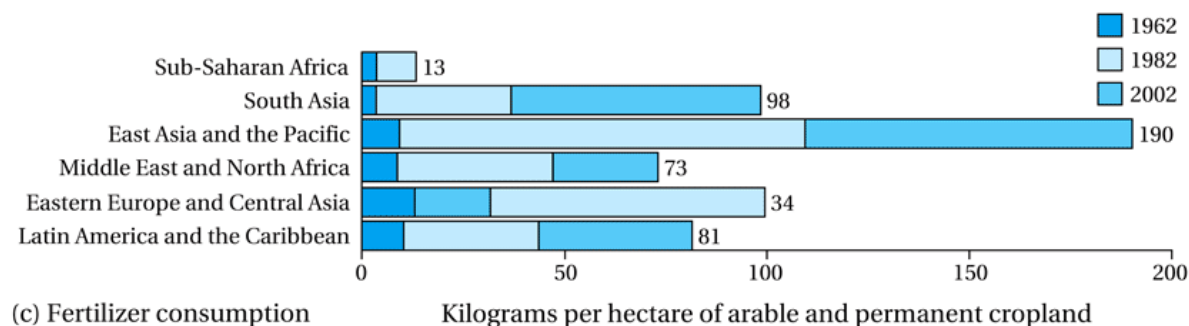
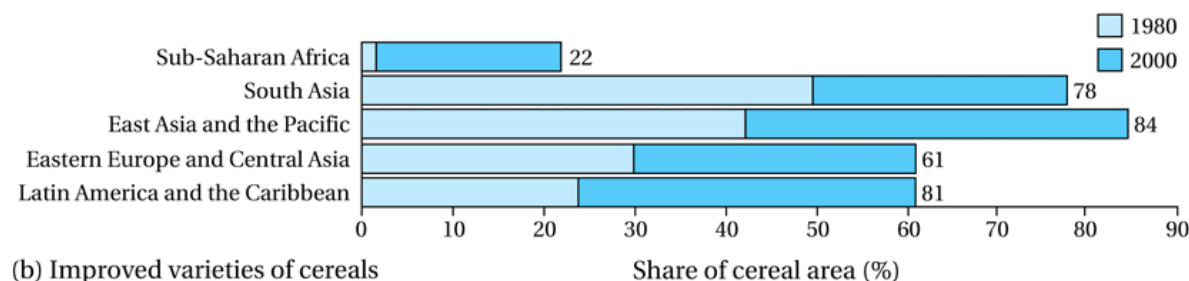
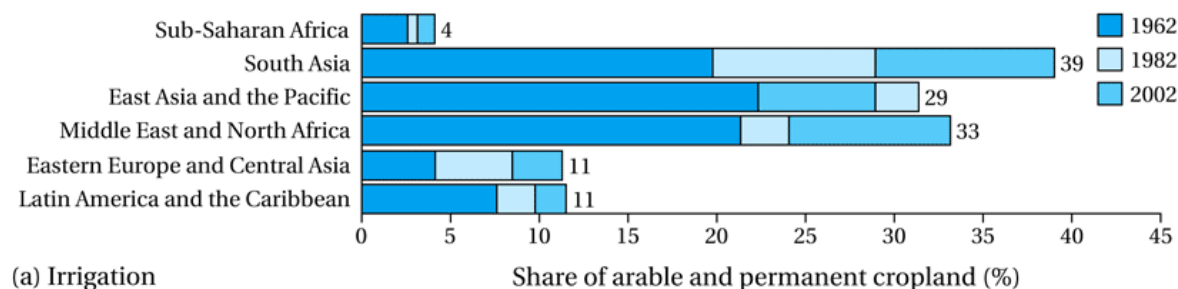
- Agrarian Patterns in Latin America: Progress and Remaining Poverty Challenges 大庄园的低效率与高交易成本.
 - Apart from latifundios (大领地 large holdings) and minifundios (small farms) much production occurs on family farms and medium sized farms.
 - Latifundios (traditional ones, especially) are relatively inefficient; landlords/owners are sometimes less focused on the business of farming; and large farms typically entail higher transaction costs
 - Overall the agricultural sector seems to be doing well in many Latin American countries. Two prominent examples: Chile (diversification), and Brazil (biofuels生物燃料) 多样化
 - Extreme rural inequalities still persist.

不平等

9.3 The Structure of Agrarian Systems in the Developing World (cont'd)

- Subsistence Agriculture and Extensive Cultivation in Africa 维持生计型农业 & 粗放耕作
 - Low productivity due to lack of technology
 - **Shifting Cultivation** 轮耕: Tilling land until it has been exhausted of fertility and then moving to a new parcel of land, leaving the former one to regain fertility until it can be cultivated again.
 - Seasonal demand for labor depending on rainy season
 - High dependence on unimproved seeds sown on unfertilized, rain-fed fields
 - Relatively high fraction of underutilized land
 - High concern about climate change impact
 - Need for an African new green revolution, there are hopeful signs that it is getting underway

Figure 9.4 Expansion of Modern Inputs in the World's Developing Regions



Source: World Development Report, 2008: Agriculture and Development by World Bank. Copyright © 2008 by World Bank. Reproduced with permission.

Note: Figures for improved cereal varieties are based on estimates for rice, wheat, maize, and sorghum.

9.4 The Important Role of Women

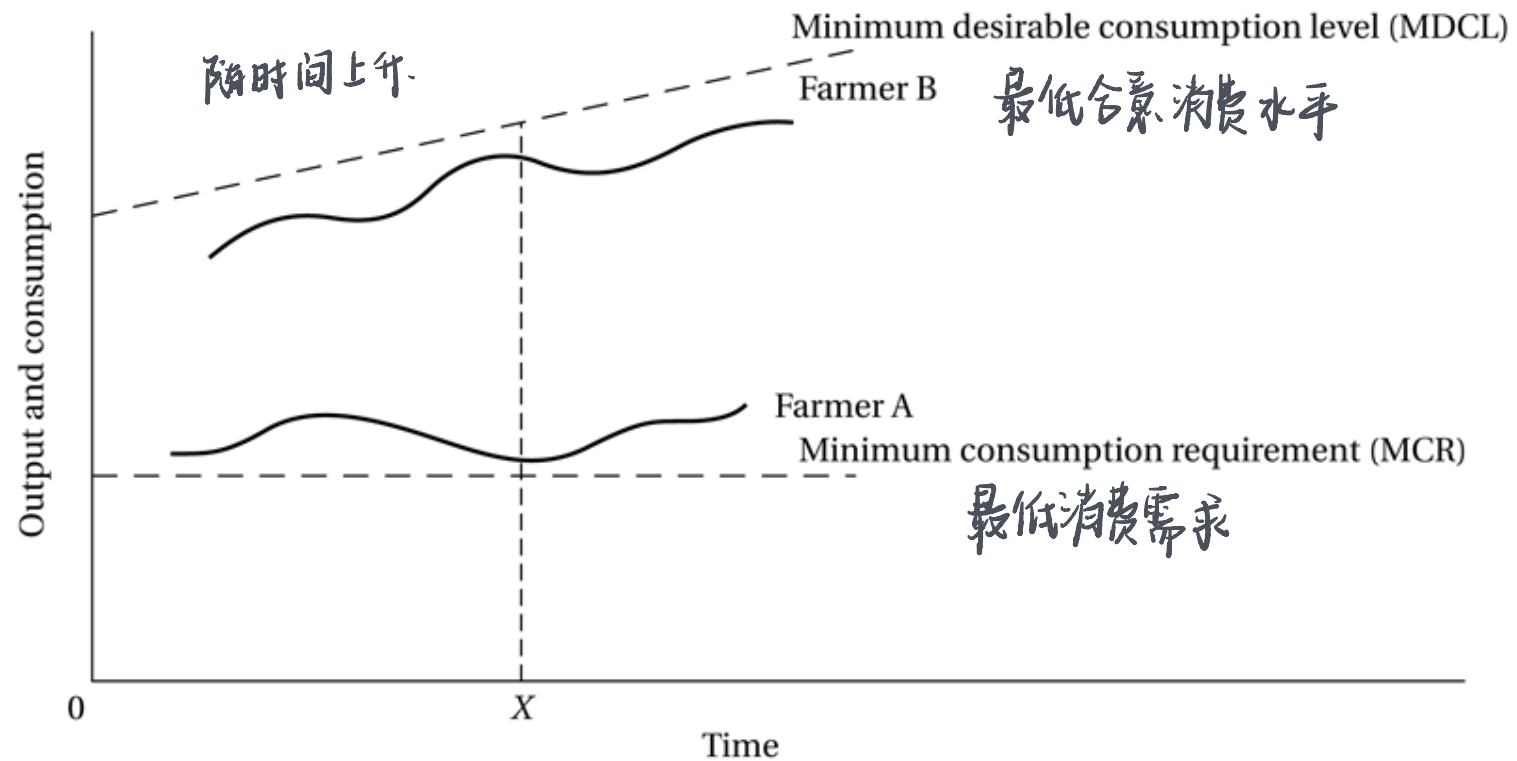
- Women provide 60% to 80% of agricultural labor in Africa and Asia, and 40% in Latin America
- Women work longer hours than men
- Government assistance programs tend to reach men, not women

9.5 The Microeconomics of Farmer Behavior and Agricultural Development

维持生计型农业：风险回避、不确定性和生存。

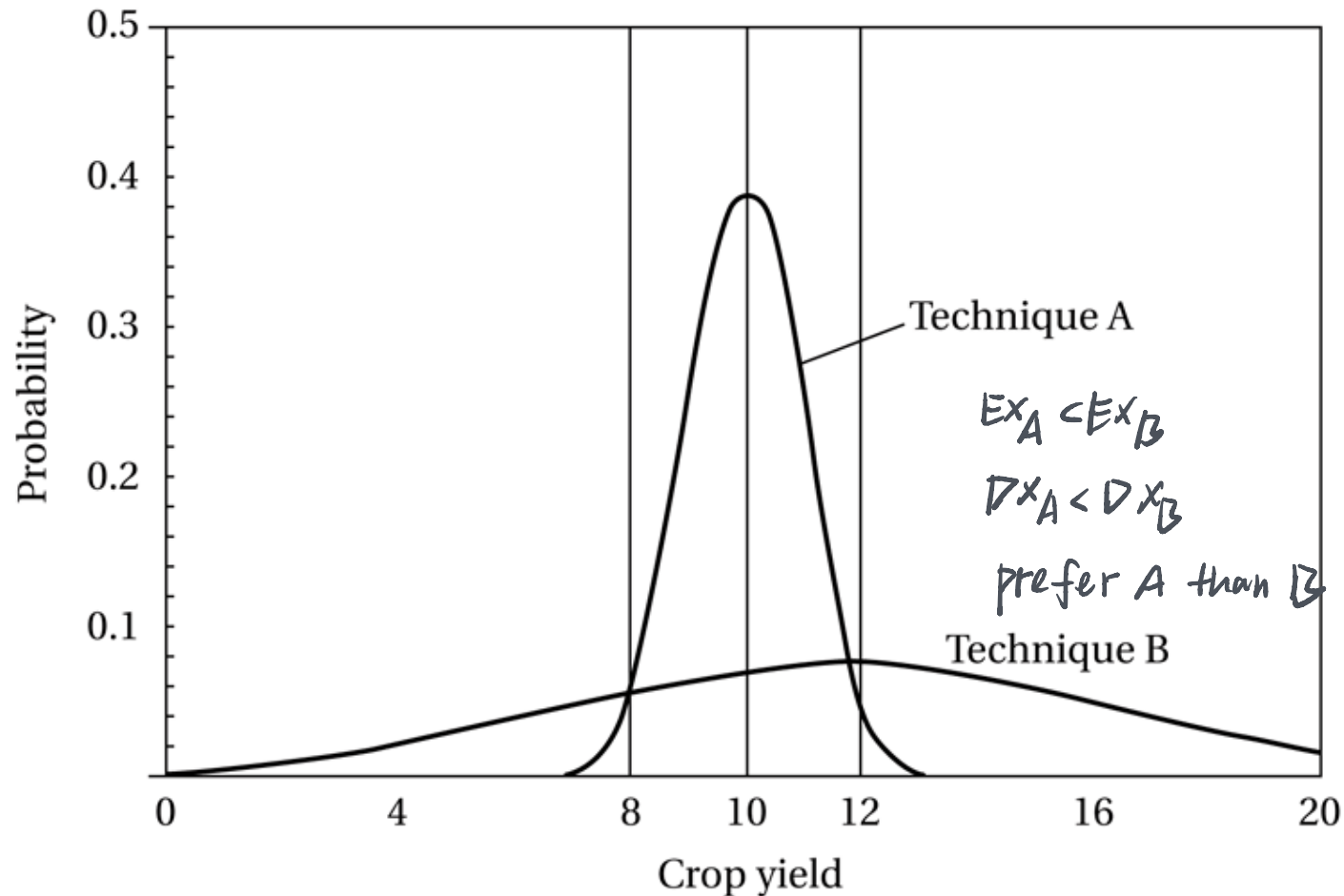
- Subsistence farming: risk aversion, uncertainty, and survival
 - Traditional neoclassical model of profit maximization with certainty is not adequate
 - Price, weather, and other uncertainty, along with limited access to credit and insurance (and even savings vehicles), largely explains the extent of risk-averse behaviors observed
 - Risk-averse subsistence farmers often (not irrationally) can prefer technologies that combine low mean-per-hectare with low variance to alternative high yielding but higher risk technologies 方差更小
 - Efforts to minimize risk and remove commercial and institutional obstacles to small farmer innovation are necessary

Figure 9.5 Small-Farmer Attitudes toward Risk: Why It Is Sometimes Rational to Resist Innovation and Change



- The lower horizontal line measures MCR necessary for the farm family's physical survival.
- The upper, positively sloped straight line (MDCL) represents the minimum level of food consumption that would be desirable given the prevailing cultural or potential productivity factors affecting village consumption standards. It rises over time.
- At time X, farmer A's output levels are close to MCR. She can't take a chance of any crop failure.
- Farmer B's output performance is close to MDCL. She will be more likely to innovate and change.
- The result may be that farmer A remains in a self-perpetuating poverty trap.
- Inequality is growing.

Figure 9.6 Crop Yield Probability Densities of Two Different Farming Techniques



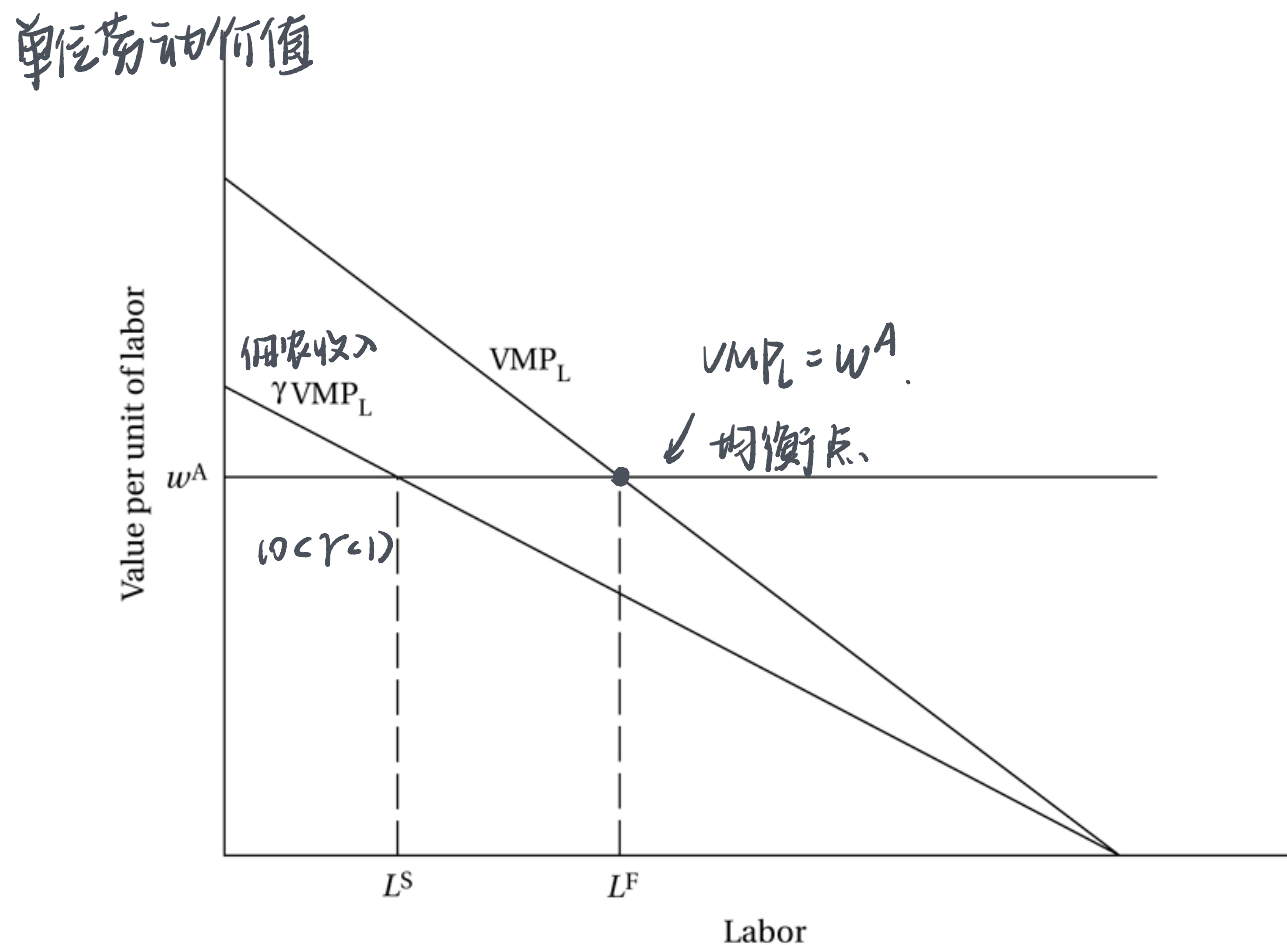
- The higher graph (technique A) shows a production technology with a lower mean crop yield (10) than that of technique B (12). But it has a lower variance around that mean yield than technique B.
- The chances of starving are much greater with technique B, so risk-averse peasant farmers would naturally choose technique A, the one with the lower mean yield.
- Evidence is clear that farmers pay for “self-insurance” of this type with much lower returns.

The Economics of Sharecropping and Interlocking Factor Markets

佃农和封建要素市场

- The poor incentive structure of sharecropping lends itself to inefficiency. (Marshall)
- x-axis: number of hours of work, or total effort
- y-axis: output per unit of labor
- A farmer who owned his own farm would work until his value marginal product of labor (VMP_L) was equal to his alternative wage, or opportunity cost of labor, w^A , and so would put in an efficient amount of labor effort L^F .
- A sharecropping would receive only γVMP_L . As a result, the sharecropper would have an incentive to put in an inefficiently low level of effort L^S .

Figure 9.7 Incentives under Sharecropping



Issues in sharecropping: a long debate

低激励导致效率低下

- Intrinsically Inefficient due to poor incentives (Marshall)
- Monitoring approach (Cheung): L^F would obtain under sharecropping by the way of contracting 合同分割实现 L^F .
- Screening argument (high ability then take pure rental, low ability chooses sharecropping)
- Empirical evidence for inefficiency sharecropping from Ali Shaban (comparing same farmer, controlling for soil)
- Compromise between two types of risk (Stiglitz, others) to the landlord that the tenant will not do much work and the risk to the tenant that a fixed rent will in some years leave him no income
- Giving sharecroppers a larger share of the produce and security of tenure on land can increase efficiency

分成 \uparrow , 土地所有权 \uparrow , $\eta\uparrow$

9.5 The Microeconomics of Farmer Behavior and Agricultural Development (cont'd)

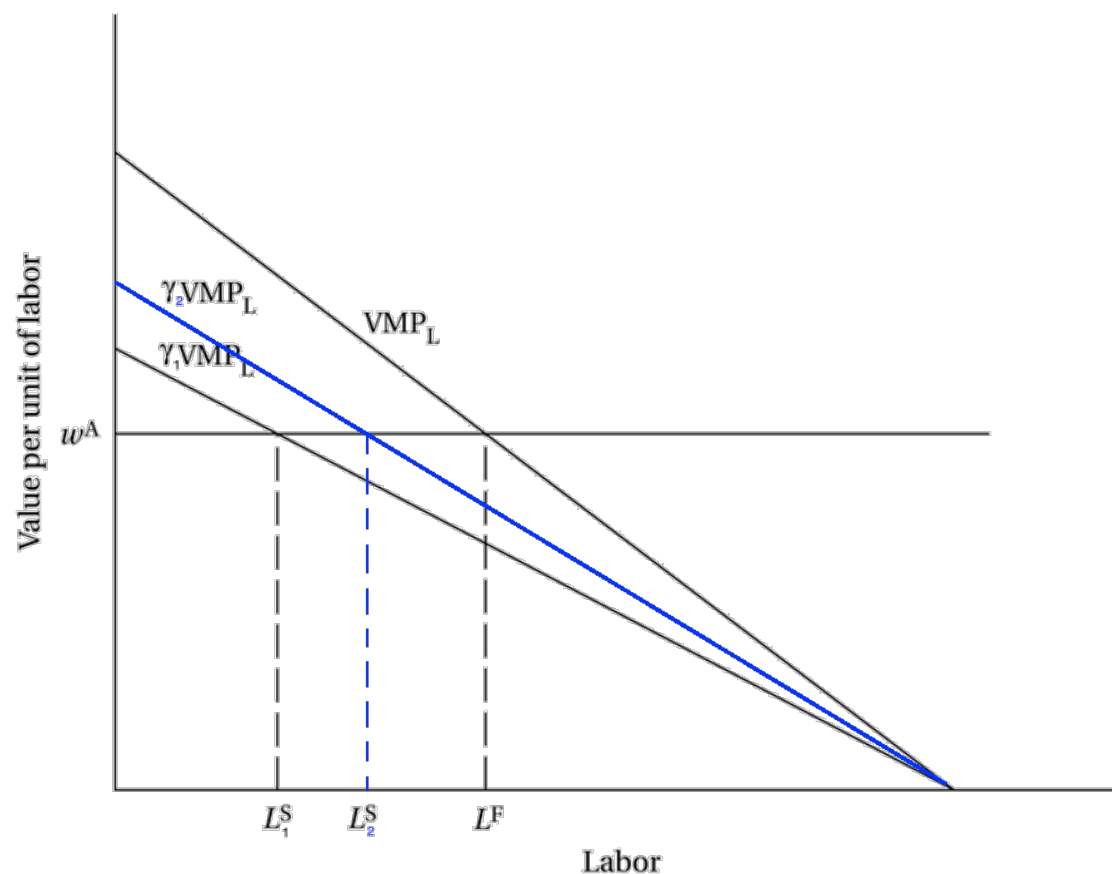
- The Transition to Mixed and Diversified Farming 混合和多样化的农业
 - New cash crops such as fruits, vegetables, coffee, tea, and pyrethrum are established, together with simple animal husbandry.
- From Divergence to Specialization: Modern Commercial Farming 从多样化到专业化

9.6 Core Requirements of a Strategy of Agricultural and Rural Development

- Improving small-scale agriculture 改进小规模农业
 - Technology and innovation 技术
 - Institutional and pricing policies: Providing necessary economic incentives 制度和价格政策
 - Adapting to new opportunities and new constraints 适应
- Conditions for rural development 发展条件
 - Land reform 土地改革
 - Supportive policies
 - Integrated development objectives 综合发展目标

- *Exercise:* Create a graph that looks like Figure 9.7 in the text. What would happen if societal pressures caused the sharecropper's share to increase? Show the effect on your graph and explain in words.

Answer: An increase in the sharecropper's share from γ_1 to γ_2 would cause an increase in the sharecropper's labor effort from L^S_1 to L^S_2 . Simply put, if the sharecropper gets to keep a larger share of his or her production, he or she will work harder.



1. The primary goal of an agricultural extension service is to

- A: bring new areas under cultivation.
- **B: increase the yield per hectare.**
- C: introduce land reform.
- D: assist rural-urban migration.

2. Sharecropping can be best understood as

- A: a type of agreement preferred by peasants.
- B: a type of agreement preferred by landlords.
- **C: a compromise between peasant and landlord preferences.**
- D: a type of agreement preferred by neither but given by tradition.