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WHY MONSOON ASIA FELL BEHIND THE WEST SINCE THE 16th CENTURY: CONJECTURES

By Harry T. Oshima*

1. Introduction

With the outstanding performance of the West Pacific Nine (ASEAN, Japan, Taiwan, South Korea and Hong Kong) in the 1960s and 1970s—no other region grew faster, and no other periods in the two centuries of modern economic growth could boast of annual growth rates as high as 4 per cent per capita product—it is often said that the center of modern economic growth is moving westward from the Atlantic to the Pacific. But for this to happen, the West Pacific Nine must continue to outpace the growth of Europe in the 1980s and 1990s by a sizeable margin. Although a born pessimist with many worries about current ASEAN industrial policies, I do not think that this is impossible. The performance of the West Pacific Nine in the 1960s and 1970s was not a "flash in the pan," a transitory fluke, nor mainly a conjuncture of lucky incidents and circumstances. (It was based on an agricultural revolution starting in Japan.)

But there is one nagging issue: how was it that Asia, which by all accounts was ahead of Europe around the middle of this millennium, fell behind during the latter centuries, ending up by the time of World War II as the poverty center of the world? Until we know more about the reasons for the stagnation of Asia relative to that of Europe, it is uncomfortable to speculate about the Pacific center of modern economic growth in the coming new millennium.

The issue of why Asia fell behind Europe in the previous centuries and now may be "catching up" is a vast problem impossible to say much about in a short paper but it is an interesting one, as it involves the discussion of the ultimate prime movers of growth and development. Fortunately, the historians on Asia have been doing extensive work on it.

Current Views

What then are some of the views of the leading historians on East Asia? The Harvard social historians of East Asia, Fairbanks and Reischauer, point out that China moved into an era of unprecedented cultural, political, and social stability between the 13th and 19th

* Visiting Professor of Economics, University of the Philippines.

centuries when the West was emerging out of the stagnation of the Middle Ages and about to go through a series of transformations (the Reformation, Renaissance, Liberalism, national states, and the various economic revolutions). But why did China become so stable? Rather than geographic isolation, "a more plausible reason is the very perfection that Chinese culture and social organization had achieved by the thirteenth century. The political, social and intellectual systems were basically so viable and so well balanced that not until this balance was destroyed by massive external blows in the nineteenth century was Chinese society again set in rapid motion.... It was during this period that they fell behind the West in many aspects of material culture and technology as well as certain forms of economic and political organizations... Chinese society though stable was far from static and unchanging but in this period the pace was slower and the degree of change less than in the West" (Fairbanks and Reischauer, 1960, pp. 241-242, 291).

The author of a seven-volume work on the science and civilization of China, Joseph Needham (1969), tackles the issue in a series of essays in *The Grand Titration, Science and Society in East and West.*[1]

> "And so we come at last to the paradox of paradoxes—'stagnant' China the donator of so many discoveries and inventions that acted like time-bombs in the social structure of the West. The cliché of stagnation, born of Western misunderstanding was never truly applicable; China's slow and steady progress was overtaken by the exponential growth of modern science, with all its consequences, after the Renaissance... There can be no doubt that there was a certain spontaneous homoeostasis about Chinese society and that Europe had a built-in quality of instability... there was no special superiority about the relatively 'steady state' of Chinese society, resembling as it did in many ways ancient Egypt, that age-old continuum which amazed the youthful, changeable Greeks.
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> There is no special mystery about the relatively 'steady state' of Chinese society either. Social analysis will assuredly point to the nature of the agriculture, the early necessity of massive hydraulic engineering works, the centralization of government, the principle of non-hereditary civil service, etc. But that it was radically different from the patterns of the West is quite unquestionable."

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[1] Needham lists the following major innovations arriving in Europe from Asia from the 12th century on: magnetic compass, stern-post rudder, paper-making, windmill concept, wheelbarrow, gunpowder, silk machinery, mechanical clock, segmental arch bridge, blast-furnace, printing press, the horizontal-windmill, ball and chain flywood, canal lockgates, etc.

"To what then was the instability of Europe due? . . . . I would prefer to think in terms of the geography of what was in effect an archipelago, the perennial tradition of independent city states based on maritime commerce and jostling military aristocrats ruling small areas of land, the exceptional poverty of Europe in the precious metals. . . . By contrast China was a coherent agrarian land-mass, a unified empire since the third century B.C. with an administrative tradition unmatched elsewhere till modern times, endowed with vast riches in minerals . . . . and cemented into one by an infrangible system of ideographic script. . . . The greater population of China was self-sufficient . . . . Europeans suffered from a schizoprenia of the soul . . . . while the Chinese, wise before their time, worked out an organic theory of the Universe which included Nature and man, church and state, and all things past, present, and to come " (Needham, 1969, pp. 120-121).

For Karl Marx (1939, pp. 350-353), it was the "Asiatic mode of production," "the simplicity of the organization for production in these self-sufficing communities that constantly reproduce themselves. . . . this simplicity supplies the key to the secret of the unchangeableness of Asiatic societies, an unchangeableness in such contrast with the constant dissolution and refounding of Asiatic states, and the never-ceasing changes of dynasty. The structure of the economical elements of society remains untouched by the storm-clouds of the political sky."

It was the widespread stability of Asian society in the centuries when capitalism was developing rapidly in Western Europe, beginning with agriculture and commerce from the 16th century and then in industry, which prevented Asia from benefitting from the changes which were propelling Europe to new heights of material and cultural well-being. To one group of writers, it was the high levels attained by Chinese society and culture which underlay the stability, a variant of this idea being the view that the traditional technology of China had reached the limits of its potential and could not go forward very much (Elvin, 1973, Ch. 17). To another group, it was the geography, the environment, the need for vast systems of canals, centralized government with a non-hereditary bureaucracy, a strong state and a unified script.

There may have been a number of reasons for the stability of Asia. It may be that in historical phenomena so enormous as the issue under discussion (encompassing several centuries and vast regions and populations), the explanations can be complex, many forces may be involved, and there is room for additional reasons. The view advanced in this paper was suggested from the study of the growth of the West Pacific Nine in the postwar decades. This was a growth sparked by a revolution in monsoon paddy agriculture which in Japan had doubled yields per

hectare while slashing labor requirements to less than one-third of prewar decades'. It is prompted by the puzzle that if Chinese society, culture and technology had reached the limits of their potentials, why was it that attempts were not made to borrow from Europe the various innovations in technology and institutions throughout the 16th to the 19th centuries, just as Europe did from Asia in the 13th through the 17th centuries? Instead, many Asian countries sought to insulate themselves from the influences of the West with policies of isolation until it was too late in the 19th century.[2]

Despite the unprecedented advances, East Asia's rice farms were not transformed into capitalistic farming, remaining essentially peasant agriculture depending on family labor. The reason for this, I believe, is that the agriculture of these countries was different from that of the West. Extrapolating backward to the mid-millennium, I conjecture that for this type of agriculture, capitalism was not a suitable form of organization. The technology and institutions emerging in the post-medieval centuries in Europe could not be transferred to Asian rice farms. Thus, these views are in the directions of Marx's "Asiatic mode of production" but depart from his ideas in that it is not the simplicity but complexity that made for stability and blocked the transfer.[3]

2. The Development of Monsoon Paddy

Geographers tell us that nowhere else in the world is there such a sharp reversal of winds as in Asia. Here, as winter comes to the vast highlands of the largest land mass centered in Tibet and bounded by the Himalayas, Pamirs, Sinhiang and the southeastern mountains of China, cold, dry winds blow out to the south. As summer comes, moisture-laden winds from the surrounding sea blow into the continent, bringing heavy rains. Instead of steady rainfalls throughout the months of the year as in Europe, these monsoon winds bring heavy rains in about one-half of the year and little or none in the months of the other half.

The agronomists tell us that in this rain pattern and environment, no cereal crop does as well as rice, grown in puddles of water. And everywhere in Asia where the monsoon winds prevail, rice is the main cereal crop—from south of Manchuria, Mongolia, Hokkaido, and

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[2] See *Asia's Monsoon Economy: Structure, Stagnation, Growth*, mimeo, December 1982; *The Transition to an Industrial Economy in Monsoon Asia*, Asian Development Bank, April 1983; *Off-Farm Employment and Incomes in East Asia*, June 1983; and the references to earlier papers found in them.

[3] Also we put less emphasis on the hydraulic nature of Asian farming. See the discussion of the "Asiatic mode of production" and the hydraulic society by Wittfogel (1957), *Oriental Despotism*, Chapter 9.

Kashmir, west of Pakistan, and north of the southernmost islands of Indonesia and Mindanao. And even in the centuries before the birth of Christ, the technology of rice grown in paddies began to move in the directions of labor intensiveness, marked by activities like deep ploughing, mid-season cultivating, terracing, green and organic manuring, ratooning, small- and large-scale irrigation, drainage, and so on in northern China. Then, in the early centuries of the first millennium, transplanting began, raising greatly not only yields but labor requirements, such as seedling beds, transplanting, thorough land preparation, water management, careful cultivation, and time-consuming reaping. And in the first century of the second millennium came multiple-cropping with the use of short-duration drought-resistant seeds from Vietnam, raising even further the complexity (and the labor-intensity) of land and seedling-bed preparations, transplantation, water management, reaping, threshing, with tight schedules as one crop is harvested and the next put in immediately and with greater crop diversification. One author concludes that "by the thirteenth century China thus had what was probably the most sophisticated agriculture in the world, India being the only conceivable rival." And in the following centuries, each of these began to be further improved, largely by the use of more labor. These improved technologies and ways were diffused over wider areas of China and beyond.[4]

Besides sophistication and intensification, the complexity is compounded by the pronounced seasonality of the monsoons (where rainfall varies by ten inches between the rainy and dry seasons while the comparable variation is only half an inch in western Europe). The timing of heavy and light rainfalls imposes a rigid and exacting schedule of heavy labor demand and intense work for plowing, planting, and harvesting of rice. I believe that it is the monsoons that stamp Asian rice agriculture as a special type of agriculture found nowhere else in the world, not so much the large hydraulic works. Most of the water for the vast majority of the paddies of Asia comes from the monsoon rains in the localities and not from the large rivers originating in the highlands of inner Asia. The differentiating characteristics of rice-growing farms and their village communities in Asia from those in Egypt, Italy, Africa, United States, Australia and elsewhere arise from the monsoon rains which call for highly labor-intensive transplantation and harvesting. The high productivity per hectare of the technology developed historically in China meant low productivity

[4] This summary is based on Te-Tzu Chang's (1977) chapter in *The Early History of Agriculture*, edited by Sir Joseph Hutchinson, et al. The quotation is from Elvin (1973), *op. cit.*, p. 129. See also various papers in *Proceedings on the Symposium on Climate and Rice* (1976), edited by T.T. Chang, B.S. Vegara and S. Yoshida.

per worker as it required more than 10 times labor per hectare.[5] And the heavy labor demands of the technology called forth the great population densities of monsoon Asia, which are in turn many times those of Europe.

In contrast, the course of technological progress in Europe, especially in England from the 15th/16th century was generally away from labor intensity. Beginning with enclosures for sheep raising, and then later for livestock-raising for food, increasing amounts of land were put into the growing of livestock feed (grasses, turnips and clover) which required little labor. The growing of crops for winter feeding of livestock enabled the English farmer to combine farming with animal husbandry instead of hand-spinning and weaving—a combination which generated economies of scale as labor requirements per hectare became less. The separation of farming from industry was not possible for the Asian rice farmer, since the great population densities required that all arable land be devoted at all time for growing food for human beings, and whatever feed was available had to be fed to the oxen and buffaloes for ploughing. In places such as densely settled Java, the amount of available feed for buffaloes was too little and most ploughing had to be done by hand. And everywhere, the average Asian had to pull his own cart or carry the produce on his back before the advent of bicycles, railways, and other modern means of transport. As one foreign observer noted in the 1880s when the Meiji Government ordered the raising of a horse in each farm, the farmers had to do so at the sacrifice of food for the family. Thus, the most important technical innovation—the combination of farming with livestock to emerging from the agricultural revolution—was not feasible for China. Nor were the others. Drilling in place of broadcast sowing would have caused yields to fall substantially; drainage systems were far more advanced and intricate in Asia; and multiple-cropping systems, rather than crop-rotation and fallowing systems, were what Asians needed. Nor were the improvements of scythes and craddles of any use as the easily shattering and lodging rice plant required smaller knives and sickles. Thus, in the labor-intensive, densely-packed agriculture of Asia, the land-using, labor-saving innovations of the European agricultural revolutions were either not feasible or irrelevant, for their adoption will mean large drops in total output and employment.

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[5] For the various data, Douglas North and Robert P. Thomas (1973), *The Rise and Fall of the Western World*, p. 10; J. C. Buck (1956), *Land Utilization in China*, p. 267; V. D. Wickizer and M. K. Benneth (1941), *The Rice Economy of Monsoon Asia;* and my paper, "Seasonality and Underemployment in Monsoon Asia," *Philippine Economic Journal*, First Semester, 1971. See L. M. Hanks (1972), *Rice & Man*, Chapters 4 & 8, for discussion as to how labor requirements per hectare rose and output per worker fell with the shift from broadcasting to transplanting rice. Also note his description of the tight scheduling of various operations, the numerous complexities and the need for labor exchange, but the greater yield.

The most important institutional innovation, capitalist farming, was also difficult to adopt, not only because the Asian farms were too small (typically one to two hectares), but, more important, the husbandry was too complex. To feed the enormous population with so little arable land available, the technology evolved became not only intensive but intricate—deep and thorough plowing several times, the fine puddling and harrowing, elaborately prepared seedling beds, properly spaced transplantation, the finely-turned water, weed and insect controls, careful reaping with a crop easy to lodge and shatter—and all this carried out within a tight schedule imposed by the coming and going of monsoon rains. This kind of labor cannot be done well by low-paying wage workers nor adequately supervised by a few managers on a large farm. Only on small farms with close coordination and the cooperation of highly motivated family workers receiving all of the returns after paying taxes, rents and costs and the labor of neighbors and kins can productivity per hectare rise to high levels in the arduous and demanding husbandry of monsoon paddy agriculture.[6]

Even as late as post-World War II, no country in Asia was able to convert peasant farming to capitalistic farming in monsoon Asia, even though attempts were made in Java and elsewhere. In the 1870s and 1880s, the new Meiji Government attempted to establish Western agricultural methods but found that the large machines were not suited to the small farms and thus had to abandon the efforts. But some successes were achieved in Hokkaido which was too far north for the monsoons. Plantations have been capitalistically operated since the 19th century for the growing of sugar, coconut, rubber, bananas, and other tropical commercial crops, but the large rice estates of the Spanish friars, the Filipino oligarchs, Thai and Indonesian nobility were rented out to tenants in small parcels for their families to work on. China now is shifting from the large-scale commune system to the household responsibility system with good results.[7]

3. Monsoon Asian Institutions and Stability

Evolving with this intensive and intricate type of farming was a set of institutions which was not consonant with the individualistic, impersonal, and market-oriented capitalistic institutions. The Asian institutions emphasized cooperation, group work, harmony, and personalism in the homes and villages. The cooperativeness of Asians

[6] Nor can work animals and better equipment be substituted for the most labor intensive operations of monsoon paddy agriculture—transplanting and reaping. See also Hanks (1972), *op. cit.*, for other complexities involved in paddy rice-growing.

[7] Buck (1956), *op. cit.*, found China's yields to be around 67 bushels per hectare in 1930, much higher than the 47 bushels of the U.S. farmers using modern inputs (chemical fertilizers, higher yielding varieties, etc.).

is in part associated with the need to construct, maintain and coordinate the system of irrigation works. I believe, however, that the stability of monsoon Asia is due more to the need for villagers to cooperate and work harmoniously in groups to get the work done during the busy seasons of planting and harvesting, when more than the labor of the family is required to meet the rigid schedules imposed by the monsoons. Even in the 1930s, with a population 50 per cent larger than in 1800, "there are periods of peak labor at planting and harvesting when available land is insufficient. This is one reason why women do 13 per cent of all farm work and children 7 per cent" (Buck, 1956, p. 13). This calls for specialization and division of labor by sex and ages, with heavier work such as land preparation being undertaken by the adult male, transplanting by the younger women, and the auxiliary and supporting work by the elders and children. For this, not only all the labor the family can provide but also the (exchange) labor of neighbors and kins is needed. And with group planting/plowing/harvesting, an element of flexibility can be introduced into the schedule by staggering the beginning of planting of neighboring farms which also makes possible staggering harvesting time (Reed, 1979; Hanks, 1972). The wholehearted cooperation of family members and neighbors can only be obtained when harmonious relations are maintained. Harmony and good relations in turn call for moderation, compromise and consensus, not independent, adversarial and individualistic actions with authoritarian methods of decision-making. The interdependence of neighbors and friends in the village was made all the more necessary as horses for transport from one village to another were few and costly, reducing mobility. Sharing of water, and more important for village cohesiveness, the sharing of labor during the busy seasons of planting and harvesting (and secondarily in the construction and maintenance of irrigation/drainage facilities in less busy times) were the basis of the stability of monsoon villages.

The cooperativeness and groupism of monsoon Asians are well-expressed not only in the East Asian phrase, "we eat from the same pot of rice" but also in the Indonesian *gotong royong* and the Philippine *bayanihan*, all of which imply group work within the village. Moreover, where transplantation is more widely practiced as in East Asia than in parts of Thailand, Bangladesh, Burma, Cambodia, Vietnam and India (where deep-water rice-growing precludes transplantation), the villages are much more cohesive and tightly structured. In these areas, population densities are lower since broadcasting and drilling do not require much labor and the harvests are smaller. The anthropologist, John F. Enbree, found that Thai villages were loosely structured and villagers more independent than in Japan, but it turned out that he was generalizing from villages to the south of Bangkok where deep-water rice (not paddy rice) was grown. Other anthropologists studying parts of Thailand where transplanting was practiced

found that villages were more cohesive and structured. Similarly, in upland areas where the rainfall is insufficient for paddies, the absence of transplantation may make for less cohesiveness.

In relating irrigation works to stability, it may be useful to distinguish between political and social stability. The network of primary and secondary canals *between* provinces, districts and villages may be related more to political stability and unity, while the tertiaries within the villages and quarternaries within a farm may be related to social stability within villages. The need to cooperate and work together on the tertiaries and quarternaries within villages in the slack months of paddy-growing contributes to the stability of Asian village communities. But the need to cooperate during the heavy labor requirements of the busy seasons seems to be even more important in the stability of Asian villages.

The reason is that irrigation problems within villages (between upstream farms and downstream farms in water sharing) or between villages are likely to create conflicts and disagreements which may leave a residue of ill feelings and hostility among them. Moreover, the large drainage facilities are needed in the northern tier of Asian countries near the highlands of inner Asia where the great rivers periodically overflow with the melting snow from the vast plateau and mountain ranges (the Ganges, Irrawaddy, Yangtze, Yellow and Mekong rivers). But flooding is a minor problem for the vast majority of paddy farms in Southeast Asia, Japan, Korea, and southern portions of India and China, where the paddies are filled with rains from the monsoons supplemented with smaller rivers which get their water directly from the local monsoon rains.

In sum, instead of the restless Faustian, schizophrenic soul of Europeans, as Needham (1969, p. 121) points out, "the Chinese, wise before their time, worked out an organic theory of the universe which included Nature and man, church and state, and all things past, present, and to come." But Confucianism, extolling the virtues of harmony, ordering, moderation, compromise, cooperation, discipline, and responsible behavior, strengthened and reenforced the need for behavior and attitudes which the monsoons made an absolute necessity for prosperity in the villages of most parts of Asia.[8] It was the stability in the basic unit of Asian economies, the village, which was responsible for the unchangeability of Asia, despite "the storm-clouds of the skies."

In contrast, in the traditional Western wheat farms of low labor-intensity, each farmer took care of his own needs, with the help of large equipment, draft animals, and occasional family help. The relatively

[8] On Confucianism, see *Confucian Personalities* (1962), edited by A.F. Wright, chapter 1.

even rainfall throughout most of the year permitted a more leisurely pace and schedule of work during the planting and harvesting seasons with no highly pronounced peak labor requirement. Water needs were largely met by rainfall. The distance between the large farms was an obstacle to collective and cooperative work; self-help and self-reliance were the predominant values. The development of values emphasizing independence, individualism, freedom, competition, and personal rights (especially, after the Renaissance and Reformation) was the logical outcome of this type of farming. The emergence of mercantile, agricultural, and industrial capitalism and its ideology of free, individualistic competition unhampered by state intervention (laissez-faire) reenforced and extended values of individualism and independence.

4. Industrialization

The big spurt that widened the material gap between the East and the West was not so much the agricultural revolution but the steam-powered industrial revolution of the 19th century which rapidly mechanized industrial production in the Western world, starting with textiles. It would appear that there were industrial machines from Europe which the monsoons could not keep out of Asia, at least in the first half of the 19th century when industrial colonization had not made much headway in most of Asia especially China. Nevertheless, as long as the basic traditional structure in the villages had remained largely intact, the vast population of peasants was needed for the peak seasons of agricultural work, while traditional transportation was inadequate for commuting to work in the cities during the seasonal slack. There was no choice but to carry on with traditional off-farm work, principally hand-spinning and weaving. Traditional agriculture hampered the growth of modern industries and Asia fell behind in industrial production.

China's agricultural labor force was around 70 per cent in 1980 and the share could not have been lower than 80 per cent in 1950. (India's share was 75 per cent in 1960 and that of Japan emerging from Tokugawa feudalism in 1872, 85 per cent.) In circa 18th and 19th century, the share of the agricultural labor force in China might have been as high as 90 per cent, considering the fact that Bangladesh's share in 1960 was 87 per cent and Nepal's, 95 per cent. Great Britain's share in 1801 was already down to 35 per cent (about that of South Korea in 1980) and fell steadily throughout the century, down to as low as 9 per cent in 1901. The low British share in 1801 suggests that it had been declining since the 1700s. By the early decades of the 19th century, the number of agricultural families was declining absolutely, while the number engaged in agriculture was declining absolutely from

the mid-century.[9]

To make possible the rapid expansion of textile and other industries, and the increase in the share of the industrial labor force from 29 to 39 per cent (1801 to 1841), (without increasing imports of food for a growing population), output per worker in British agriculture must have been rising throughout the 19th century. Deane and Cole (1969, pp. 75, 172) estimated that farm product per worker rose at a rate of 1.2 per cent per year in the first half of the 19th century, with even larger increases in the 18th century. It does not seem plausible to conjecture that, during the first half of the 19th (and throughout the 18th) centuries with as much as 90 per cent of the labor force in Chinese agriculture, output per worker was rising. But without this increase, it is difficult to assume that yields per hectare could rise faster than the population, which is said to have doubled from 1580 to 1850.[10] If so, where would the labor force to mount a drive for industrialization come from?

Conceivably, it could come from the poor peasant families with little or no land, not too far from the cities. And there must have been some in the cities without jobs who would be willing to work in the factories. But two factors need to be kept in mind if we are to understand the inability of China to succeed in industrialization with Western technology in the first half of the 19th century. First, the machines of the steam-powered industrial revolution were primitive and of low productivity. The factory housed few machines and many workers, just the reverse of the factories in the 20th century. The textile industry in England employed the cheapest labor available—pauper children and women who comprised most of the working force and who did the many simple jobs in preparing the cotton to be fed to the machines. Most of these processes which are mechanized today were not: combing, carding, trimming, spooling, warping, cleaning, sweeping, feeding, tying, etc.) The low pay and long hours in steamy, dirty sweatshops were not attractive to most workers in the cities.

Secondly, despite the lower productivity of hand-operated spindles and loom, the opportunity cost of working on them in the villages was low, perhaps close to zero. As noted, much of the labor force needed to produce food in the rainy seasons had little to do in the dry seasons

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[9] See IBRD, *World Development Report 1982;* Kuznets, *Modern Economic Growth,* pp. 106-107; and B. Mitchell and Phyllis Deane (1962), *Abstract of British Historical Statistics,* p. 60.

[10] See Elvin, 1973, *op. cit.,* p. 255 and Hanks, 1972, *op. cit.,* chapter 4 for his estimates of the fall in output per worker with the shift from broadcasting to transplanting.

other than to make cloth. To attract this labor all year round, the factories would have to pay wages equal not only to cloth-making but to food production. And because of the high cost of machines and other overheads, the factories to be profitable had to be operated year round, unlike the hand spindles and looms. Until the factories became much more productive with more and better machines and scale-economies, the wages offered were not attractive enough for village labor to abandon the farms. As long as labor was tied up in the village farms, cheap labor for year-round employment in factories and workshops in the cities was not sufficiently available for industrialization to make much progress. As long as this labor produced its own clothing and other needs, the domestic market for industrial products was confined to the small urban market.[11]

This was the experience of the first textile factories in early Meiji Japan which had to turn to the daughters of unemployed samurais for their labor force. The Dutch in Indonesia had to force peasants to work on the plantations; the British in Malaya had to bring in labor from India and Ceylon; and throughout Southeast Asia, the colonial governments brought in Chinese workers to labor in the mines, and handicraft shops and stores. Although the Dutch interpreted the backward sloping supply curve of Indonesian workers as indolence, it was largely a reflection of workers going back to the villages during the busy seasons when the return to labor rose with labor scarcity.

I am aware that recent historical research has shown that Marx's account of vast labor surplus flowing from the farms to the modern industry (found in his first volume of *Capital*) exaggerated the picture of early British industrialization (Deane, 1972, pp. 138-140). This is difficult to ascertain since data on unemployment do not exist. The contention of this paper is that for industrialization of the kind represented by the early steam-driven mechanization, a flexible supply of cheap, unskilled labor is a necessity; without the dissolution of traditional agriculture (but without farm output per worker falling), such a supply is not forthcoming, and real wages will not remain constant and low. (Nor will there be the expansion of domestic demand for textiles and other manufactured goods—a necessity if profits are to be high and savings can be reinvested.) Matters changed as the 19th century wore

[11] Elvin (1973, p. 215) argues that it was the shortage of cotton that prevented the growth of a mechanized cotton industry, which "would have had to take away supplies from the handicraft industries." If it could compete with the latter, why didn't it do so? The growth of new industries is the history of old industries giving up their supplies of inputs to the new ones who can better combine them into cheaper/better products. It is interesting to note that British factories in Bombay using labor released from the exports of cotton yarns to India were selling machine-made yarns to Shanghai and Japan where they were woven by hand looms during the latter part of the 19th century.

on and more workers were taken out, and this greatly accelerated with the more efficient electric/gas power replacing steam power in the early decades of the 20th century.[12] Early industrialization required rapidly increasing amounts of unskilled labor which could not be met by population increases nor by the higher-wage service sectors.

5. Growth of Agriculture and Industry up to World War II

It was conjectured above that the progress of Asian agriculture was slow during much of the centuries before mid-19th century. It fell behind the West as Europeans began to revolutionize manorial agriculture from the feudal past. The technology and institutions of capitalistic agriculture could not be applied to the small, paddy plots of monsoon Asia. And as long as the traditional agriculture of Asia remained intact, the mechanization of industry was slow, because the supply of cheap, unskilled labor available for the primitive factories and domestic demand was insufficient.

Since the latter half of the 19th century, Asia began to change rapidly. The penetration of Western colonialism to all the countries (except Japan) opened up the markets of these countries to Western machine-made products, especially textiles. At first, it affected mainly the urban areas but since the turn of the century, with the construction of railways and roads, the markets penetrated went beyond the cities, and the peasantry began to lose the urban markets for their products made during the slack seasons. Plantations were established by the European colonialists (by the Filipino oligarchs in the Philippines) and their exports to the Western countries expanded rapidly throughout the decades. Population growth which used to be slow began to accelerate.

Various restrictions were imposed by the colonial governments on the establishment of most mechanized industries; and this, together with the expanded import of Western industrial products, implied that handicraft industries were not growing much. Under these circumstances, the growth of industrial production was increasing no faster than population. Despite the enormous increases in the production of plantation crops, the development of the subsistence crop, particularly rice, was slow. As a matter of fact, the shift to export crops meant a decline in rice production as labor was shifted from traditional to plantation crops. The Philippines, Indonesia, Malaysia and Ceylon began

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[12]This is discussed in my paper, "Arthur Lewis' Dualistic Theory and its Relevance for Postwar Asian Growth," *Malayan Economic Review*, October 1981 and "The Growth of Factor Productivity in the U.S.: The Significance of New Technologies in the Early Decades of the 20th Century," *Journal of Economic History*, forthcoming.

shift of labor from rice to commercial crops might have been re
sible for the constancy or decline in the trend of rice yields found
statistics of many countries of South and Southeast Asia in the p
from the 1910s to the 1930s. (There is a slight increase for the P
pines but Hooley's estimates show a slight decline in produc
worker in agriculture from 1902 to 1938.)[13] All in all, it may be re
able to suppose that total population was growing as rapidly as
product during the century before 1950. It is not surprising ther
that at the beginning of the 1950s, most countries of Asia (e:
Japan, Malaysia, Hong Kong and Singapore) started out with per c
incomes not very much higher than $100.[14]

But this period was important for Asia in that it saw the begin
of a revolution in monsoon paddy-growing, first in Japan, and th
Taiwan and Korea—which was to raise yields per hectare to three
in Japan by the 1940s. As noted, after a couple of decades of unsuc
ful attempts to introduce Western technologies and institutions, J
decided that there was no other alternative but to improve and dev
its own technologies and institutions. The government proceede
develop higher yielding varieties in the experiment stations toge
with the necessary land improvements, irrigation facilities, ins
tions for training and dissemination, and so on. These and others
responsible for the increases in yields per hectare and per wo
shown in Figure 1 in the 1900s, 1910s, and 1920s (Hayami et al., 19
Ch. 5). Taiwan's indexes started to go up since the 1910s and accel
ted in the 1920s and 1930s, and those of Korea, in the 1920s and 19
These were the years of Japanese colonization which, unlike
Western variety, focussed on production increases in rice to
exported to Japan to feed the expanding industrial labor force. A
Japan, the new rice varieties developed were introduced in the colon
together with more water for irrigation, fertilizers, extension for be
cultivation, and so on. That these represented relatively rapid gro
of yields per hectare and per worker may be seen when compared w
the trend of wheat yields in the United States and Britain up to Wo
War II.

With regard to industrialization, it will be seen in Figure 2 t
although mechanization made rapid headway in the early decade
this century in Japan, its level was relatively low; even after ha

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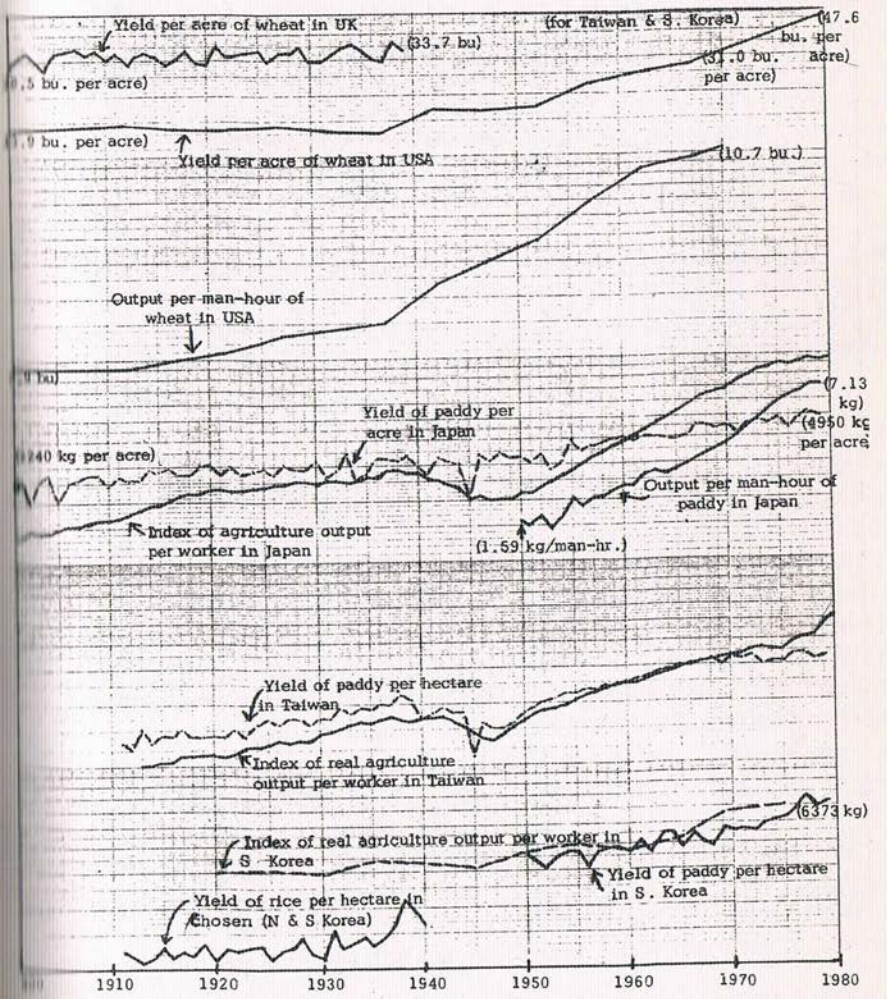
[13] V.D. Wickizer and M.B. Bennett (1941), *op. cit.*, pp. 318-319; for some of the c
tries, the authors question the reliability of the data; Hooley's estimates from his pap
the *Philippine Economic Journal*, First Semester, 1968.

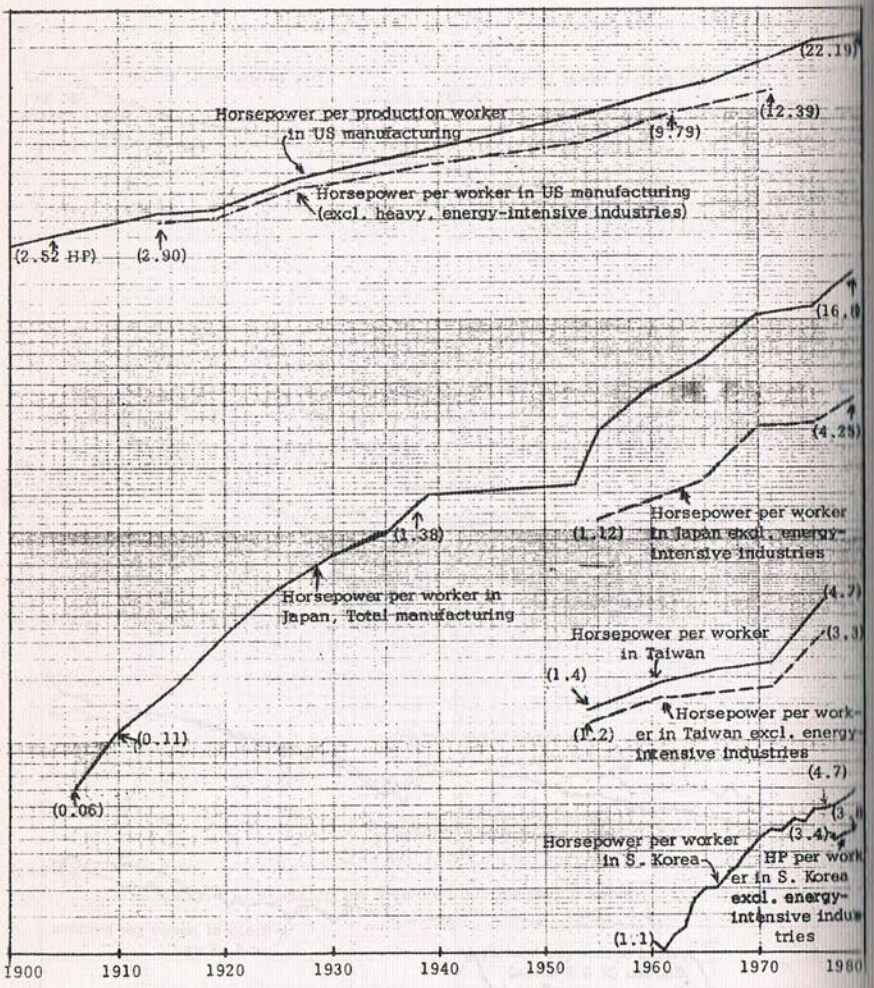
[14] *Per Capita National Product of 55 Countries: 1952-1954*, Statistical Papers, Se
E, No. 4, UN: NY.

Figure 1—Changes in Rice Yields and Production Per Worker in U.S., Japan, Taiwan and Korea, 1900 to 1980.



Sources: *Historical Statistics of the US* (for US), *One Hundred Years of Agricultural Statistics in Japan*, updated by *Japan Statistical Yearbook* (for Japan), *Agricultural Growth in Japan, Taiwan, Korea and the Philippines* by Y. Hayami, V.W. Ruttan & H.M. Southworth.

Figure 2—Changes in Rice Yields and Production Per Worker in U.S., Japan, Taiwan and Korea, 1900 to 1980.



Sources: US data computed from *Historical Statistics of the US* and updated by *1980 Annual Survey of Manufactures—Fuels and Electric Energy Consumed;* Japan data computed from *Long Term Estimate Statistics* and updated by *Japan Statistical Yearbook;* Taiwan data computed from various censuses of commerce and industries; and Korean data computed from various issues of *Korean Statistical Yearbook.*

century of modern Japan in 1920, it was only about one-tenth of the U.S. level. One reason was the prohibitive cost of steam power for small producers who continued to work with hand-equipment; steam power required large installations in the factory for the generation and transmission of steam power (Minami, 1979). Moreover, with the coming of electric/gas drives, the engines and equipment in the machines began to be smaller, more efficient, more plentiful and cheaper. Thus, the new drive and technology it spawned were a god-send to monsoon Asia with its vast army of small, labor-intensive producers. The big push to mechanization came after the 1920s, for it was in the 1920s that the West began to change over to electric/gas driven mechanization, thereby enlarging the stock of new machines for late comers like Japan to borrow. Thus, despite the low *initial* levels of industrialization, the average annual growth rates of manufacturing product were relatively low for a "latecomer," no more than about 2.3 per cent (1908-1931), far lower than the 8 per cent for Southeast Asia (1960-1980), and 5 per cent for India.[15]

In Taiwan and South Korea, the Japanese rulers, like their Western counterparts in Southeast Asia, looked upon their colonies as markets for industrial products, in exchange for rice (instead of tropical, commercial crops), and did not allow much industrialization to take place.

It may be noted that the growth rate of GNP in Taiwan (1911/1920 to 1931/1938) and Korea (1920 to 1938) was about 3.5 per cent, no lower than that of Japan for the comparable period.[16] (In the earlier decades, 1880s and 1890s, Japan's growth rate was even lower, 2 to 2.5 per cent). These rates suggest that these countries were beginning to shake off the obstacles imposed by the monsoons and moving out of stagnation, into the orbit of modern economic growth. Japan led the way to technological modernization of paddy-rice growing since it can be said to have begun the revolution in monsoon rice agriculture, with the adaptation, first of steam-powered technologies, and then of electric/gas powered technologies from the West. There was an acceleration in the growth of population in all three countries, largely with the decline in mortality. This, together with the rise in yields per hectare and agricultural product per worker and the import of rice from the colonies, was making unnecessary the increase in employment for food production for a larger population. It thus loosened up the labor market by releasing the additional labor force for industries

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[15] K. Ohkawa and H. Rosovsky (1973), *Japanese Economic Growth*, p. 73 and IBRD *World Development Review, 1980.*

[16] T. Mizoguchi and M. Umamura (editors), *Quantitative Studies on Economic History of Japan Empire, 1890-1940*, 1981.

especially because the increase in machine-made textiles was wiping out work during the slack seasons of agriculture.[17] But the revolution had only begun.

6. Post-World War II and Beyond: Concluding Remarks

This section is a brief summary of a number of my papers published elsewhere, dealing with the remarkable acceleration of economic growth in Japan, Taiwan, South Korea, and Southeast Asia over prewar decades. The changes were revolutionary in all these countries, not the least in Japan where a series of institutional changes eliminating the militaristic, authoritarian, and the feudalistic remnants in the economy and society of prewar Japan was initiated by the allied military government immediately after the surrender, and improved upon thereafter by the Japanese. These changes triggered a set of new and improved institutions which succeeded in motivating the manpower at all levels to produce with exceptional efficiency. The peasants were freed from the domination of landlords and from the necessity to finance costly militarization and industrialization, as in the prewar decades. Government funds were made available to develop further the physical infrastructure and institutions for higher productivity of the farms. Industry developed new and improved ways of enhancing productivity in the factories and in adapting and developing foreign technologies. Among the most important for the present discussion was a series of innovations in monsoon paddy production which succeeded in mechanizing the most labor-intensive operations during the peak seasons. Starting with imported technologies, Japanese industry succeeded in developing small but efficient reaping machines for plowing, transplanting and reaping wet rice grown, and thus releasing labor for industry and raising rice output per manhour by many times (see Figure 1)[18]

These machines (or their earlier versions), which were adapted in Taiwan and South Korea, also succeeded in raising output per worker though not by as big a margin as in Japan since the mechanization of transplanting and reaping was not yet as extensive as in Japan (see the gap between the growth of yields per hectare and output per worker in Figure 1). Although agricultural productivity per hectare and per worker accelerated substantially from prewar decades, the

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[17]The share of the agricultural labor force was 72 per cent in 1872 and this had declined to about 50 per cent in the 1920 and 1930 censuses, falling somewhat below 50 per cent in the 1940 census (with the expansion of war industries), and returning to 50 per cent in the 1950 census.

[18]For details, see *Economic Development and Cultural Change*, October 1982.

peasantry in South Korea and Taiwan had to bear most of the burden of militarization and industrialization, though by no means as much as in prewar Japan since large amounts of foreign aid and loans, especially from the U.S., were available. As in Japan, extensive land reform set the stage for motivating the peasantry to produce but unlike in Japan, its political power was limited by authoritarianism.

A significant event for Taiwan and South Korea was national independence from Japanese controls. This set the stage for industrialization as their governments were able to protect and subsidize their new industries and bring in foreign enterprises as joint ventures, for their own banking and fiscal systems. These developments enabled them to borrow from abroad enormous sums to build the physical infrastructure for industrialization, to modernize agriculture and the cities, and to rapidly develop educational institutions for training the necessary manpower. These and other measures, built on the strengths inherited from the past, coupled with ideas borrowed and learned from the best that the West and Japan could offer, underlie much of the acceleration of postwar growth of Taiwan and South Korea over the prewar decades.

The story is similar for the acceleration in Southeast Asia. Independence from Western controls enabled it to obtain enormous sums from the West to finance the development of agriculture, industry, infrastructure, and so on; to initiate programs for improving peasant agriculture; to protect, subsidize, and encourage industrialization; to extend educational opportunities to more and more families (necessary to understand and work with the science-based technologies of the second industrial revolution); and to establish infrastructures and institutions better suited for national development than the colonial ones.[19]

The West Pacific Nine did better than South Asia (which also became independent) because they were alert and better able to take advantage of the unprecedented postwar growth of their colonial masters in the West which spilled over into a worldwide boom in international trade, as the West opened its enormous domestic markets. East Asia took advantage of the isolation of the giants, China and India, which sacrificed their light industries to develop heavy industries, while the concern of Ceylon, Burma and Vietnam to build socialism opened up the agricultural markets for Southeast Asia. But these advantages

[19]For further discussion on the above paragraphs, see *The Transition to an Industrial Economy*, Asian Development Bank, April 1983. See Hanks (1972), *op. cit.*, for description of younger members of peasant families leaving for jobs in Bangkok where earnings were higher in the much more productive factories of the 20th century technologies while their parents mechanized farm operations and staggered transplanting in their different plots with seed varieties of varying maturities to spread labor.

may lessen in the decades ahead, as the West begins to tighten up wi an intractable unemployment problem compounded by the spread the electronic revolution, and as the other Asian nations begin to wa up to the adverse effects of their old policies.[20]

As we look ahead into a new era which is opening up, the role Japan is likely to be crucial in the West Pacific region. But Japan growth has slowed down from 10 per cent in the 1960s to 5 per cent the 1970s, and perhaps even lower in the 1980s. The easy years importing industrial technologies and exporting their output may gone forever as Japan approaches the technological frontier and Western markets tighten. In a more bearish era, the high costs of fo and services and of agricultural subsidies are likely to be more difficu for the industrial sector to live with, particularly because output p worker in agriculture and services may slow down as the limits of t potentials of small-scale mechanization in farming and the services a approached. The slowing down in the growth of the labor force (wi the completion of the demographic transition in the 1960s), togeth with the large number of workers bottled up in small-scale farming an services, may tighten the labor supply available for industrial expa sion. This will in turn push industry prematurely toward capit intensity, especially to automatic and robotic technologies. Wi Japan leading the way, the other industrialized countries are forced t push ahead in the same direction, adding to problems of technologic unemployment (as may have been the case in the 1930s). A rapid tran formation of small-scale agriculture and the service sectors on a larg scale basis is needed for more balanced growth. The imbalances dev oping in the 1970s may have contributed to the slowdown in t Japanese economy and may be contributing even more in the 1980s.

Similar observations can be made of Taiwan and South Korea. Th shift to industrialization was too fast (relative to their technologic capabilities) and the mechanization of agriculture and services to slow. Both these countries were following too closely the Japane strategy in the 1960s and 1970s, aspiring to catch up with Japan, ju as India and China through their heavy industry strategy were hopi to leap-frog into the ranks of the industrialized countries. But techn logical capabilities can grow only with the growth of industrializati from downstream to upstream, especially with the development machinery/engineering industries. Also, the balanced growth of indu tries depends on the balanced growth of the economy, in particular th agricultural and the service sectors. The capital-intensive industri that Taiwan and South Korea established in the 1970s are now causi them much trouble.

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[20]For details on this paragraph, see *Asian Development Review*, Asian Devel ment Bank, January 1983.

In turn, the ASEAN Four has begun to imitate the strategies of Taiwan and South Korea in the 1970s and plan for capital-intensive industrialization. But agricultural productivities and levels of food consumption are much too low for these countries and top priorities should still be given to agriculture and labor-intensive industries. Unlike Korea and Taiwan which got a headstart with improvements in peasant agriculture in the prewar decades, these countries need more time for their agriculture. There is somewhat a long way to go before their institutions are raised to levels conducive for efficient industrialization—the bureaucracy, the schools and training centers, industrial relations, and so on.

In sum, I believe that the West Pacific Nine, if they can avoid the pitfalls of a wrong industrialization strategy, can move ahead of European countries, as the latter get bog down more and more with problems of their capital-intensive industries. But these industries are too tempting for Asian countries which can easily borrow the capital and consultants from the industrialized countries to establish them—as an easy way out of balance of payments difficulties. The foreign funds should be used to develop agriculture to overcome the obstacles imposed by the monsoons, and the consultants from abroad should be tapped to help develop industries lower-stream, especially in labor-using machinery industries.

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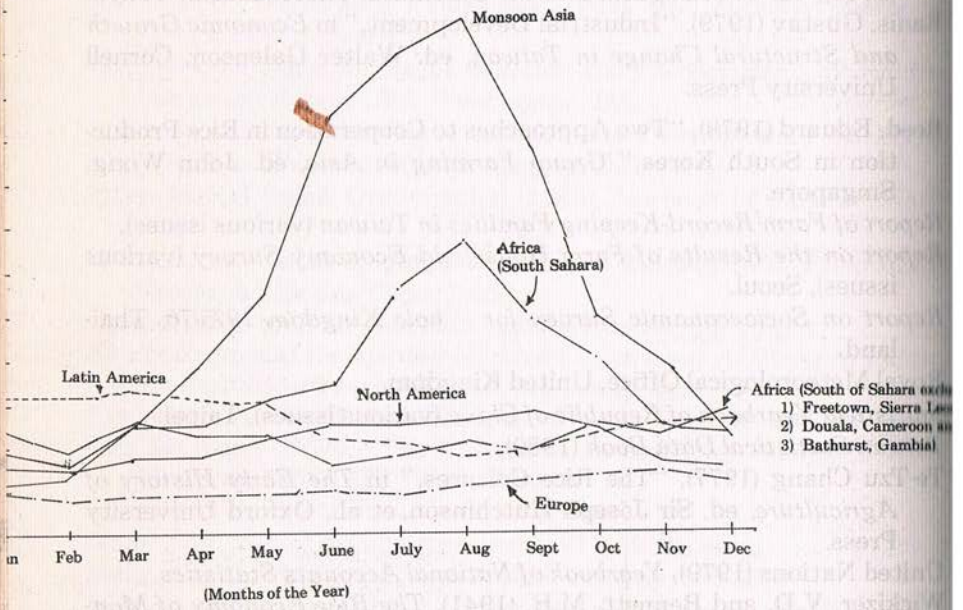
Rainfall Patterns for Major Regions of the World



Source: Royal Meteorological Office, U.K.

Region: Cities in:	Yearly Ave.	Average Monthly Rainfall (inches)											
		January	February	March	April	May	June	July	August	September	October	November	December
Monsoon Asia	78.4	2.2	2.3	3.5	4.9	6.6	10.5	11.9	12.7	9.8	5.9	4.9	3.2
Africa (South of Sahara)	52.9	2.9	2.6	3.5	3.5	4.1	4.4	6.6	7.7	5.9	5.0	3.4	3.3
Africa*	38.5	3.4	2.9	3.6	3.3	3.3	2.6	2.8	3.1	2.9	3.5	3.3	3.8
Latin America	43.2	4.2	4.2	4.3	4.1	4.0	3.2	3.1	2.8	2.9	3.3	3.5	3.6
North America	36.8	2.6	2.5	2.8	2.8	3.2	3.5	3.5	3.6	3.8	3.4	2.6	2.5
Europe	24.6	2.0	1.8	1.9	1.9	1.9	2.0	1.9	2.1	2.2	2.3	2.4	2.2

*Africa excluding (1) Freetown, Sierra Leone; (2) Douala, Cameroon; and (3) Bathurst, Gambia; these are (except for Cameroon) small countries in West Africa where torrential summer rains make for rain forests and not paddy agriculture.

General notes and sources: Data are taken from various publications of Royal Meteorological Office, United Kingdom and are simple unweighted average of cities in each region. Monsoon Asia's rainfall pattern is the average of (1) Amoy, China; (2) Shanghai, China; (3) Nagasaki, Japan; (4) Tokyo, Japan; (5) Akyab, Burma; (6) Rangoon, Burma; (7) Mandalay, Burma; (8) Cochin, India; (9) Darjeeling, India; (10) Allahabad, India; (11) Bangalore, India; (12) Quang-Tri, Vietnam; (13) Saigon, Vietnam; (14) Hanoi, Vietnam; (15) Aparri, Philippines; (16) Manila, Philippines; (17) Aranyaprathet, Thailand; (18) Chiang Mai, Thailand; (19) Kuala Lumpur, Malaysia; (20) Hong Kong; (21) Taipei, Taiwan; (22) Tainan, Taiwan; (23) Seoul, Korea; and (24) Pusan, Korea. Africa's (South of Sahara) rainfall pattern is the average of (1) Barumbu, Rep. of Congo; (2) Nouvelle-Anvers, Belgian Congo; (3) Freetown, Sierra Leone; (4) Port Nolloth, S. Africa; (5) Kimberley, S. Africa; (6) Port Elizabeth, S. Africa; (7) Goreé, French W. Africa; (8) Mombasa, Kenya; (9) Ibadan, Nigeria; (10) Wary, Sudan; (11) Nova Lisboa, Angola; (12) Beira, Mozambique; (13) Kasempa, Northern Rhodesia; (14) Douala, Cameroon; (15) Bathurst, Gambia; and (16) Walvis Bay, Southwest Africa. Latin America's rainfall pattern is the average of (1) Medellin, Colombia; (2) Santos, Brazil; (3) Manaus, Brazil; (4) Rio de Janeiro, Brazil; (5) Coquimbo, Chile; (6) Puerto Montt, Chile; (7) Santiago, Chile; (8) Buenos Aires, Argentina; (9) Mar del Plata, Argentina; (10) Tucuman, Argentina; (11) Lima, Peru; (12) Cababozo, Venezuela; (13) Gaayaquil, Ecuador; and (14) Asuncion, Paraguay. North America's rainfall pattern is the average of (1) Miami, Florida; (2) Goodland, Kansas; (3) San Diego, California; (4) Phoenix, Arizona; (5) Cairo, Illinois; (6) New York, N.Y.; (7) Washington, D.C.; (8) San Antonio, Texas; (9) Montgomery, Alabama; (10) Sitka, Alaska; (11) St. Paul, Minnesota; (12) Albany, New York; (13) Dubuque, Iowa; and (14) Duluth, Minnesota. Europe's rainfall pattern is the average of (1) Astrakhan, USSR; (2) Turin, Italy; (3) Trieste, Italy; (4) Paris, France; (5) Dublin, Ireland; (6) Reykjavik, Iceland; (7) Franjfurtam Main, W. Germany; (8) Edinburgh, Scotland; (9) Athens, Greece; (10) La Coruna, Spain; (11) Granada, Spain; (12) Lisbon, Portugal; (13) Bucharest, Romania; (14) Odessa, USSR; (15) Oslo, Norway; (16) Moscow, USSR; (17) Stockholm, Sweden; (18) Tromso, Norway; (19) Archangel, USSR; and (20) Vardo, Norway. The monsoon rains in most parts of Indonesia and Malaysia come in the fourth and first quarter each year, not in the second and third as in most parts of Asia. These countries have been excluded from the Asian average.

Chart 1 — Trends in Farm Family Income in Postwar Japan

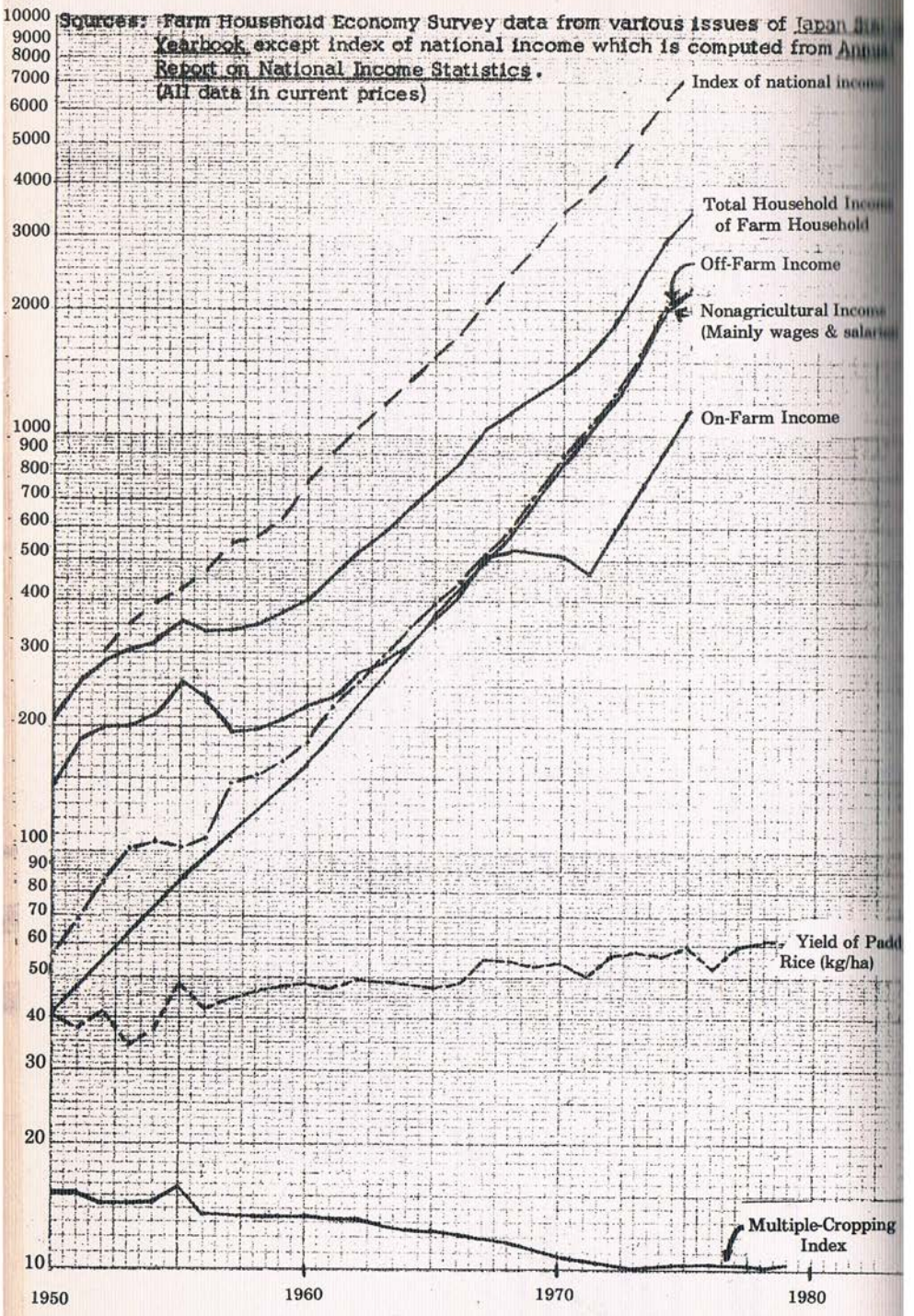
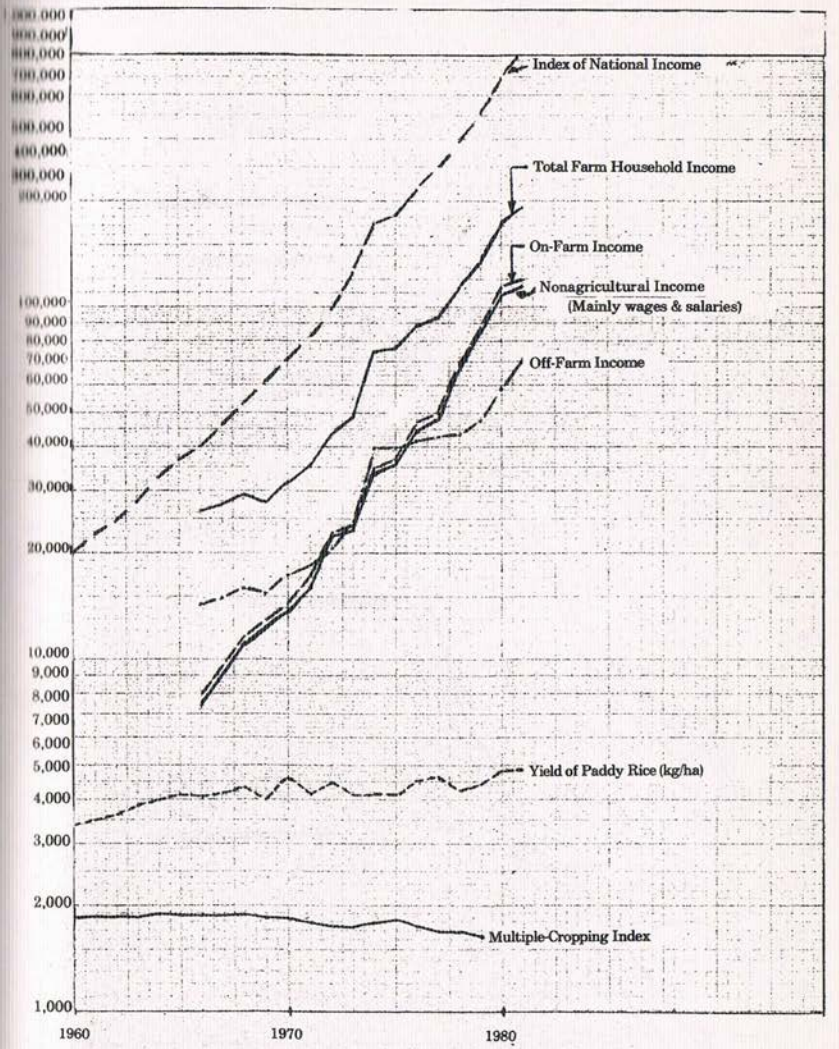


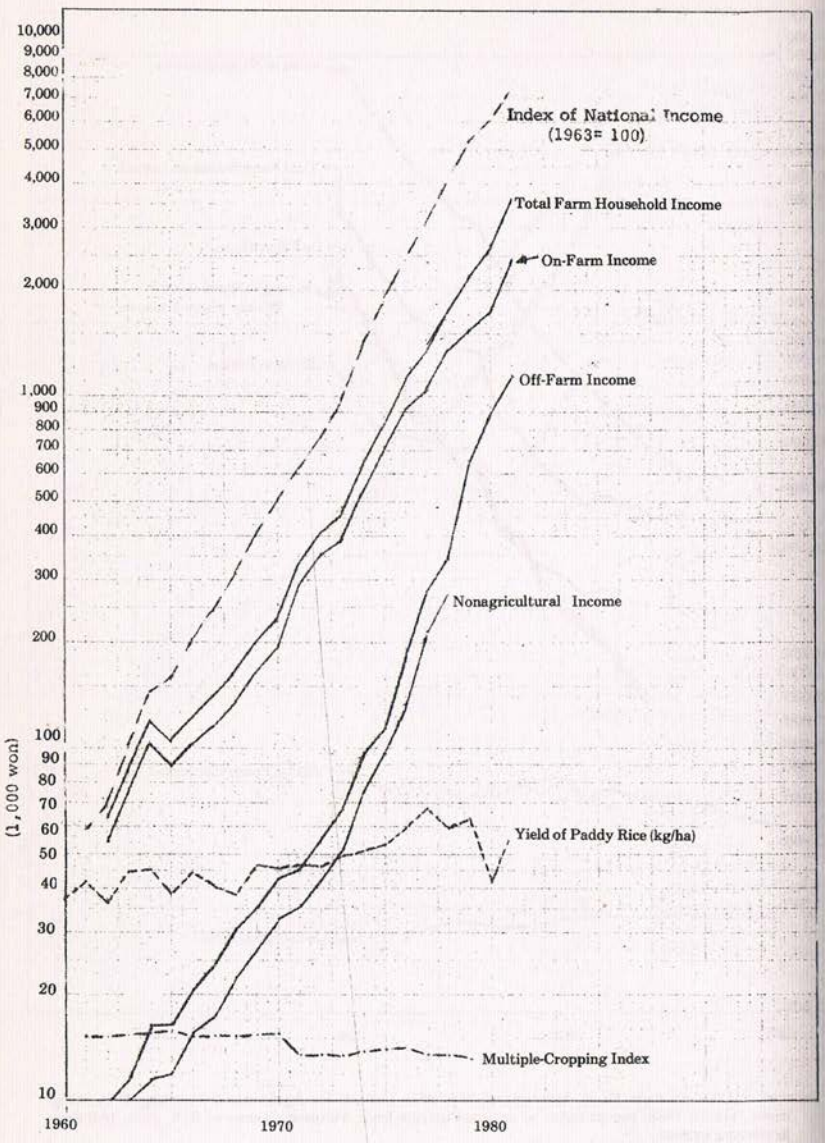
Chart 2 — Trends in Farm Family Incomes in Postwar Taiwan



Source: FIES data from *Basic Agricultural Statistics*, Council for Agricultural Planning & Development, March 1983; except index of national income from *National Income of ROC* 1981. (All data in current prices).

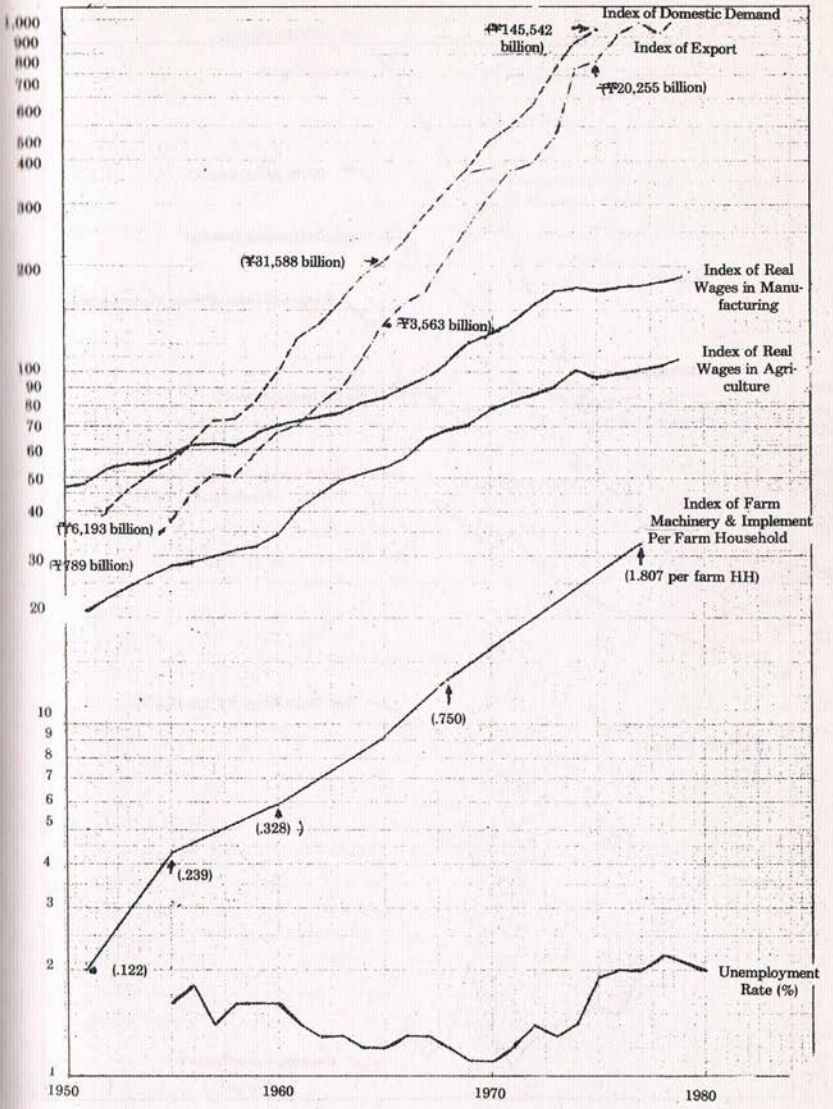
Note: Total farm household income and on-farm income before 1970 were adjusted by extrapolating with current agriculture product per farm household.

Chart 3 — Trends in Farm Family Incomes in Postwar South Korea



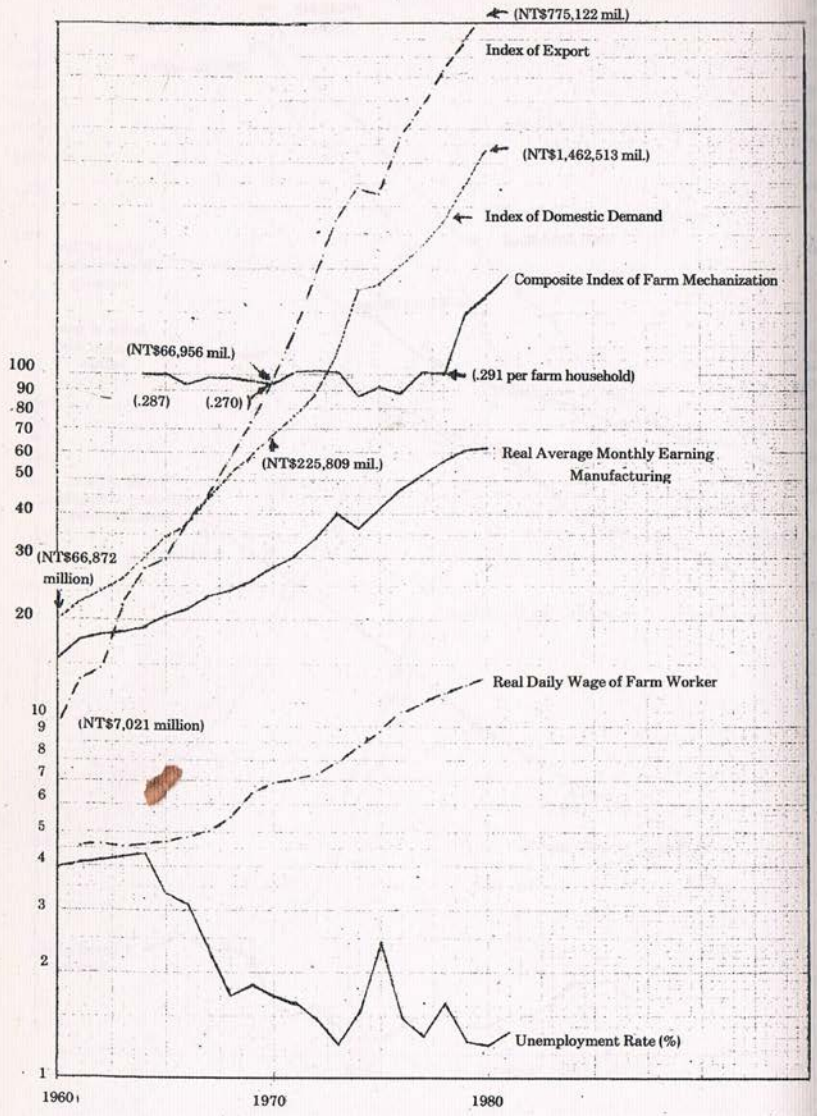
Sources: Various issues of *Report on the Results of Farm Household Economy Survey* except index of national income from *Major Statistics of Korean Economy 1982*. (All data in current prices.)

Chart 4 — Trends in Wages, Demand, Mechanization in Postwar Japan



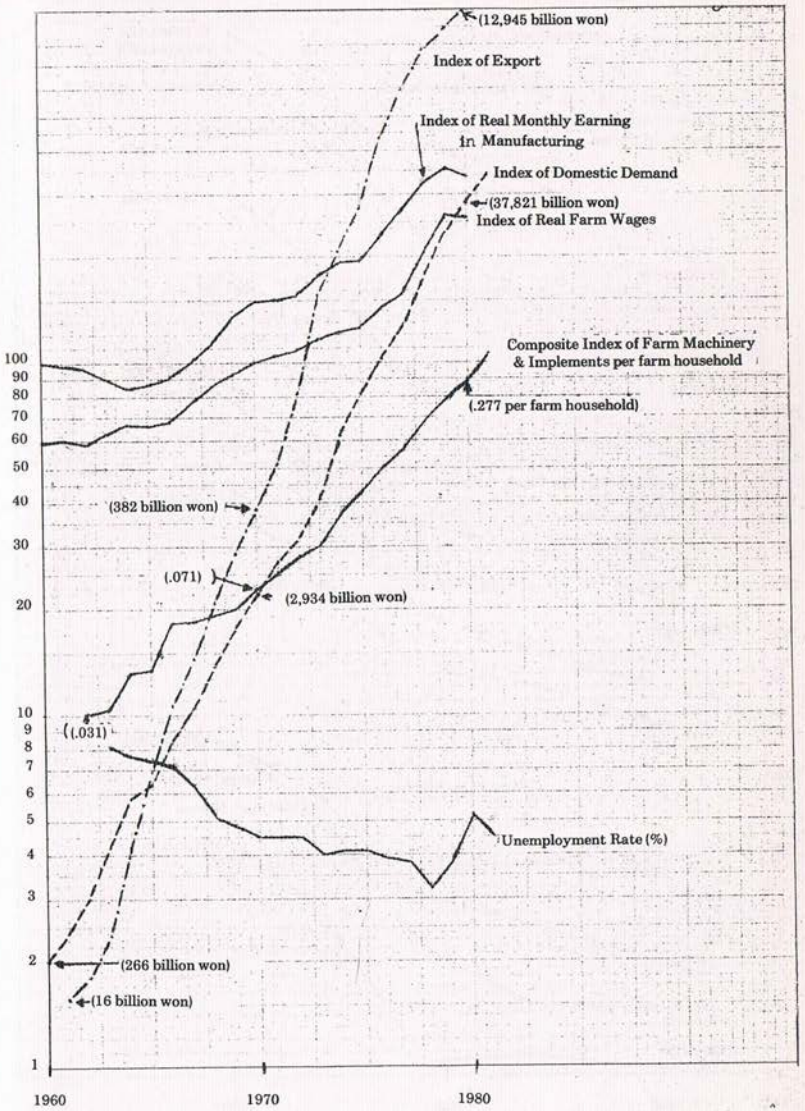
Source: Mainly from various issues of *Korea Statistical Yearbook*.

Chart 5 — Trends in Wages, Demand, Mechanization in Postwar Taiwan



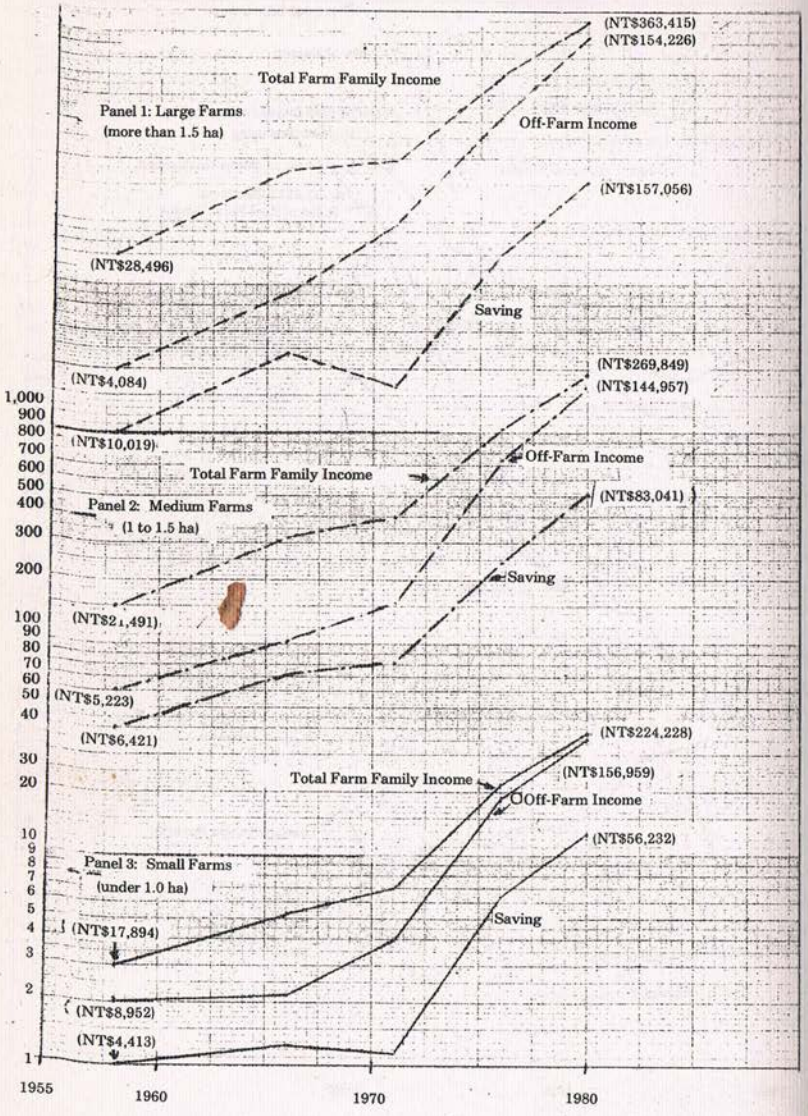
Source: *Statistical Yearbook of ROC*, various issues.

Chart 6 — Trends in Wages, Demand, Mechanization in Postwar South Korea



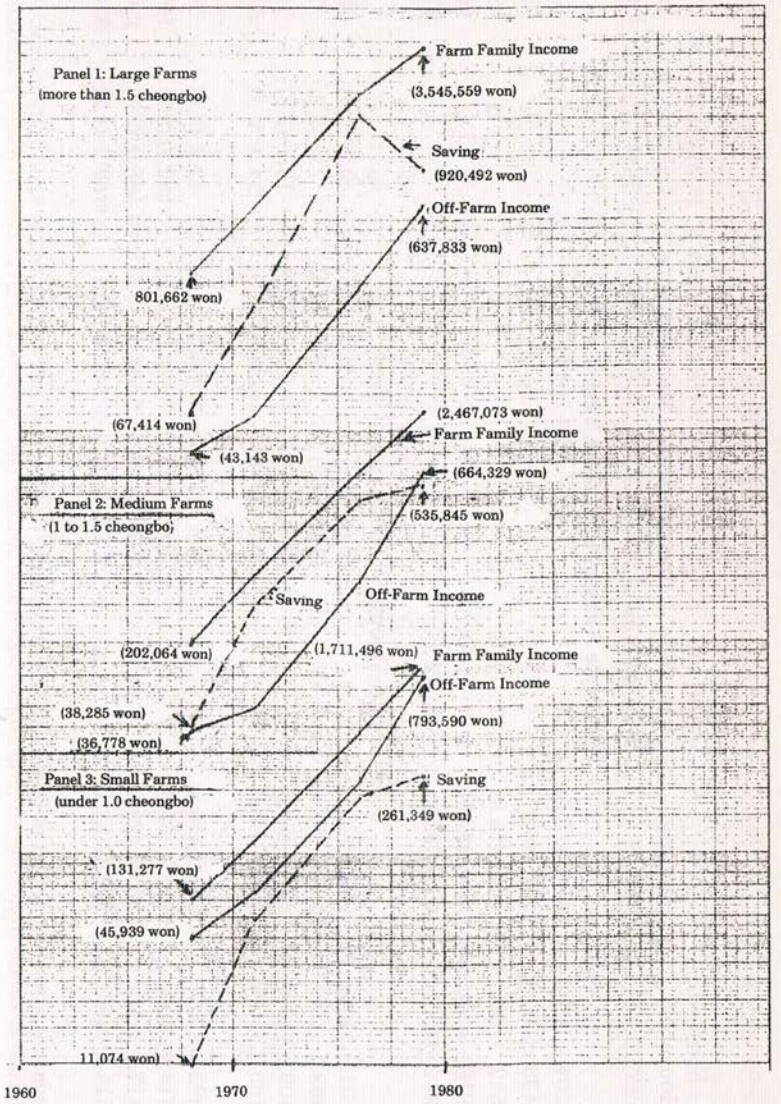
Source: Mainly from various issues of *Korea Statistical Yearbook.*

Chart 7 — Farm Family Income and Savings by Size of Cultivated Land in Taiwan



Source: *Report of Farm Record-Keeping Families in Taiwan*, various issues.

Chart 8 — Farm Family Income and Savings by Size of Cultivated Land in South Korea



Source: *Report on the Results of Farm Household Economy Survey*, various issues.

Appendix Table 1—Farm Household Income in Japan

	Farm Household Income (%)	On-Farm Income (%)	Income from Side Business (%)	Income from Forestry (%)	Income from Commerce, Manufacturing & Mining (%)	Income from other Off-farm Sources (%)	Wages and Salaries (%)
			(Absolute Amount in Current Yen)				
1921	1204 (100)	1057 (87.8)	*				147 (12.2)*
1926	1433 (100)	1162 (81.1)	*				270 (18.8)*
1931	552 (100)	414 (75.0)	7 (1.3)				131 (23.7)
1936	916 (100)	759 (82.9)	14 (1.5)				143 (15.6)
1941	1642 (100)	1319 (80.3)	48 (2.9)				275 (16.7)
			(Absolute Amount in 1000 Current Yen)				
1950	201.9 (100)	147.3 (73.0)		13.5 (6.7)	3.3 (1.6)	0.7 (0.3)	37.1 (18.4)
1955	358.1 (100)	255.6 (71.4)		17.2 (4.8)	2.1 (0.6)	7.8 (2.2)	75.4 (21.1)
1960	409.5 (100)	225.2 (55.0)		22.9 (5.6)	11.6 (2.8)	13.7 (3.3)	136.1 (33.2)
1965	760.8 (100)	365.2 (48.0)		22.5 (3.0)	21.9 (2.9)	24.8 (3.3)	326.4 (42.9)
1970	1393.2 (100)	508.0 (36.5)		24.4 (1.8)	55.2 (4.0)	42.2 (3.0)	763.4 (54.8)
1975	3414.4 (100)	1146.0 (33.6)		32.6 (1.0)	124.2 (3.6)	132.7 (3.9)	1978.9 (58.0)
1979	4417.7 (100)	1126.7 (25.5)		58.6 (1.3)	151.3 (3.4)	166.0 (3.8)	2915.1 (66.0)
1980	4515.2 (100)	952.3 (21.1)		48.5 (1.1)	167.8 (3.7)	188.2 (4.2)	3158.4 (70.0)

Notes: *Income from side business included in wages and salaries column. (1) Livestock income included in agriculture income. (2) Income from fishery included in income from other off-farm sources which also includes rent, interest and dividends. (3) Wages and salaries include work on other farms.

Source: *Farm Household Economy Survey*, Ministry of Agriculture, Forestry and Fisheries, various issues. Prewar data from *One Hundred Years of Agricultural Statistics*, IDE.

Appendix Table 2—Farm Household Income in Taiwan (Current 1000 NT$)

	Farm Household Income* (%)	On-Farm Income (%)	Side Business Income (%)	Wages and Salaries (%)	Property Income (%)	Other Miscellaneous Income (%)
1966	29.2 (100)	21.3 (72.9)	0.9 (3.1)	6.5 (22.3)	0.2 (0.7)	0.3 (1.0)
1968	28.4 (100)	16.8 (59.2)	0.8 (2.8)	10.3 (36.3)	0.1 (0.4)	0.4 (1.4)
1970	31.6 (100)	17.3 (54.7)	1.0 (3.2)	12.8 (40.5)	0.2 (0.6)	0.3 (0.9)
1971	35.7 (100)	18.5 (51.8)	1.3 (3.6)	14.5 (40.6)	0.6 (1.7)	0.9 (2.5)
1972	43.6 (100)	20.7 (47.5)	1.5 (3.4)	20.7 (47.5)	0.5 (1.1)	0.2 (0.5)
1973	48.7 (100)	24.8 (50.9)	1.1 (2.3)	22.1 (45.4)	0.3 (0.6)	0.3 (0.6)
1974	74.7 (100)	39.9 (53.4)	2.9 (3.9)	31.0 (41.5)	0.6 (0.8)	0.3 (0.4)
1975	76.7 (100)	39.8 (51.9)	2.4 (3.1)	33.5 (43.7)	0.5 (0.7)	0.5 (0.7)
1976	88.9 (100)	41.8 (47.0)	3.4 (3.8)	40.8 (45.9)	1.5 (1.7)	1.4 (1.6)
1977	92.9 (100)	42.9 (46.2)	3.4 (3.7)	44.6 (48.0)	1.3 (1.4)	0.7 (0.8)
1978	112.8 (100)	43.5 (38.6)	4.6 (4.1)	62.3 (55.2)	2.0 (1.8)	0.4 (0.4)
1979	135.0 (100)	48.0 (35.6)	5.3 (3.9)	78.8 (58.4)	2.5 (1.9)	0.5 (0.4)
1980	171.2 (100)	58.5 (34.2)	7.9 (4.6)	100.1 (58.5)	4.3 (2.5)	0.4 (0.2)
1981	190.5 (100)	71.4 (37.5)	6.2 (3.3)	108.3 (56.9)	4.2 (2.2)	0.2 (0.1)

Notes: *Farm Household Income excluding Imputed House Rent. Side business income same definitions as that of Japan and Korea. Property income refers to interest, rent and investment dividends.

Source: FIES data from *Basic Agricultural Statistics,* Council for Agricultural Planning and Development (March 1983).

Appendix Table 3—Farm Household Income in South Korea (1000 current won)

	Farm Household Income (%)	On-Farm Income (%)	Income from Forestry and Fishery (%)	Income from Commerce, Industry and Services (%)	Wages and Salaries (%)	Rent and Interest (%)	Others (%)
1962	63.8 (100)	54.0 (84.6)	1.2 (1.9)	1.4 (2.2)	6.4 (10.0)	0.5 (0.8)	0.3 (0.5)
1963	88.1 (100)	76.5 (86.8)	1.0 (1.1)	1.3 (1.5)	8.1 (9.2)	0.9 (1.0)	0.2 (0.2)
1964	120.0 (100)	103.7 (86.4)	2.4 (2.0)	2.1 (1.8)	9.5 (7.9)	1.6 (1.3)	0.7 (0.6)
1965	105.3 (100)	88.8 (84.3)	2.0 (1.9)	1.9 (1.8)	10.0 (9.5)	2.0 (1.9)	0.5 (0.5)
1966	122.1 (100)	101.4 (83.0)	2.2 (1.8)	3.1 (2.5)	12.3 (10.1)	2.5 (2.0)	0.6 (0.5)
1967	140.5 (100)	116.4 (82.8)	2.7 (1.9)	3.9 (2.8)	13.3 (9.5)	3.6 (2.6)	0.6 (0.4)
1968	167.4 (100)	136.9 (81.8)	4.0 (2.4)	4.4 (2.6)	17.8 (10.6)	3.3 (2.0)	0.9 (0.5)
1969	202.2 (100)	167.1 (82.6)	3.2 (1.6)	4.9 (2.4)	21.5 (10.6)	4.3 (2.1)	1.1 (0.5)
1970	236.4 (100)	194.0 (82.1)	3.6 (1.5)	6.0 (2.5)	26.8 (11.3)	4.9 (2.1)	1.0 (0.4)
1971	337.5 (100)	291.9 (86.5)	4.1 (1.2)	7.0 (2.1)	28.3 (8.4)	5.6 (1.7)	0.6 (0.2)
1972	408.4 (100)	353.4 (86.5)	5.9 (1.4)	8.6 (2.1)	33.4 (8.2)	6.6 (1.6)	0.5 (0.1)
1973	457.4 (100)	390.3 (85.3)	5.8 (1.3)	9.6 (2.1)	41.8 (9.1)	7.0 (1.5)	2.9 (0.6)
1974	638.1 (100)	541.9 (84.9)	9.8 (1.5)	12.5 (2.0)	62.3 (9.8)	8.2 (1.3)	3.4 (0.5)
1975	828.6 (100)	714.8 (86.3)	7.7 (0.9)	14.2 (1.7)	82.2 (9.9)	8.8 (1.1)	0.9 (0.1)
1976	1102.3 (100)	921.2 (83.6)	8.6 (0.8)	19.9 (1.8)	110.8 (10.1)	10.6 (1.0)	31.1 (2.8)
1977	1314.4 (100)	1036.1 (78.8)	7.5 (0.6)	31.9 (2.4)	178.8 (13.6)	27.4 (2.1)	32.7 (2.5)
1978	1702.0 (100)	1355.7 (79.7)	7.1 (0.4)	36.9 (2.2)	234.4 (13.8)	34.6 (2.0)	33.3 (2.0)
1979							
1980							
1981							

Appendix Table 4—Absolute Levels of Off Own-Farm Income Per Household

	Off-Farm Income per farm household in national currency	IBRD exchange rate per US dollar	Off-Farm Income per farm household in US dollar	Index
Japan (1975)	¥ 2,268,400	297.0	$7,638	100
Taiwan (1975)	NT$ 36,921	38.0	$ 972	13
South Korea (1975)	Won 113,800	484.0	$ 235	3
Philippines (1971)	₱ 969	7.3	$ 133	2
Thailand (1975/76)	Baht 3,448	20.4	$ 169	2
W. Malaysia (1973)	M$ 854 (1)	2.4	$ 356 (1)	5
W. Malaysia (1973)	M$ 428 (2)	2.4	$ 178 (2)	2

Notes: (1) occupation grouping (2) industry grouping
Exchange rates from IBRD, World Tables, 1980. Philippine incomes will rise by 33% and West Malaysia's by 21% in 1975 US prices.

Sources: *Farm Household Economy Survey* (for Japan); FIES data in *Basic Agricultural Statistics*, Council for Agricultural Planning and Development, March 1983 (for Taiwan); *Report on the Results of Farm Household Economy Survey* (for South Korea); *NCSO Family Income and Expenditure Survey 1971* (for the Philippines); *Report on Socio-Economic Survey for Whole Kingdom 1975/76* (for Thailand); Department of Statistics data (for West Malaysia).

Appendix Table 5—Transport Density in Selected Asian Countries, 1973-74

	(1) Meters of railway and highway per sq. kms. of total area	(2) Index for column (1) Japan=100	(3) Meters of railway and highway per 1000 population	(4) Index for column (3) Japan=100	(5) Composite index (simple average of columns 2 & 4)
East Asia					
Japan	2,927	100	9,931	100	100
Taiwan	611	21	1,389	14	18
South Korea	411	14	1,156	12	13
Southeast Asia					
Philippines	337	12	2,280	23	17
Malaysia	61	2	1,638	17	9
Thailand	65	2	768	8	5
Indonesia	29	1	323	3	2
South Asia					
Burma	43	2	926	9	5
Sri Lanka	994	34	4,684	47	41
India	471	16	2,248	23	19
West Asia					
Pakistan	53	2	644	7	4
Iran	30	1	1,428	14	8
Iraq	77	3	2,046	21	12

Source: Computed on the basis of data from Table 3.9 by Gustav Ranis in Walter Galenson (ed.), *Economic Growth and Structural Change in*

Appendix Table 5 (Continued)

	(6) Meters of railway and highway per hectare of agricultural land*	(7) Index for column (6) Japan=100	(8) Meters of railway and highway per 1000 agricultural population	(9) Index for column (8) Japan=100	(10) Agricultural composite index (simple average of columns 7 and 9)
East Asia					
Japan	186	100	69,242	100	100
Taiwan	24	13	3,770	5	9
South Korea	17	9	2,596	4	6
Southeast Asia					
Philippines	12	6	4,573	7	7
Malaysia	3	2	3,311	5	3
Thailand	2	1	1,017	2	1
Indonesia	2	1	510	1	1
South Asia					
Burma	3	2	1,666	2	2
Sri Lanka	27	15	8,636	13	14
India	8	4	3,417	5	5
West Asia					
Pakistan	2	1	1,177	2	1
Iran	2	1	3,579	5	3
Iraq	3	1	4,858	7	4

Appendix Table 6—Average Annual Income per Farm Family and per Farm Population in 1960 US Dollars

	(1) Ave. Income Per Farm Family in National Currency	(2) Average Income per Farm Family in US dollar	(3) Average Income per Farm Family in 1960 US$	(4) Index for Col. (3) US=100	(5) Average Size of Farm Family	(6) Per Capita Farm Family Income in 1960 US$	(7) Index for Col. (6) US=100
USA (1960)	$ 4,531	4,531	4,531	100.0	4.50	1,007	100.0
Japan (1960)	¥ 409,500	1,138	1,138	25.1	5.72	199	19.8
Taiwan (1966)	NT$ 32,320	808	737	16.3	5.80	127	12.6
Korea (1965)	Won 112,200	422	396	8.7	6.31	63	6.3
Philippines (1965)	₱ 1,727	443	415	9.2	6.10	68	6.8
Thailand (1968/69)*	Baht 8,073	388	321	7.1	5.76	58	5.8
Indonesia (1976)	Rup. 174,684	421	219	4.8	5.85	37	3.7
W. Malaysia (1967/68)*	M$ 1,440	470	408	9.0	5.78	71	7.1

Note: These are exchange rate conversions into dollars and may undervalue the income of most of the Asian countries in terms of purchasing power parities. But even if they are doubled, they are still low. Data on exchange rates and US cost of living index from *IBRD World Tables 1980.*

Footnote: *Average annual income per rural family instead of per farm family.

Sources: *Historical Statistics of the US, Colonial Times to 1970,* Part I, p. 301 (for the US); *Japan Statistical Yearbook and Hundred Years of Agricultural Statistics in Japan* (for Japan); *Family Income and Expenditure Survey Report* (for Taiwan); Major Statistics of Korean *Economy 1977* (for South Korea); *Family Income and Expenditure Survey 1965* (for the Philippines); Table 2.3.1 of Oey Astra Meesok, "Income Distribution in Thailand," CAMS Discussion Paper No. 76-12 (for Thailand); p. 17 of Lim Lin Lean, "The Pattern of Income Distribution in West Malaysia 1957-1970," ILO World Employment Programme Research Working Paper 2-23 (for West Malaysia); and Central Bureau of Statistics, *Income Distribution in Indonesia 1976* (for Indonesia).

Appendix Table 7—Product Per Worker in Agriculture, Industry and Service Sectors, 1979

	(1) Product per worker in agriculture in US$	(2) Index for col. (1) US=100	(3) Product per worker in industry in US$	(4) Index for col. (3) US=100	(5) Product per worker in services in US$	(6) Index for col. (5) US=100
U S A	19,762	100.0	25,800	100.0	24,870	100.0
Japan	7,829	39.6	22,884	88.7	20,403	82.0
Taiwan	2,033	10.3	6,167	23.9	5,758	23.2
South Korea	2,522	12.8	5,354	20.8	5,557	22.3
Philippines	834	4.2	2,880	11.2	1,994	8.0
Malaysia	2,419	12.2	5,989	23.2	4,683	18.8
Thailand	440	2.2	4,837	18.7	3,080	12.4
Indonesia	482	2.4	2,802	10.9	1,023	4.1
India	326	1.6	1,127	4.4	825	3.3

Note: Agriculture includes Agriculture, Forestry, and Fishery; Industry includes Mining, Manufacturing, Construction, Public Utilities and Transport, Storage and Communication; Services include Commerce and Services.

Sources: *Key Indicators of Developing Member Countries of ADB*, April 1982 (for all countries unless otherwise indicated); *Japan Statistical Yearbook 1981* (for Japan); *Taiwan Statistical Data Book 1980* (for Taiwan); *Major Statistics of Korean Economy 1982* (for South Korea); *UN Yearbook of National Accounts Statistics 1979* and *ILO Yearbook of Labour Statistics 1980* (for USA).