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CHINESE GRAIN TRADE

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF SCIENCE

IN

AGRICULTURAL ECONOMICS

DEPARTMENT OF RURAL ECONOMY

EDMONTON, ALBERTA

FALL, 1982

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ABSTRACT

This study is an analysis of China's grain trade. It examines each aspect of China's agricultural, marketing, and trade systems to understand why and how this trade has taken place. It concludes that there is not enough information to develop complete trade models, but consistent estimates of China's grain imports in the near future can be determined from grain supply agreements. Grain imports, in the long run, are due to lagging grain production in China. While grain production has risen rapidly in recent years, it cannot keep ahead of population growth, and is still affected by frequent disasters. A stable government, a large surplus in invisibles trades, a determination to build grain reserves, a growing animal husbandry industry, and relaxed consumption controls, are all contributing to China's record grain imports. The grain stocks themselves, the determination to balance imports with exports, the improved agricultural technology, and high world grain prices could all be reasons for China to cut back on imports in the future. Political factors play a major role in China's choice of grain suppliers. China exports rice at a high price to import wheat at lower prices. However, rice exports have fallen rapidly in post-Mao years due to increased domestic consumption and the slow growth in rice production as emphasis has been given to a balanced and more diversified agriculture.

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PREFACE AND ACKNOWLEDGMENTS

China trade is a fascinating, yet curious, subject. It can mean different things to different people. To governments it can be a form of diplomatic exchange. To farmers and those involved in the grain industry it provides a livelihood. To analysts it can be the subject of involved econometric models. To instructors it can illustrate the comparative advantage of economic trade theory. To many, however, grain trade can be summarized in a few short tables without need for lengthy discussion. With or without its study, trade movements continue to occur.

What topics grain trade is extended to include depend on the purpose of the study. The most immediate use of this paper is to promote Canadian grain sales. While China is one of Canada's largest grain markets, relatively little is known about the demand and supply of grain in China. While endeavoring to bridge this information gap, market development has not been the major purpose of this research. This study has, instead, been motivated by a personal respect for the Chinese people, and is designed to promote an understanding of China by all Canadians interested in grain trade.

A thesis, in a more customary sense, implies the testing of an hypothesis or an experimentation procedure designed to answer some existing problem. No hypothesis has been tested for the main body of this thesis. The problem which has existed in the study of Chinese grain trade has been the absence of adequate material collected in one body for a comprehensive understanding of trade issues. The question most often asked, however, is how this trade will develop in the future.

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The body of this thesis represents, therefore, a collection of information viewed as pertinent to Chinese grain trade, and at least two means for viewing China's grain trade into the future.

The task of predicting China's grain trade can be approached in various ways. The easiest, and to all appearances more reliable, method has been simply to use the negotiated agreements for long term imports. This method, however, does not carry the satisfaction of explaining why this trade has occurred. The discussion of trade related information holds some, if not most, of these answers, but will be expanded upon by using the second approach of trade modelling.

Econometric trade modelling involves the use of quantifiable data and regression analysis to predict trade as a function of the factors most affecting it. In the inception of this thesis it was not known whether enough reliable data existed for China in order to formulate trade models. It was also questioned, even with proper data, whether trend predictions of trade could be successful, given the many unpredictable political factors which could influence this trade. It is fortunate that the limited data available do permit the formulation of some basic trade models. Credit and appreciation are extended to Mr. Frederic M. Surls, of the U.S. Department of Agriculture, whose work in modelling has given a basis for the further analysis of China's grain trade.

While regression analysis can help to explain trade patterns of the past, it is of limited use for current trade predictions. Trade predictions are dependent on consistent trade policies over short run periods of at least six or seven years. While this was the case for the period of 1966 to 1975, China's grain import policies have shifted dramatically in post-Mao years. If new patterns do exist these cannot

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be verified as yet through modelling. Moreover, the lagged nature of these models renders them of more historical than practical use.

Ordinarily an economic study in the field of international trade will include a discussion of international trade theory. This has been omitted from the text for the reason that trade theory sheds little further light into China's trade patterns (see Appendix One).

The weightier portion of this study has been qualitative in nature rather than quantitative or theoretical. Subject matter has been grouped into chapters on land policy, grain production, marketing, and grain trade itself. China's background and history before the People's Republic have been included when shedding light on present policy and trade patterns. When available, economic data have been used to illustrate these subjects.

Ideally, it would be best to learn about China while in China. Fortunately, however, extensive materials have been written on China in English. The lack of objective comments on China's trade and agriculture by China's own specialists is a deficiency to be regretted. With the development of China's statistical system and the improvement of scientific research, the contribution of China's own scholars in providing missing information is anxiously anticipated.

A deep appreciation and respect is expressed to Dr. J.R. Richter for his encouragement in continuing this study through the extended period of its preparation. My wife and children have been guiding lights to brighten the burden of this work. No great achievement can be made without sacrifice, and the greater sacrifice of my wife during this time is fully acknowledged. Further gratitude is extended to Dr. W.E. Philips, Reg Norby, the Rural Economy staff, and the many professors who have taught, assisted, and encouraged me in the course of this

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INTRODUCTION

The analysis of China's grain trade is divided into two sections. The background and the first four chapters are qualitative and do not require the reader to be familiar with economic theory, econometrics, statistics, agriculture, grain marketing, or international finance, even though each of these areas of specialization has been examined while researching the study. Chapter five deals solely with statistics relating to grain production and trade, while chapter six delves into econometric modelling.

Perhaps the most useful tool for learning about China is an understanding of the Chinese language. This can help to clarify the various geographic locations which can otherwise be confused when using different systems of romanization (see Appendix Two, Table A-1, and note one of the background). The background to Chinese agriculture is included to help familiarize the reader with the geography, climate, and agricultural regions of China.

The background draws mainly on materials written prior to 1955. The most thorough original study of Chinese agriculture (to the knowledge of the author) was carried out by John Lossing Buck in the inter-war period. The details of geography and climate have been supplemented with newer data as available. The grain regions designated by Buck are still used by every commentary on Chinese agriculture; and more recent data on the percentages of crop area in each region have not been released by the Chinese government. The inclusion of Buck's data on grain regions followed by post-war[1] changes in chapter two allows the

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reader to compare these periods, while providing a reminder that our knowledge of China's agriculture is by no means complete.

The chapter on land policy serves a dual purpose. It helps to understand characteristics of the Chinese people as evidenced by their history, as well as introducing the communal structure which is the basis for agriculture today. The central theme of chapter two is how well can China be expected to look after her own needs in the future. This entails an examination of the inputs to agriculture, what China has tried in the post-war period, and what can yet be done. Grain marketing is concerned with China's use of grain after the harvest. This includes banking, transportation, and storage, as well as pricing policies and market structure. Chapter four discusses China's trade in general, followed by details of grain trade and its determinants.

The quantitative analysis in chapter six attempts to predict China's grain trade for one year ahead using factors known in the previous year. Models reported by Frederick M. Surls, showing grain imports to be a function of the lagged grain production and the lagged hard currency trade balance, are repeated. These models are modified by the inclusion of the rice/wheat price ratio factor. A simultaneous equation is attempted using the endogenous variables of grain imports and rice exports. Chapter five discusses the availability and the reliability of the grain production, population, and trade data required for the trade modelling. Data problems and shifting Chinese import policies relegate trade modelling to a basic exercise in econometrics, shedding some light on China's policies during the Cultural Revolution, but holding no promise, as yet, for trade directions in the future.

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Chapter seven is the summary and conclusions. The intent of this summary is not to repeat information already summarized in the preceding chapters, but to highlight those findings most relevant to China's grain trade.

---

[1] Post-war will most often refer to China after 1949, while pre-war China is occasionally used to refer to the Nationalist period of rule prior to World War II.

BACKGROUND TO CHINESE AGRICULTURE[1]

A. Geography[2]

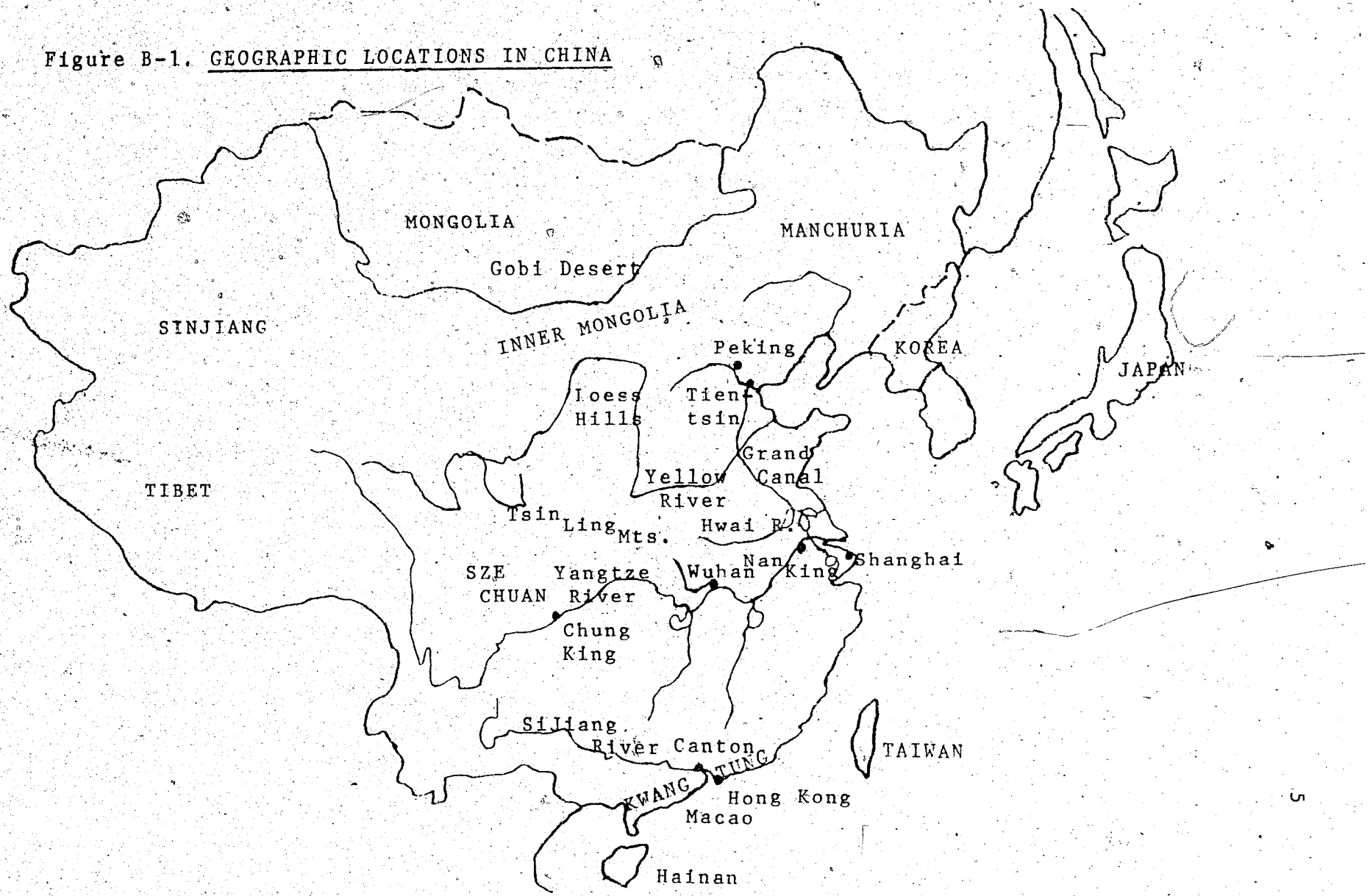
George Babcock Cressey describes China as an oasis surrounded on the west by mountains, on the north by desert, and on the east and south by the Pacific Ocean. Early trade by land was limited to luxury goods. However the advent of low cost shipping has given much easier access to China along its eastern coast.

Most of China is covered by mountains and deserts. Only about 14% of the land area is suitable for agriculture compared to 23% for the United States.[3] Most of this arable land lies in the southeast part of the country, with the geographical distribution of the population reflecting this. A diagonal line drawn from the northeast to the southwest of China divides the country into two contrasting regions. Before World War II the northwestern part had 64% of China's total land area, but only 4% of the population, while the southeastern part had only 36% of the land area, but supported 96% of China's population.[4]

With the land sloping from the mountains in the west to the flood plains of the eastern coast, China's rivers also flow from west to east. The Yellow River in northern China flows through sections of severely eroded hills, the remnants of the ancient Chinese civilization. The yellow silt it carries has caused frequent flooding, while building the plains at its mouth.

The Yangtze is China's longest river and the most important waterway into central China. It connects the rich agricultural region

Figure B-1. GEOGRAPHIC LOCATIONS IN CHINA



of Szechuan in central China with the coastal port of Shanghai. Areas south of and including the Yangtze River contain only a third of China's cultivated area, but almost 80% of the country's surface water. The Yangtze alone accounts for 40% of China's river water flow, compared to 2% for the Yellow River. The Pearl (Si Jiang) River flows through the populous southern province of Canton (Kwang Tung) to the port of Hong Kong, and accounts for 20% of the surface water flow.[5]

Canals are interlaced with natural rivers and streams in southern China to provide a ready system of transportation for goods. In northern China the Grand Canal, a remnant of past dynasties, has been reconstructed for water transportation in a north-south direction. It connects the Yangtze River with the Yellow River near the centre of government in Peking (Beijing). Tientsin is a major port city lying at the northern tip of the Grand Canal.

Figure B-1 outlines some of China's geographic locations referred to here and later.

B. Climate

China's climate is characterized by monsoon winds. These blow from the sea to the interior, in a northerly direction in the summer, and from the interior to the sea in a southerly direction in the winter. Summers are very hot throughout the country, with an abundant rainfall concentrated mostly in the south. Northern China's winters are extremely cold with frequent droughts in the spring.[6]

The Tsin Ling mountains running east and west in central China protect Szechuan and the south from the strong, cold winds of the winter monsoon. They also prevent northern China from receiving the full

benefit of the summer rains. Northern rainfall is not only variable with a high rate of evaporation, but comes sharp and heavy further raising the risk of floods. The calamities of droughts, floods, insects, wind, hail, and frost are all more prevalent in the north than in the south. Occasional typhoon winds affect southern areas close to the coast.

C. Grain Regions

The Tsin Ling mountains also divide China into general agricultural regions. Rice is by far predominant in the south while wheat is the major crop in the more diversified agriculture of the north. Figure B-2 illustrates the further division of China Proper (south of the Great Wall) into eight agricultural regions specified by John Lossing Buck. Table B-1 records for each region the percentage of cultivated land area sown in various crops. Manchuria, under Japanese control before World War II, does not have data listed.

Wheat and barley are generally grown as winter crops in China. Spring wheat is grown in the northern extremities, being replaced by millet where droughts are frequent. Where rainfall is not dependable, kaoliang (sorghum) is grown instead of rice as a summer crop in northeast China. Corn and cotton are grown on the better soils of northern China, while kaoliang can be grown on poorer soils. Corn is grown in a belt from northeast to southwest China, growing favorably in warm hill and plateau areas.[7]

Rice is well adapted to a hot, moist climate. It yields more per acre than other grains, and keeps well due to the thickness of the husks. Rice is labor intensive requiring more man hours than any other field crop. Planted first in seed beds, it is later transplanted by hand and

Figure B-2. AGRICULTURAL REGIONS OF PRE-WAR CHINA

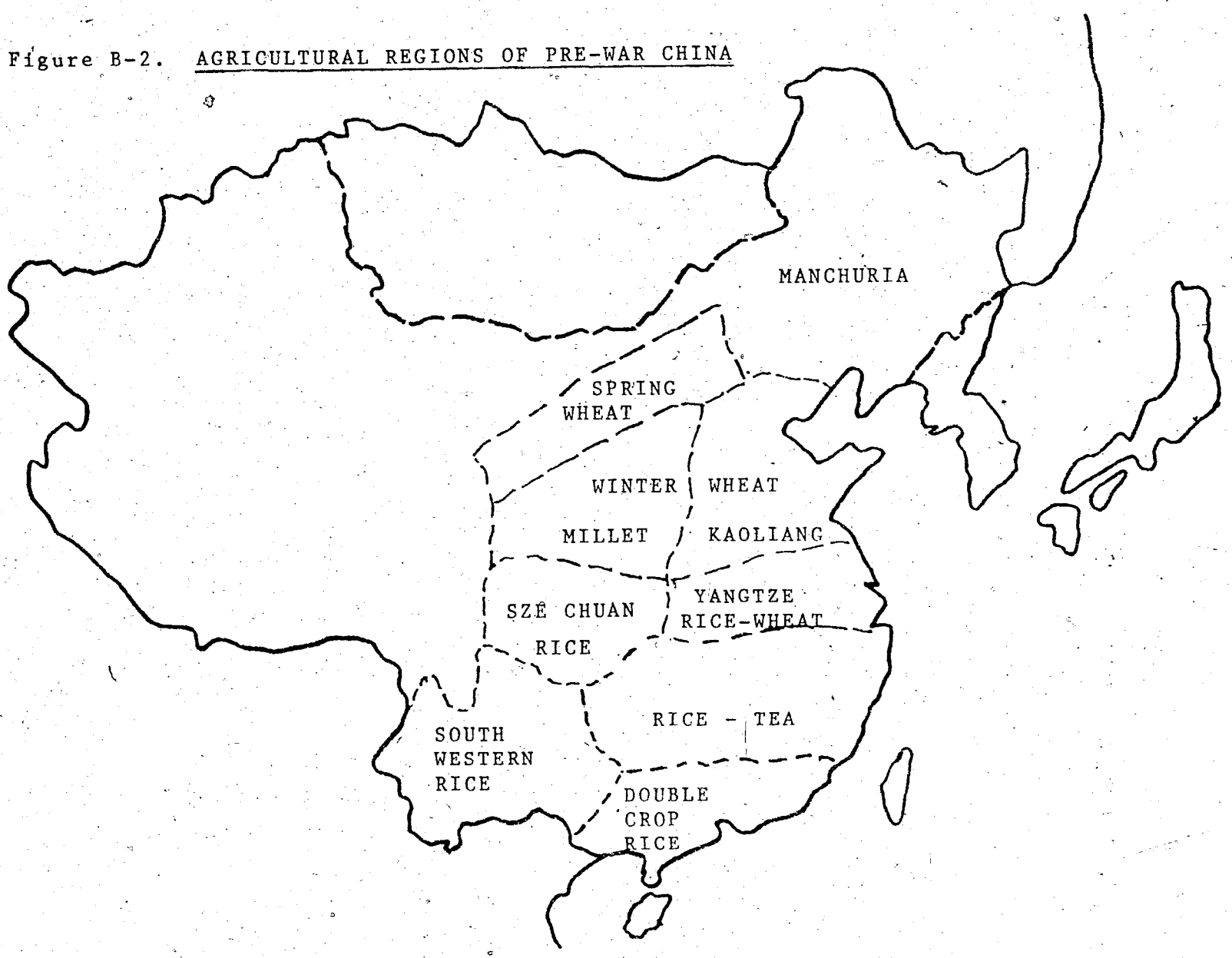


TABLE B-1

PERCENTAGE OF THE CULTIVATED LAND AREA OCCUPIED BY VARIOUS CROPS IN PRE-WAR CHINA[1]

Region/Crop	%	Region/Crop	%
Spring Wheat		Manchuria	
Wheat	13.2	Soybeans	
Millet	12.5	Kaoliang	
Oats	11.7	Spring Wheat	
Irish Potatoes	9.0	Corn	
Barley	7.2	Rice	
Winter Wheat-Millet		Winter Wheat-Kaoliang	
Wheat	39.7	Wheat	45.5
Millet	21.2	Millet	18.7
Corn	12.5	Kaoliang	18.5
Kaoliang	11.6	Corn	16.3
Cotton	9.1	Soybeans	13.4
Barley	7.9	Cotton	8.6
Sze Chuan Rice		Yangtze Rice-Wheat	
Rice	41.3	Rice	57.9
Wheat	18.6	Wheat	30.8
Corn	14.2	Barley	18.5
Barley	13.9	Cotton	12.7
Rapeseed	12.0	Soybeans	9.5
Field Peas	11.8	Rapeseed	8.7
Broad Beans	11.3	Broad Beans	8.4
Soybeans	9.0		
Sweet Potatoes	7.8	Rice-Tea	
		Rice	72.6
Southwestern Rice		Wheat	15.3
Rice	60.4	Rapeseed	12.8
Broad Beans	16.9	Barley	11.2
Corn	13.6	Soybeans	7.1
Wheat	10.5	Sweet Potatoes	6.9
Barley	8.3		
Rapeseed	8.1	ALL CHINA	
Soybeans	6.7	Rice	32.8
		Wheat	29.2
Double Crop Rice		Millet	10.9
Rice	90.2	Corn	9.6
Sweet Potatoes	12.0	Kaoliang	9.0
Wheat	9.6	Soybeans	8.1
Barley	6.7	Barley	7.6
Peanuts	6.4	Cotton	6.5

SOURCE: John Lossing Buck, Land Utilization in China (Nanking: The University of Nanking, 1937), Table 3, p.211.

[1] Percentages can total over 100% due to multicropping.

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requires irrigation. Yields vary from region to region with the rainfall, and the soil fertility. Double and triple cropping of rice are common in southern China.

Sweet potatoes are also grown in southern China. They are high yielding and somewhat drought resistant, but do not keep well. Irish potatoes thrive in a cool climate and are the principal food of farmers in the north and west. Soybeans are also classed as a grain in China, growing well in Manchuria, and also as a summer crop in the Yangtze and Pearl River Valleys.

Post-war changes in cropping patterns are discussed in more detail in Chapter Two.

NOTES TO BACKGROUND

[1] Chinese names of places and people generally appear in their familiar form. The pin-yin system of romanization has been introduced by the People's Government, and will be used for names and places unfamiliar to most readers. A table giving the pin-yin spelling of familiar Chinese places and names is provided in Appendix Two, Table A-1 for convenience where confusion may arise.

[2] A useful description of China's land and people is given by George Babcock Cressey in Land of the 500 Million.

[3] International Wheat Council, "The Grain Economy of China," in Review of the World Wheat Situation 1976/77, p. 74.

[4] T.H. Shen, Agricultural Resources of China, pp. 2-3.

[5] Jan S. Prybyla, The Chinese Economy: Problems and Policies, p. 31.

[6] Further details of China's weather patterns are given by B. Borgoyne Chapman, chapter IV in Land Utilization in China by John Lossing Buck.

[7] T.H. Shen describes the production patterns and consumption uses of China's grains in Agricultural Resources of China, chapters 19-22 and 27.

CHAPTER ONE

LAND OWNERSHIP AND RURAL STRUCTURE

I. INTRODUCTION

Perhaps the characteristic for which China is most known, and a factor most significant in determining China's history, is her population. Up to about the fifteenth century A.D., China's population had been limited to some degree by wars and famine. However the relative peace of the Ming dynasty (1368 to 1644) and the Ching (Qing) dynasty (1645 to 1912) brought an unprecedented population growth. The crowded rural lands, as in the past, have once more brought a change in government as a means of solving the crisis of land ownership. Some characteristics of China's traditional land policies are discussed briefly followed by a more careful discussion of the present rural structure and its inception.

II. TRADITIONAL LAND POLICIES[1]

Eighty percent of China's population have earned their livelihood by cultivating the soil.[2] While aspects of China's historical agriculture are very similar to European feudalism, it is misleading to describe the Chinese farmers as peasants. Land in traditional China had long been freely bought and sold. Farmers were not bound to the land as were the European serfs. Chinese dynasties have alternated between various forms of public and private land ownership with the latter predominating after 221 B.C.

In China's feudal period (prior to 221 B.C.) a public fields system worked well to colonize new agricultural land. A square section of land was divided into nine parts similar to the Chinese character "#" (qing). Eight families would farm the border fields, owning that which they produced. The center field, containing the farm buildings, was jointly farmed with the produce paid as taxes to the feudal princes. The central areas became the Chinese villages of today.

The public fields system worked well when land was sufficient, and variations of public ownership similar to this were latter attempted.[3] When land became scarce, however, the equitable distribution of this land became increasingly difficult. The Chin and Han dynasties of 221 B.C. to 220 A.D. found that more taxation revenue could be collected under a private land ownership system where the more efficient farmers were allowed to buy fields of their less efficient neighbours.

The accumulation of land brought class distinctions. The wealthier land owners rented land to the tenant farmers with payment made in kind. A middle class owned and worked their land allotment, while those who had sold their land became tenant farmers or laborers. Fathers divided their land evenly among their sons, bringing smaller and smaller plots as the population grew. Those who could not support their family on their land allotment rented fields from the land-owning class.

Both the Han dynasty (206 B.C. to 220 A.D.) and the most recent Ching dynasty (1645 to 1912 A.D.) were characterized by light land taxes, while rents rose to 50% or more of a farmer's harvest.[4] The abuse of land ownership also came from the government itself. Government officials and military leaders were granted land as rewards for their service. The plight of the farmers became the driving force behind both the Taiping Rebellion of the mid-nineteenth century and the

Communist Revolution of the modern era.

III. THE CHANGE TO A COMMUNAL STRUCTURE

The suddenness of the communist movement has swept away a private land ownership system which had existed for over two thousand years. While forms and programs have changed, the people themselves operate much according to the patterns of their ancestors. Traditional markets and production methods continue to reemerge and mix with the new structure. The collectivization movement is discussed here from basic land reform to the formation of teams, cooperatives, and eventually communes.[5]

A. Land Reform

While Dr. Sun Yat-Sen had called for 'land to the tiller' in the Nationalist Revolution of 1911, China was in a constant state of civil war and political turmoil until the victory of the Communist forces in 1949. The rent reduction included in the Kuomintang (Nationalist Party) program was never implemented under their control in China, although carried out in Taiwan after World War II.[6]

After splitting with the Kuomintang in 1927 the Communists experimented with land reform policies in the various areas which they controlled. The people's participation in these programs and in the common resistance of the Japanese helped to strengthen their support for the People's Liberation Army. When the agrarian reform law was proclaimed in 1950 much of the country had already experienced land reform.

China's rural population was categorized by the Communists into five groups. Landlords rented out some of their land while employing laborers to work the remainder. Rich peasants worked their own land,

but also hired workers. Middle peasants worked their own land, neither employing others, nor being employed. Poor peasants had their own land, but supplemented their income by working for others as well. Landless laborers could only hire themselves out for a livelihood. An estimated 53% of the land prior to 1950 was held by the landlords and rich peasants who formed about 10% of the rural population.[7]

Land reform was not viewed as an end in itself, but was a necessary step prerequisite to the socialization of China's agriculture. Its purpose was not just to equalize land holdings, but to politically overthrow the landlord class. The general policy was to rely on the poor peasants, unite the middle peasants, neutralize the rich peasants, and eliminate the landlord class. Middle peasants were generally allowed to retain more land than the poor peasants, and participated in land redistribution. Only part of the land of the rich peasants was requisitioned with remaining land and property left untouched.

Initially rents were reduced by 25% and limited to 37.5% of the harvest.[8] Advance rent payments were prohibited, prepaid rents were refunded, and unpaid rents were cancelled. Peasant associations and assemblies were formed throughout the rural areas including poor and middle peasants, farm laborers, artisans, and organizers sent by the Party. Each farmer was assigned to one of the five classes in order to struggle against the landlords. Following this differentiation the properties of the landlords were expropriated. The confiscation of houses, furniture, and personal possessions was characterized by mass trials and executions. Land and property were redistributed by the peasant assemblies within the administrative unit known as a 'hsiang' and consisting of several villages. The amount of land received depended on the average size of land holdings in the hsiang. Party workers

and soldiers received land as well as the poorer classes. The land transferred averaged about one-third acre per person and about one draft animal per hundred people.[9]

The land reform achieved its purposes of eliminating the landlord class and uniting the lower and middle classes under party direction. However the smaller size of land holdings only aggravated agricultural production. Without the upper classes, rural credit disappeared causing production problems. The people were still poor, and more importantly, were not truly equal in wealth. Some possessed more animals and better equipment, or simply could make a better income through industry and better education. Poorer farmers after selling or renting their land became hired laborers again. Among the rising higher class, the majority were rural cadres. This threat of capitalism made collectivization more urgent.

B. Mutural Aid Teams and Cooperatives

It was a traditional practise for farmers to help each other at harvest and planting times, pooling resources to compensate for shortages of draught animals, implements, and manpower. From this basis mutual aid teams were formed, and normally dispersed after the busy season. With government encouragement permanent teams were established. Land, assets, and production were privately owned and controlled while any disparity in the pooling of property was compensated for in cash or in kind. Teams also began to acquire some tools, animals, or other property owned in common.

While socialization was an ultimate goal of the government it was originally planned to take place over many years. Land reform and mutual aid teams helped consolidate the power of the government under a

basic system of private ownership. However only 40% of the households had organized into teams by 1953.[10] The compensation paid to farmers for the property they had contributed to the team allowed some to get rich at the expense of others. This early return to classes and capitalism necessitated an earlier change to socialism than had been planned. Moreover excessive food consumption helped bring on a grain crisis in 1953 which led to the introduction of compulsory grain sales to the state. Such sales were easier to administer through cooperatives.

The formation of cooperatives was much more sudden than were the mutual aid teams. From essential nonexistance in 1953, about 88% of the households were organized into higher cooperatives by 1956.[11]

Farmers joined lower cooperatives by contributing their share to a fund which became common property. Land, animals, and tools were still owned privately, but were put under a unified control. The aggregate production paid first for taxes, then grain was set aside for reserve and welfare funds. About 30 to 60% of the crop was paid as dividends on the pooled land, animals, and tools, while the remainder was distributed according to labor performed.[12]

Joining the higher cooperatives meant that land and major means of production were transferred to collective ownership. Small private plots were allowed, but could not exceed 5% of the average local land holding. The net aggregate ~~production~~ was now distributed only according to the work performed, with no payments made for land and capital contributed. This step effectively eliminated the richer classes.

The transition from teams to cooperatives to communes was achieved by massive participation among the people under government direction and encouragement. Experimental forms of collectivization had been tried dating back to war years. Programs were often well

under way while they were being announced, and in some areas were carried out far beyond the plans envisaged. Official statements emphasized that participation was to be voluntary and to the mutual benefit of all who joined, but social pressures would have ostracized any outsiders. Peasants were free to withdraw from the cooperatives, with some doing so, while cadres on occasion disbanded the larger groups as they proved unwieldy.

The introduction of the cooperatives brought many problems. Cadres were inexperienced in managing several households, unclear directions led to inefficiencies, and accountants were in short supply. Many peasants showed no interest in purchasing farm implements or accumulating fertilizer. In some areas animals were slaughtered and forests were destroyed. Pig numbers dropped from 100 million in 1953 to 83 million in 1956, much due to the lack of care.[13] Respites were called after each stage of collectivization, but the reaction against the cooperatives only spurred on a faster socialization. It was maintained that industrialization could not be carried out in isolation. Mechanization in agriculture needed larger units of land, as did the development of light rural industry. A surplus from agriculture was needed for capital investment in industry. Cadre enthusiasm for the movement brought the birth of the communes.

C. Communes

The formation of the communes could be termed a planned accident. Despite the setback of the collectivization movement, the shortage of accountants, lack of incentive among workers, and misdirected efforts, the government believed that production would increase in the spirit of the 'Great Leap Forward'. Hence the spontaneous growth of the

collectives, once initiated, was encouraged and not checked. Extreme measures such as communal mess halls were soon disbanded while the confiscation of private plots was later rescinded. Convinced by overblown statistics of the movement's success, the government's reaction was delayed. Nonetheless the failure of the Great Leap Forward halted further socialization, as the resulting structure was cut back to workable units.

The basic idea in forming communes was to amalgamate all economic and political functions of an area into one unit. The commune had grown beyond a mere production unit for agriculture. It was to incorporate the government, industry, financial institutions, and agriculture all into one. China's economy became decentralized as each unit was instructed to be self supporting. The sheer size of the commune allowed large work groups to be formed for special tasks such as the building of dams and irrigation projects, yet the absence of workers from their agricultural pursuits took its toll on grain production.

The communes established in 1958 ranged from about 2000 to 9000 households in various provinces, with the largest communes located in heavily populated areas such as Peking and Shanghai.[14] The average number of households per commune was 4,600 compared to 54 and 170 for the average lower and higher co-operatives respectively, and about 20 households for the original mutual aid teams.[15] The team and brigade units became permanent parts within the commune, and could best be compared to the elementary and higher cooperatives of the mid-fifties.

Production teams currently average about 33 households.[16] Since the early sixties they have become, most often, the basic accounting unit responsible for decisions as to the production of goods and the distribution of income. Some production decisions have more recently

reverted to individual families under a contract system. The basic accounting unit bears the burden of calculating profits or losses. Most of the food produced is consumed by members while only a portion is marketed. Individual households have maintained private garden plots since the early sixties, from which come most of China's vegetables, poultry, and hogs.

Brigades, averaging about 233 households, oversee the work of the teams.[16] They represent the final unit of government and party control, although brigade cadres have complained of not having a purpose. Brigade leaders nominate officials to lead teams, as well as exercising coercive power by controlling common services of electricity, water, farm machinery, health, and education.

The commune itself, now with about 3400 households, is responsible for procuring grain, collecting taxes, public security, and reporting statistics to higher levels.[16] It formulates production plans for lower units, after receiving general plans from higher levels of administration. It manages water resources, construction, local industries, afforestation, and transportation projects requiring heavier inputs of labor and technical expertise. Communes have progressed significantly since 1962 introducing a modern world to a vast people still living in an ancient culture.

IV. SUMMARY

The rapid population growth in [illegible]ght the People's Government to power in China, with a [illegible]nge to public land ownership. The distinguishing features of the rural structure are the communes, brigades, and teams established in the collectivization movement of the 1950's. Born in a revolutionary fervor, the communal

structure has survived the pains of inception and is now the means of introducing modern technology to a people rooted in a proud past.

NOTES TO CHAPTER ONE

[1] It is extremely difficult in a short section to give a concise summary of China's historical land policies. Not only is the material to be covered lengthy, but the time for the required research is insufficient. Moreover a problem is encountered in differing historical views between those who support China's current social system and those who favor free enterprise. While the author is of the latter leaning, and this may slant the representation of China's history, an objective wording is attempted to the extent possible. The intent of this section is to provide information considered relevant to China's grain trade. It should not be interpreted as evidence supporting either of the contrasting economic systems.

[2] Parker Po-fei Huang et al, Twenty Lectures on Chinese Culture, p. 93 (Chinese). The figure of 80% is quoted in many references and does not appear to have varied a great deal over time.

[3] Chinese theorists believed the equal distribution of wealth led to a prosperous society.

[4] Maurice J. Meisner, "The Agrarian Economy of China in the Nineteenth Century," Thesis, p. 10.

[5] T.C. Kuo gives a concise summary of structural changes in Agriculture in the People's Republic of China: Structural Changes and Technical Transformation (New York: Praeger Publisher, 1976), chapters one to five.

[6] Audrey Donnithorne, China's Economic System, p. 36. Details of Nationalist attempts to reform land ownership were not found. Most authors, as Donnithorne, simply stated that rent reductions were not carried out by the Kuomintang.

[7] This is one of various figures given by Marion R. Larsen, "China's Agriculture Under Communism," in An Economic Profile of Mainland China, papers presented to the Joint Economic Committee of the U.S. Congress (hereafter footnoted as J.E.C. papers), p. 214, footnote 32. Communist sources indicate that one-tenth of the population (the rural landlords) owned 70 to 80 percent of the land. See "What Happened in the Countryside," China Reconstructs 30 (October 1981), p. 21.

[8] Larsen, "China's Agriculture," p. 214.

[9] Ibid.

[10] Donnithorne, China's Economic System, p. 39.

[11] Ibid.

[12] Ibid., p. 38.

[13] Cheng Chu-Yuan, Communist China's Economy 1949-1962: Structural Changes and Crisis, pp. 35-36.

[14] Cheng, Communist China's Economy, p. 40.

[15] Donnithorne, China's Economic System, p. 43.

[16] Frederick W. Crook, "The Commune System in the People's Republic of China, 1963-74," in China: A Reassessment of the Economy, J.E.C. papers, pp. 366 and 409. Crook lists sources for population and relevant statements on the numbers of communes, brigades, and teams. He then estimates the numbers of people and households for each unit.

CHAPTER TWO

GRAIN PRODUCTION IN POST WAR CHINA

I. INTRODUCTION

How to feed her population is a difficult and important problem for the Chinese. China has been known both as a land of plenty and a land of famine. While the good earth continues to support her people, sheer numbers dictate minute attention to all aspects of agriculture for adequate harvests to continue. While initially achieving some success at obtaining a surplus from agriculture, the People's Government has struggled for many years to reach a goal of being self-sufficient and prosperous. Post-Mao policies are aiding considerably in China's agricultural revival.

Despite large grain imports, the Chinese are not starving. In 1957, a good production year, China's grain supply after exports was 285 kg. of unhusked grain per capita, compared to 289 kg. for Japan, 191 kg. for India, and 230 kg. for Pakistan.[1] In 1980 the government reported an average production of 300 kg. of grain per capita.[2] China could manage on her own without food imports from abroad, which satisfies China's current definition of self-reliance.

Productivity, however, means obtaining the most output from the fewest inputs. Anthony M. Tang points out that from a productivity standpoint, China's agriculture falls far behind other nations of the Far East, such as Japan, Taiwan, and Korea.[3] The present agricultural

policies have resulted from the failure of stricter communist policy to raise agricultural output. While grain output has risen substantially since 1949, it has only kept slightly ahead of the rise in population.

With rapid population growth in the past six centuries, China was able to raise grain production half due to an increase in cultivated and sown acreage, and about half due to an increase in grain yields.[4] The government was able to increase the cultivated area somewhat in the 1950's by removing land boundaries, expropriating religious land, and by limited land reclamation, but the total area of cultivated land continues to decline due to the expansion of urban areas and industry. The sown acreage has grown with multiple cropping, but this too has found its limits. Improvements in China's grain output have become increasingly dependent on raising grain yields.

This chapter deals primarily with the factors affecting China's post war grain production. Agricultural policy is discussed first, followed by the inputs to agriculture in a rough order of importance. Those most directly related to raising yields are included together, followed by factors connected with land use, and finally the labor saving conveniences of mechanization.

II. POLICY FOR ACHIEVING TECHNOLOGICAL CHANGES IN AGRICULTURE

Traditional China was able to achieve high grain yields through the extensive use of water, control of soil erosion, maintaining soil fertility, crop rotation, and weed control. The modern age has brought yield improvements through plant breeding, insect and disease control, the use of chemical fertilizers, and improved irrigation and drainage systems.

The largest agricultural production in pre-war China was obtained under favorable conditions in 1936. However, the breaking of a dike on the Yellow River during the war with the Japanese resulted in the worst flood in modern China's history, destroying people, farmland, irrigation systems, transportation and communication facilities, and disrupting industries dependent on agriculture. Despite attempts at reconstruction after World War II, China's immense agricultural problems waited for action by the People's Government.

While Communist leaders agreed on the fact that agriculture in China was backward, and needed to undergo a technological as well as a social transformation, the timing and implementation of these changes was not clear. Priorities had to be established for state investment. A major purpose in collectivizing agriculture was to farm larger units to make mechanization easier. But heavy industry needed to be developed first to produce the agricultural machinery. Industry thus received the greater portion of investment funds during the first five year plan, while grain surpluses were extracted from agriculture to pay for this industrial development.

After 1955 the government realized that mechanization improved the productivity of labor, but alone could not raise yields per unit of land. Some yield improvements could be made through using better seed varieties and improved cropping systems, which required a small amount of state investment, but leaders were unwilling to divert large amounts of industrial investment to agriculture. Moreover, there was a shortage of scientific personnel to make rapid advances in agricultural technology. Mao's plan, instead, through the commune movement, was to use indigenous inputs, and to have these inputs produced on a local level involving

investment by the collective, but not the state.

The moderates within the government regarded technical and scientific work as delicate tasks, to be handled carefully by those with professional training. However, the technocrats were silenced during the Great Leap Forward years by a strict adherence to the party line. Unfortunately while new ideas were easier to introduce under collectivized agriculture, it was also easier to introduce wrong ideas. Untested plans to improve agriculture led to disaster and waste when traditional aversions to risk were swept away by party decrees. In the wake of the Great Leap Forward's failure, the moderate views came to the fore under the direction of Liu Shao-Chi. Agriculture was returned to priority in state investment plans and has remained so since. While the Cultural Revolution brought disrepute to agricultural experts as opposed to farmers having practical experience, the return of moderate leaders has allowed science to once more take the lead in raising agricultural production.

Since the early years the People's Government has sought to modernize China's agriculture through the four processes of mechanization, electrification, irrigation, and the introduction of chemical fertilizers and insecticides, as well as improved cropping systems; breeding, and seed selection. In the 'National Agricultural Development Program for 1956-67', Mao specified eight important measures for improvement in agricultural production. This eight word charter for farmers includes water, fertilizer, soil (conservation), seeds (selection), closeness (in planting), (plant) protection, implements, and (field) management. Each of these measures will be discussed as they relate to grain yields, land use, or labor convenience.

III. FACTORS AFFECTING YIELDS

China's primary concern in agriculture is controlling water, both providing enough and preventing damage from too much. Closely connected with irrigation is the use of fertilizers. Chemical fertilizers and insecticides are both a recent development. Plant protection and seed selection are also important in determining crop yields.

A. Water Control

Water control can be divided into three areas of discussion: preventing floods, improving irrigation systems in areas with adequate supply, and providing water to areas without a reliable supply.

Floods are considered the worst of natural disasters in China. They not only destroy crops and property, but endanger human and animal life as well. Droughts, at worst, reduce crops in the affected area. Waterlogging occurs on fields without proper drainage as runoff water is collected. Approximately one fourth of cultivated land in China is subject to floods and waterlogging. Typhoons and tidal waves also threaten southern coastal areas. Traditional China had an average of one natural calamity each year. Post-war China had 17 occurrences of severe drought and 10 major floods between 1949 and 1966.[5] Frequent disasters in 1959 to 1961 had a combination of natural and man-made causes. While major floods were thought to be under control,[6] Szechuan has been struck by further disasters in July and mid-August of 1981.

Early Communist water policy centered on the control of floods, in conjunction with the building of large scale hydroelectric projects. Irrigation was largely left to traditional means and the rebuilding of pre-war systems. Dams were not built for water storage, partly due to

the land this took out of agriculture. In the Great Leap Forward peasants were suddenly mobilized in massive projects for the building of water storage and irrigation facilities. The suddenness of the work left weaknesses in the flood prevention systems, contributing in great part to the unprecedented calamities of the post-Leap period.[7] Other projects, such as the San Men Gorge Dam suffered with the withdrawal of the Soviet experts.

Besides reducing the area of cultivated land by the water storage facilities, careless drainage facilities for the irrigation projects led to salinization of farm land. Salts from the natural surface water remained in the soil harming the plant life. Problems were most acute in areas not accustomed to irrigation practises.

Policy after 1960 took a more careful approach to water management. Pumps were installed in high yielding areas to replace the excessive reliance on gravity for irrigation. In 1970 irrigation still depended mainly on human and animal power, but power driven facilities are being used to a large and increasing extent. About half of these pumps are electrical and half are diesel powered. Traditional equipment has been improved by the development of a more efficient waterwheel. A turbine pump was popularized in 1964 in the south and southwest, using a rapid flow of water, but neither consuming electricity nor oil.

Since 1960 agricultural policy has emphasized the extension of high and stable yield areas, rather than investment in poorer areas for land reclamation. Extending the area under effective irrigation and drainage has been stressed, rather than simply maximizing the irrigated area. China already has the largest area of irrigated farmland in the world. As a whole irrigated farmland has tripled in area since 1949.[8]

About half of China's cultivated land is irrigated, and about half again of this is irrigated effectively.[9] It is hoped the high and stable yield area can be raised to one third of the cultivated area.

A major subject of concern for China is how to provide its northern areas with water. This can be done by underground wells, removing silt from the northern rivers, or diverting southern water to the north. Almost 2 million tube wells have already been sunk, mostly on the North China Plain.[10] However with a number of these running dry there is a concern whether underground water is being replaced at an adequate rate. A massive afforestation program has been undertaken to reduce the silt levels of the northern rivers, but this is a more long term project.

A particular fascination for the Chinese lies in redirecting southern waters to the north. This has already been accomplished to some extent by a massive project along the Grand Canal connecting the Yangtze River with the Huai River further to the north. Formerly subject to severe flooding during the summer, the Huai river waters can now be directed to the Yangtze instead, while Yangtze river waters can fill Huai irrigation channels during low periods for the latter. The Yellow River has also been redirected to its former course after changing directions as a result of the war time flood. Redirection of Yangtze river waters to the north at points further upstream have been considered.

B. Fertilization

Of all government policies for increasing agricultural production, the policy on fertilization has been most persistently stressed, least disputed, and comparatively successful. Its direct result is to raise grain yields without encroaching on other inputs. Total fertilizer

application in 1977 is estimated at 186 kg. of nutrients per sown hectare, compared to 72.4 kg. per hectare in 1952.[11] China's fertilizers can be divided into organic and chemical components for discussion.

China uses organic fertilizers to a higher degree than any other country in the world. In 1977, A.M. Tang estimates the organic fertilizers applied had almost three times the quantity of nutrients supplied by the chemical fertilizers.[12] The fertilizer nutrients supplied from organic sources have more than doubled between 1952 and 1977. Specific organic fertilizers are green manure, oilseed cake, night soil, animal manure, and pond mud.

Green manure are crops grown not for their own sake, but as nutrient sources for future crops. They require the least amount of human labor, being grown and used in the same field. They are also higher in nutrient content than other natural fertilizers, and involve almost no cash cost as do chemical fertilizers. The disadvantage of green manure and oilseed cake is that they compete with other crops for land. The 1977 area sown to green manure crops was five times the area sown in the early 1950's.[13] Varieties include milk vetch, cow vetch, alfalfa, hairy vetch, and duck week grown in ponds and slow streams.

Night soil (human waste) and animal manure have been almost fully utilized by Chinese farmers. Pigs are the largest source of farm manure in China and have quadrupled in number since 1949.[14] The drop in pig numbers during collectivization had a delayed effect of lowering grain production in the crisis years of 1959 to 1961. While pigs are raised both collectively and by individual families the latter has proven to be more successful. Sheep are raised instead of pigs in Muslim areas. The gathering of pond mud, while occupying many hours of labor during

the Leap Forward years, has proven inefficient due to the low nutrient content of these fertilizers.

Chemical fertilizers appear to have had the greatest impact on China's grain output during the 1960's. The use of chemical fertilizers in pre-war China was insignificant. Despite a rapid growth in their production and use after the war their current level of application is only one-tenth that of Japan, and one-fifth that of Taiwan.[15]

While fertilizer imports have grown consistently since 1950, they were outstripped by domestic production after 1959. Plant equipment was purchased from the Soviet Union and Czechoslovakia in the mid-fifties, producing a good quality fertilizer, but with insufficient quantity. The high cost of transportation led to the building of small and medium sized local plants during the Great Leap Forward. However many of these plants had to be scrapped due to the poor quality of the fertilizer produced. Higher quality fertilizers were imported from abroad to complement the Chinese fertilizers. Fertilizer imports grew rapidly in the mid and late sixties with China becoming the world's largest fertilizer importer in 1970. Reaching a height of 1.53 million metric tons of nutrients in 1972, these imports have since declined due to rising prices and tight supplies.[16]

Japan and Europe have been China's major suppliers of both fertilizers and fertilizer plants. Many plants were imported during the 1960's, while thirteen of the world's largest synthetic ammonia-urea complexes were purchased in 1972. These urea plants are capable of producing a fertilizer volume equal to China's total nitrogen output in 1973.[17] They were scheduled to come on stream in 1978. China's soil is mostly deficient in nitrogen due to the large application of organic

fertilizers. Domestic fertilizer production has been hampered by the shortages of construction materials and funds for investment, so local production continues to be emphasized. A humic acid fertilizer was successfully produced from coal or peat mixed with ammonium, potassium, sodium, and other materials in 1971 and is now produced in many local areas.

Fertilizers have mostly been supplied to the high and stable yield areas in a package of complementary inputs which include proper irrigation and new rice varieties responsive to high levels of fertilizer application. Chemical fertilizers are distributed for use in collective agriculture, while organic fertilizers have generally been applied to private plots before being contributed for collective use.

C. Plant Protection

Grain crops can suffer damage from insects, rodents, weeds, and diseases. Buck estimated that 10 to 20% of China's pre-war grain crops were damaged by insects and diseases. As recently as 1962 seriously affected areas have also lost about 10% of their crops in this manner.[18]

Insect pests have included locusts, rice borers, army worms, corn borers, cotton aphids, red spiders, pink boll worms, and wheat juice-sucking worms. Locusts, in particular, were a great menace to Chinese agriculture, with outbreaks occurring about twice in every five years, apparently in connection with droughts and floods. Using mass campaigns to surround and destroy the locusts, spraying insecticides from aircraft, and by converting breeding grounds into farmland, 62% of the areas affected by locusts were brought under control by 1962.[19] Locust problems have practically been eliminated but require continual attention to

prevent recurrences. Losses due to the rice borer are under 1% today, while damage done by army worms, bollworms, and the corn borer have been greatly reduced.

Most counties and communes have disease and insect forecast stations. Peasants are organized in insect scouting and research groups. They study insect habits and migrations, and the development of plant diseases, to recommend economical and effective methods of prevention and control. Quarantine offices have been established since 1958 to inspect agricultural products and for plant research to control diseases and insects, but this work suffers from lack of co-ordination. Crop infections have included rice blight, wheat rust and smut, and black rot on sweet potatoes. Pesticides have been used to control rice blight, wheat rust, wheat aphids, and army worms. While disease-resistant varieties of rice and wheat have proved effective, organized research suffers in this area. Bacteria and destructive insects change continuously requiring intensive research to breed new grain varieties with a stronger resistance.

Crop protection in China is based on cultural practises, with increasing use of chemical pesticides and predatory insects. In 1958 eighty per cent of the pesticides used were native varieties, which are simpler and cheaper to produce due to the shortage of chemicals.[20] However the application of chemical pesticides has grown rapidly since the early 1960's. Chinese pesticide production in 1977 was about four times the output of 1963, with domestic production augmented by imports in the 1960's.[21] However the quality of China's spraying and dusting equipment has been poor, and farmers have much to learn yet concerning the use, maintenance, and repair of this equipment. Pesticides will become more important with the further introduction of high yielding

grain varieties.

China is experimenting on a large scale with using beneficial insects and organisms to prevent and eliminate insect pests. Wasps are used to control corn borers and cotton bollworms. Biological control, however, is not as convenient nor as simple as chemical control, and produces results at a slower rate. Great care must be used in applying pesticides in China not to upset the delicate ecological balance.

Moles and rats are the principal animals causing damage to crops in China. Poisonous bait has been popularized for rodent control. Many rats have been exterminated by peasant campaigns. Weed damage is not as serious in China due to intensive care by the farmers. Herbicides, however, have also been developed and used successfully.

D. Seed Selection

Since the early 1960's China has successfully raised grain yields through the introduction of new seed varieties. High yielding rice strains developed by the International Rice Research Institute in the Philippines have not been as useful to China since early maturing varieties are required for multicropping. The practise of selecting seeds from the hardiest and most desirable plants has adapted grains to local growing conditions, but simple methods of crossing and hybridization have not produced any exceptional varieties for widespread use. The shortcomings of China's agricultural science program are most evident in the use of modern seeds.

Breeding research has concentrated on rice and wheat, although the use of high yielding corn and other coarse grains has spread. High yielding rice varieties developed in pre-war China have continued to be

widely planted. Long grain rice has traditionally been grown in China south of the Huai River. It is native to China and grows well on infertile soils. It can tolerate poorly drained paddy land, but its long stem is unable to tolerate high winds and typhoons. Short grain rice was originally imported from Japan and grown in North China and Manchuria. Short grain rice gives higher yields in response to heavy fertilizer application, is more cold resistant, and can withstand high winds better due to its shorter stalks. These varieties, however, can not tolerate deep standing water on poorly drained lands, are sensitive to the hours of sunlight, and will not yield as well on infertile soils.

Short grain rice was introduced to the Yangtze Valley area during the 1950's because of its high yields and resistance to cold for double rice cropping. The rapid introduction overlooked the large quantities of fertilizer required by this rice for increased production. Without the proper inputs rice production dropped instead of rising. Short grain rice found its place in Chinese agriculture as policy changed to emphasize high and stable yield areas. Used in conjunction with proper irrigation and fertilizer application the new rice varieties significantly raised China's grain output.

With the rapid assimilation of new methods possible under the commune system, China has learned to be cautious in its introduction of new grains. New varieties have a tendency to be less disease resistant. The wide use of a high yielding wheat variety in the 1950's turned into a disaster when it was plagued by rust. This unexpected turn of events led to seed shortages as farmers attempted to return to traditional varieties.

China has developed hybrid rice varieties on her own which are now thriving,[22] but agricultural research has yet to experience the fuller

benefits of modern science. Genetic methods of the Soviet Union were followed closely in the 1950's, but were later discredited. China had just started to make discoveries of her own when the work of the scientists was cut short by the Cultural Revolution. A more suitable environment in recent years has allowed research to continue, but the emphasis is still on practical production-oriented work, without the details of Western studies.

IV. FACTORS OF LAND USE

The factors concerning land use can be further subdivided into cropping practises on land already cultivated, and those factors determining the amount of cultivated land.

A. Cropping and Cultivation Practises

During the people's regime multiple cropping has been extended, and higher yielding crops have been substituted for less productive ones. Intercropping has grown, being more important in the north where multicropping is limited by the weather. New cultivation practises of close planting and deep plowing have been tested. While heavy emphasis was formerly placed on grain production, post-Mao policies now favor a more diversified agriculture.

1. Multicropping

More land is used for multicropping in China than in all other countries of the world combined. The degree of multiple cropping is usually represented by an index of sown area divided by cultivated area and multiplied by 100. The extension of multiple cropping was emphasized

most in the early years and continues to be important today. The annual multiple-sown area index rose from 130.9 in 1952 to 145.0 in 1958.[23] In pre-war years Buck gave a multiple-cropping index of 149 for China proper, which did not include Manchuria or the outer regions.[24] Tang estimates this index to be 157.9 in 1977.[25] This means that sown area grew by 11% between 1952 and 1958, and by a further 10% between 1958 and 1977. Multiple cropping is credited with increasing annual rice output by 40% between 1949 and 1975.[26]

Most early increases in multiple cropping took place in areas south of the Yangtze River. The planting of rice changed from single crops to double crops, from intermingled cropping patterns to consecutive rice crops, from upland rice to paddy rice, as well as the switch to short grain varieties. Due to irrigation, winter crops are now grown on fields that formerly collected water for spring rice planting, and on lowland areas of the north that have been drained. Triple cropping was an early ideal, and is now practised in many areas.

Multiple cropping was not as successful in northern China. The Yellow River area traditionally grew three crops in two years. Changing to two crops each year initially dropped total grain output by 19%.[27] After subtracting production costs, the net income for this area was less than half that received under the former system. Many of the late rice crops tried in central regions of China sufferred from bad yields or failed to produce at all, while the grain itself was of poor quality. Changes in cropping systems tended to ignore local conditions for farming. One area, after harvesting two rice crops, created an environment favorable to moth breeding which led to even further crop damage.

Multiple cropping requires additional fertilizer, adequate

irrigation, early maturing rice varieties, and plenty of labor during peak periods to be successful. Without these complimentary factors many early attempts at multicropping failed. Since the emphasis on high and stable yield areas, multicropping has progressed steadily. It is most successful in the densely populated areas where labor and fertilizer are in greater abundance. The Canton area now records multiple cropping indexes of 260 to 280, including vegetable crops, compared to a pre-war index of 176.[28]

Wheat, beans, rapeseed, tubers, tobacco, and green manure are common as winter crops. Besides rice, cotton is also grown as a summer crop in the south and in the north. Coarse grains, notably corn, are generally grown as summer crops in the north. Green fertilizer, a kind of clover, is a common winter crop used in triple cropping systems, as it allows rice to be planted early in the spring.

The deficiency of phosphates and potash in paddy fields could restrain the further expansion of multicropping. However the greatest obstacle lies in labor shortages during rush seasons. Due to the cold winters, winter wheat on the Yangtze Delta requires over six months to mature, leaving barely enough time for the growing of two summer rice crops. Great effort is required to harvest the first rice crop in early or mid-July and then transplant the second crop by the beginning of August. Low marginal crop returns are obtained at high marginal labor costs. Going from double to triple cropping in Shanghai gained only about 16% in farm income while adding many hours of toil and labor.[29] Grain production is not particularly profitable in relation to other sideline activities that farmers could be involved in. The post-Mao government has given a reserved support to further multicropping, while

encouraging farmers to use their time in more profitable earnings. Excessive triple cropping has harmed agriculture in the Szechuan area.

2. Crop Substitution

Switching to higher yielding grain crops is an effective way for China to raise total grain output. In 1956 the following figures were given for grain yields in China:[30]

(Chin per mou of sown area)

Rice	Potatoes*	Corn	Millet	Kaoliang	Soybeans	Wheat
312.2	231.3	179.6	136.5	133.5	102.0	99.7

* converted at four chin of potatoes equals one chin of grain.

[illegible], potatoes, and corn are higher yielding in comparison to other crops, and therefore more desirable.

Rice constituted 45.5% of China's total grain output in 1956, while accounting for only 26.7% of the total sown area.[31] It has never been a major crop in northern China due to the shortage of water. The government originally planned to increase rice production in the north as irrigation facilities came on stream, but these projects never materialized in the ways hoped for. The area of rice cultivation in the north almost doubled between 1952 and 1957,[32] but most of this increase was in the province of Manchuria as it opened up after the war. Northern farmers were unaccustomed to irrigation practises and many fields became salinized due to the lack of drainage.

Between 1952 and 1957, the acreage in all China sown to rice increased more than any other crop, followed by wheat and then potatoes. However, in relation to previous sowings, potatoes increased by 20.8% over their 1952 level, while rice grew by 13.6%, and the area sown to

wheat grew by 11.1%.[33] The area sown to coarse grains had negligible changes in the early years. While northern lands switched to wheat, new lands in Manchuria could often only be sown to coarse grains. The extra wheat acreage in the north was offset by switching from wheat to rice in other parts of the country. The coarse grain acreage may have risen during the post-Leap Forward famine years, but no data have been reported. When more normal conditions were restored in the early 1960's, rice wheat, and cotton sown acreage are noted to have risen again.

The gains in potato sown acreage have been very successful for the Chinese, although some waste was incurred introducing corn and potatoes to inappropriate areas in 1956. Some farmers now grow corn and soybeans on hilly land instead of rice. Corn has grown in importance as a summer crop in north and south China, replacing soybeans and kaoliang.

3. Intercropping

The interplanting of crops is an old Chinese practise which has spread since 1958. Farmers seed or transplant a new crop between the rows of an existing crop before it is harvested, thus lengthening the growing season. It can increase yield by as much as 40%.[34] Intercropping is more common in the north in adjusting to the growing season. While irrigated rice fields cannot be intercropped, diversified patterns also appear in the south when other crops are grown.

Cotton is often grown with wheat so one can be harvested while the other is small. Due to closer planting, more cotton and wheat can be grown on 100 intercropped hectares than on 50 hectares of each.

In both north and south, tall stalked crops (such as corn and surgarcane), are grown with short stalked plants (such as soybeans, tobacco, and potato) in combinations which give full

> use of sunshine and air. Crops having tap roots (such as cotton) and those having fibrous roots (such as wheat) are often interplanted to keep the soil loose. The peasants also interplant early ripening crops (such as vegetables) with late-ripening crops (such as cereals). These crops absorb nutriment at different times in their growing periods and make possible a more efficient use of the fertilizers in the soil.[35]

Intercropping is still in a trial stage in China. Farmers experiment to find the optimum combination of crops, planting distances, and depths in their local areas. Problems can arise as the dense vegetation increases the likelihood of disease and insect damage. Irrigation and fertilizer needs differ for each crop. Intercropping also requires the intensive use of labor, while complicating mechanized planting and harvesting. Increased mechanization is incompatible with continued intercropping in China.

4. Close Planting

The use of close planting to achieve high yields was known anciently in China, but only followed to a limited extent in pre-war years. Experiments in close planting carried out in the early years of Communist rule were very encouraging. Farmers, however, resisted the change due to the added expense of seeding and machinery. Increased wheat production between 1952 and 1956 was partly attributed to a wider adoption of close planting methods.

Close planting, as part of Mao's eight point charter, was emphasized during the Great Leap Forward campaign. Failing to achieve the yields it had been popularized for, close planting came under severe criticism from 1959 to 1961. The Chinese now emphasize being rational

in close planting. A wheat survey conducted in 1958 by the Research Institute of Plant Breeding and Cultivation indicated that close planting beyond a certain limit interfered with the normal growth of the plants, and recommended flexibility according to local conditions.[36] Rice experiments, too, indicated that too close planting was unproductive.

Seed planting levels are determined by testing and practise, and vary with the progress made in soil improvement, irrigation, fertilization, seeds, and other factors of production. In many areas, the density of planting has increased many times since 1949 in conjunction with technical improvements. Today rice seedlings are placed in clusters four inches apart with seven inches between rows, whereas pre-war China spaced them ten inches between clusters and fourteen inches between rows.[37]

5. Deep Plowing

In 1958 the government urged communes to increase production by deeply plowing fields once every three years. The depth of plowing should be at least 14 inches (one chih), and two chih in more productive fields.[38] Plowing could be done in stages where difficulties existed. Explosives were used in many areas to accomplish this. By the end of 1958 it was estimated nearly half the total area of cultivated land had been deeply plowed. This purportedly improved the soil, strengthened plant root systems, and prevented weeds, diseases, and pests. Experiments showed similar results, although doubts have been raised as to the effectiveness of deep plowing in certain areas.

6. Diversifying Agriculture

The value of agricultural output in 1978 was distributed as follows:[39]

Crops	67.8%
Forestry	3.0%
Animal Husbandry	13.2%
Sideline Occupation*	14.6%
Fishery	1.4%

* includes small industries run by brigades, but not communes.

The post-Mao leadership has noted that grain crops were overemphasized in earlier years. Present agricultural policy is recommending shifts out of grain crops to other agricultural pursuits by allowing local units to make production decisions. Becoming self-sufficient is still a major goal for grain production, as borne out by the raises in grain procurement prices, but agriculture is becoming more diversified. These changes away from grain crops have dampened output somewhat, but have not resulted in a major grain deficit.

B. Factors Affecting The Cultivated Land Area

China's land uses are first discussed, followed by efforts at land reclamation through state farms, and the vital needs of soil conservation.

1. Cultivated Land Area

Table 2-1 illustrates the distribution of land use in China, as estimated by Kuo. Topographically, 14% of China's land is below 500 meters in elevation, and is mostly suitable for farming. Eighteen per cent of the land lies between 500 and 1000 meters, and is mostly hilly,

TABLE 2-1

Land Use in China

Land Use	%
Arable Land	15.3
Cultivated	11.5
Uncultivated	3.8
Forest Area	7.9
Land Suitable for Afforestation	31.2
Grassland	27.8
Other (deserts, etc.)	17.8
Total	100.0

SOURCE: Leslie T.C. Kuo, The Technical Transformation of Agriculture in Communist China, p. 34.

although agriculture can be operated by terracing and other methods of water and soil conservation. Areas between 1000 and 2000 meters constitute 35% of the land area, and are more profitable for animal husbandry than for farming. The remaining 33% of the land lies above 2000 meters with little chance for agricultural use.[40] The maximum area for farming would be about one third of the land area, that lying under 1000 meters. Much of this land, however, has inadequate rainfall and poor soils.

Official data indicate that cultivated land area grew slowly from 10.2% of total land area in 1949 to a maximum of 11.6% of land area in 1957.[41] This dropped in 1958 due to combined factors of land used for water storage, the expansion of non-agricultural land use, and a greater emphasis on maximizing yields as opposed to cultivated acreage. The cultivated land area appears to have declined further

since then. A two million hectare reduction in grain (sown) acreage was noted from 1978 to 1979, although grain output rose substantially.[42]

As population grows it has been necessary to use some arable lands for housing, government, industry, highways, and airports. Cremation and cemetaries have replaced family burial plots which formerly occupied spaces in farmer's fields. Some waste did occur in the requisitioning of farmland for industry and government in the late 1950's. Many areas reclaimed for crop cultivation have been turned again into pasturelands for reasons of soil conservation.

2. Land Reclamation

Land reclamation was a major agricultural policy in the first decade of the people's government. Unfortunately much of this land was unproductive for agriculture, and its cultivation only worsened soil erosion problems. More permanent solutions for transforming wasteland are now being applied, but most of this work remains long and arduous. The emphasis has changed to using pasture land for animal husbandry and forestry rather than trying to cultivate it. The improvement of existing land is being stressed instead.

A 1957 survey indicated that about one third of China's wasteland could be reclaimed 'at a comparatively low cost'.[43] This land is referred to as arable but uncultivated. Major portions of this land lie in Manchuria, areas of the northwest, Tibet, the Yellow River area, and subtropical areas of the southeast. Much work has gone into reclaiming desert land in Inner Mongolia and preventing the further spread of these deserts. Reclamation in the north western province of Sinkiang has been done by military units. Communes in local areas have

brought more land under cultivation by terracing, straightening river courses, filling in dry river beds, and various other methods. Land reclamation has been encouraged under collective ownership by reducing or eliminating state taxes on the harvests of newly opened lands.

State farms have been the major instrument for reclaiming wasteland. They are heavily concentrated in Manchuria, the Northwest, and in South China where virgin land exists. Originally established by local, regional, and central governments, and by the military, all state farms in 1956 were placed under a separate ministry for land reclamation and have received substantial government subsidies. After 1960 many of these farms were transferred to local jurisdiction in accordance with decentralization policies. Their expansion has been restricted as they have proved very costly.

State farms have never played an important role in China's agricultural production. In 1964, they occupied only 4% of the country's total cultivated area, with an even smaller share of agricultural output.[44] While being a higher form of socialist organization than collective agriculture, state farms did not replace collectives even in the height of the 1958 commune movement. Besides being unprofitable, state farms hire workers and are therefore not as effective as communes in achieving total employment of labor. While running at a loss from 1966 to 1978, state farms began to show a profit in 1979.[45] They are now being run as state enterprises in closer accord with the laws of econo

3. Soil Conservation and Afforestation

Land productivity has been maintained in China by terracing, fallowing, applying manure, crop rotation, and other methods. Extensive areas, however, have been damaged by improper drainage, irrigation, fertilization, and poor management. In 1958 over one third of the cultivated land in China had low production by being saline, alkaline, acidic, sandy, swampy, or erosive. In 1962 saline and alkaline land were about 10% of the cultivated land in North China, and accounted for about 20% of the irrigated land.[46] From hard experience northern farmers have since learned to lead flood waters to wash away salt, drain land to grow rice, build embankments to stabilize planting, and store fresh water to suppress salt. Soil acidity has been reduced by applying manure and lime.

About one quarter of China's total land area is subject to soil erosion.[47] Mountainous topography, frequent sandstorms, alternating frost and thaw, typhoons, and the stripping of hillside vegetation all play some part in soil erosion problems. The loess plateau area, enveloped by the bend of the Yellow River in north central China, was reportedly once covered with forests and pastureland. Once known as 'the cradle of the nation' it later became 'China's sorrow'. With less than 5% of the loess plateau being covered with vegetation, heavy summer rains carry away much of the topsoil, causing flooding in the lower reaches, clogging up hydro-electric projects, and intensifying irrigation problems.[48] Serious soil erosion caused by the destruction of trees has been a major cause of recent flooding in Szechuan.[49]

For centuries Chinese farmers have terraced hilly areas to prevent soil erosion. The Tazhai production brigade in the loess

plateau area became famous for its intricate system of irrigation and terracing constructed in a ravine area subject to seasonal flooding. In the late 1960's many further campaigns of terracing, construction of check dams, and the planting of trees and grass were undertaken to control soil erosion in the middle reaches of the Yellow River. However many of these attempts were sporadic and inadequate. Terrace barriers were broken as farmers carried fertilizer to the fields, creating more openings for soil erosion. A basic problem was that policy still dictated agricultural use of the land for cropping.

After careful discussion it has been decided in post-Mao years to build the loess plateau into an animal husbandry and forestry base. A massive project has been undertaken to build a 'Great Green Wall' of trees across northern China to protect the central areas from sandstorms. The Chinese have discovered that the building of shelter belts reduces wind speeds, raises humidity levels, and reduces evaporation by significant amounts.[50] It is hoped the afforestation of the northern areas can also cause climatic changes favorable to agriculture. Previous afforestation efforts in this area, however, have been difficult due to inadequate rainfall. China's forested area has slowly risen from 8% of the total land area in 1958, to 10% in 1964, to 12.7% in 1979, with a goal of reaching 20% of the total land area by the year 2000.[51] The area planted to trees between 1978 and 1980 was almost as large as that of the previous 27 years.[52]

V. FACTORS AFFECTING LABOR

While modernization is an important step for rural China, many of the capital inputs to agriculture used by Western nations only

serve to displace and convenience labor. Factors discussed in this section must be combined with previous factors to raise grain output. Mechanization policy is discussed first, followed by tractor production, farm implements, draft animals, electrification, and finally labor itself.

A. Mechanization Policy

Mechanization has been a controversial and central subject for government policy. As tractors had become a permanent part of Soviet agriculture after their collectivization movement so mechanization became the symbol of the new China. Mao emphasized collectivization for a more rapid mechanization of agriculture. Liu Shao-Chi, on the other hand, felt mechanization should be used as an enticement to first demonstrate the benefits of forming collectives. Both, however, equated mechanization with agricultural progress. In the mid-1950's a state economic planner named Po I-Po used survey results to show mechanization primarily served to displace labor, without raising yields per unit of land. This brought about a shift in priorities to inputs more directly affecting yields as already discussed. Improving farm implements became a transitional step towards achieving mechanization.

With labor shortages occurring during the Great Leap Forward Mao urged a ten year program to accelerate agricultural mechanization which was adopted in 1959. Farm machinery bureaus were established at the county level throughout the country. With moderate policies in the post-Leap years mechanization was assigned a lower priority, and less investment funding. Whereas tractors had been assigned from tractor stations to the communes in 1958, they were transferred back to the

stations again after 1960. Semi-mechanization was stressed. Mechanized pumps, using less steel and energy than tractors, were popularized for irrigation. Small walking tractors and rice transplanters also had a rapid growth in production about 1964-65.

Mechanization regained priority in agricultural policy during the Cultural Revolution. Tractor controls was transferred back to the communes, while walking tractors became the focus of the mechanization program. Between 1965 and 1976 annual tractor production increased by five to six times.[53] The tractor plowed area, however, was less than doubled between 1965 and 1973.[54] Walking tractors were convenient for their speed in aid to multicropping, whereas their use had previously been discouraged for having a shorter cultivation depth than the improved paddy plow.

Post-Mao leadership has also accorded mechanization a high priority. An earlier goal of 'basic mechanization' by 1980 was reaffirmed. This called for a 70% mechanization of the 'main work' in agriculture, forestry, animal husbandry, sideline production, and fisheries, although main work was not defined. By 1985 all major farm processes are to be 85% mechanized. Between 1977 and 1980 the output of large and medium sized tractors was to increase by 70%, larger tractor drawn farm tools were to increase by 110%, walking tractors by 32% and the power capacity for irrigation and drainage machinery was to grow by 36%.[55] More machinery is to be employed in rural construction, crop protection, transport, harvesting, and the processing of farm and sideline products, with specific needs met for specific areas.

B. Tractor Production and Maintenance

Many early tractors were imported from the Soviet Union, while with Soviet assistance the first Chinese tractor factory was completed in 1958, and went into full operation in 1959. Smaller plants were started in 1958, and placed under local jurisdiction. The tractors in use steadily increased throughout the years, although production slowed in the early 1960's.

The seven horse-power, walking tractor was found most suitable to Chinese farms. This two-wheeled, single-axle tractor is compact, and easily manoeuverable on small land segments. It is cheaper and complements the role of larger tractors, is easier to produce in local factories, durable, a[illegible]mple to maintain and operate. The two wheeled tractors are used for plowing, cultivating, pulling other machinery, and, with an attached trailer, are popular for transporting goods and people. Their tractive power, however, is not sufficient for heavy work, nor for use in very dry conditions.

Tractors in China have been owned by state farms, by tractor stations, and by collectives and research institutions. State farms were the most important users of tractors in the early years, but declined later as land reclamation was de-emphasized. Tractor stations in China were patterned after those already existing in the Soviet Union. The number of such stations grew mostly in 1956-57, and later in the mid-sixties. They were later called agricultural machine stations, as their functions widened with the growth in agricultural machinery. The stations owned no land of their own, but operated either by renting services to the collectives, or by direct sales of machinery. The machine stations have teams assigned to each commune, and thus are

indirectly supervised by the communes.

In the U.S.S.R. tractor machine stations were abolished in 1957 in favor of collective ownership. This was not feasible for the Chinese, however, as tractors were in limited supply and many communes could not purchase all that they needed. The technical personnel to operate and repair tractors are also limited. The emphasis on self reliance without regard to standardization has created a proliferation of tractor models and designs which complicates repair and maintenance. Spare parts cannot be substituted between models, while the quality of local production is often poor. The adoption of two-wheeled tractors has made it easier for communes to purchase and repair them, and thus switch to collective ownership.

While China emphasizes the collective purchase of machines, new programs have called for key agricultural bases to be set up. These bases are to use advanced machinery and equipment, and introduce scientific methods of production and management. They are to gradually expand into larger enterprises combining farming, industry, and commerce. Special companies are to be set up to supply farm machinery and chemicals, maintenance, hiring service, and dissemination of technical know-how under a unified management.

C. Farm Implements

The improvement of farm tools in China has been less disputed than has full mechanization. The first Five Year Plan (1953-57) dealt more with implements than with machines. While initial concern was to replace tools lost during the war, many innovations of farm implements were developed for plowing, tilling, raking, pressing, sowing, harvesting, and threshing. Experimental stations were established to

demonstrate and popularize the new and improved tools, mostly in the northern areas. Foreign tools thought appropriate to China were introduced, while emphasis was later given to the production of larger tractor-drawn implements.

Semi-mechanized tools, using ball bearings in all turning joints, were introduced after 1958. The variety and quantity of improved implements increased rapidly in the early sixties. The Chinese claim that improved implements have had a direct effect of raising unit yields as well as easing tedious labor. As the transplanting of rice is the most labor-consuming operation in Chinese agriculture, various transplanters were developed with manual versions being widely adopted in the early 1960's.

The Chinese have had difficulties to overcome in the use of implements as well. An unfortunate lack of planning introduced two-wheeled share plows from Russia which were too heavy for one ox or buffalo, could not be used on paddy land or hilly slopes, and were too wide for the narrow passages between fields. The mass production of the share plows led to unused stockpiles as farmers could not afford, and refused to use them. The commune movement also brought the loss of many tools as farmers neglected them in the fields where they were ruined by the elements. Larger tools owned in common were placed in storage sheds under the care of specially appointed commune members.

A final problem for the production and maintenance of both tools and machines has been the acute shortage of steel in China. Agriculture must compete for steel with industry, defense, and transportation, all of which have ambitious targets for modernization. While China's steel industry can be expanded in the longer run with imported equipment for new complexes this is also limited by foreign exchange constraints.

The lack of steel, and skilled technicians and operators continues to be a hindrance to China's agricultural mechanization.

D. Draft Animals

Many medium sized farm implements still require draft animals as a source of power, while tractors cannot be used on many soils during wet weather. Draft animals are used principally for irrigation, for turning primitive village mills, and for local transport.

Animal numbers increased in post-war China until the formation of the collectives in 1955. Besides peasant slaughter, longer term causes of death have been overwork, excessive heat or cold, and diseases. Draft animals have been fed primarily on roughage, with only limited amounts of concentrates. A shortage of fodder has hindered the growth of animal numbers, while communal care of animals did not prove as effective as private ownership.

In 1960 orders were issued for the strengthening and proper care of draft animals. Provision was to be made for the production of sufficient grass and fodder for feeding, while improvements in breeding and management of animals was urged. Premiums have on occasion been paid for well done work in animal care. Students have been trained as 'barefoot' (local) veterinarians, to provide each collective with trained personnel. The shortage of veterinarians was extremely acute during the 1960's and the late 1950's. Both modern and native veterinary methods have been improved. Native prescriptions, herbs, and methods of diagnosis and treatment have been studied. Treatment for sick animals is often left to native methods, while modern methods are used for diagnosis.

E. Electrification

The use of electricity for power began with the Communist regime. Early hydroelectric projects concentrated on power for industry while rural electrification did not become a major concern of Chinese planners until 1958. Rural hydroelectric stations mushroomed during the Great Leap Forward. However, with the failure of many water projects, the total capacity of electric power actually installed was far short of that planned. Rural generating stations had a high production cost in relation to electricity generated by the national networks. Electric power is used primarily for the processing of agricultural products (rice husking, flour grinding), for the preparation of fertilizers and animal feeds, for water pumps, and for illumination. Electric plows have also been experimented with.

F. Labor and Field Management

China has one of the highest rural populations per unit of arable land in the world.[56] However, the marginal product of labor is not yet zero. A scarcity of labor still exists in peak periods of multicropping schedules, while hand weeding will not soon be replaced by chemicals or machines. The communes are turning more to machinery to aid in labor intensive tasks. Water wheels, turned by men and animals for irrigation, are being replaced by power driven pumps. The commune system ensures that workers do not go unemployed although the productivity of their labor may not be great. Incentives to work have been a major problem, but recent policy changes are encouraging to the farmers.

A major challenge and concern for the government has been

modernizing rural farm techniques. Changes in traditional attitudes and techniques have been brought about by permanently installing in the countryside a vast network of semimodern industries. Urban youths, relocated in the countrysides, were also counted on to stimulate rural modernization, although many of these are now filtering back to the cities. While the tools and machines produced by the collectives are lacking in both quality and quantity, what exists is used in a labor-intensive way. Labor is used heavily in conjunction with existing capital inputs, while the use of labor alone is being reduced.

Field management is to co-ordinate all the steps of farming (irrigation, drainage, weeding, and timely application of fertilizer) in proper relation to the weather, soil, and growth of the crop. While the capabilities of the farmers were stifled somewhat under the communal leadership, much greater freedom is being given now for individual decision making in farming. Science is being used in conjunction with successful methods of the past. The timing of fertilizer and water application is carefully tested to make maximum use of limited resources. In the words of the Chinese, 'We grow our crops as carefully as one does embroidery'.

VI. SUMMARY OF PRODUCTION FACTORS

China has been able to control floods and provide irrigation water through the building of large and small dams for water storage, the drilling of tube wells in the north, the improvement of irrigation and drainage facilities in high production areas of the south, and the redirection of Yangtze river water to northern coastal areas along the Grand Canal. While organic fertilizers are the major source of

nutrients for agriculture, the use of chemical fertilizers has grown rapidly. High and stable yield areas have successfully combined irrigation improvements, chemical fertilizers, high yielding grain varieties, insecticides, and higher levels of multicropping to raise China's grain output. The domestic production of fertilizers has been boosted by imports of large fertilizer plants from Europe and Japan. Crop protection is based on cultural practises while farmers are learning to use pesticides and insect predators to combat pests and diseases. While China has introduced some new grain varieties, agricultural research is weak due to political disruptions.

Multicropping has increased steadily, but is not emphasized as much since the costs of additional crops are high in comparison to other productive pursuits for the farmers. Rice, corn, and potatoes have been substituted for other grain crops to achieve higher yields. Complementary crops are grown in the same fields, which complicates the use of machinery and fertilizers. Policy now is favoring a shift away from grain crops to other forms of agriculture. Sideline occupations are encouraged. The emphasis on maximizing the cropping area has changed to the use of marginal lands for animal husbandry and forestry. A massive shelter belt of trees is being planted across north China in an attempt to transform the loess plateau area, prevent soil erosion, and alter climatic conditions.

Mechanization policy has adjusted to China's agricultural needs through the adoption of two wheeled tractors, rice transplanters, irrigation pumps, and the improvement of implements. Repair and maintenance of machinery is complicated by the lack of standardization in machinery models, while steel and energy are in short supply. Labor

and animal power are still used to a large extent in farming while modern farming methods are gradually being introduced.

NOTES TO CHAPTER TWO

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[2] "Food Grain for China's Millions," China Reconstructs 29 (April 1980):4.

[3] Anthony M. Tang, "Food and Agriculture in China," in Food Production in the People's Republic of China by Anthony M. Tang and Bruce Stone, International Food Policy Research Institute (hereafter footnoted IFPRI), p. 25.

[4] Perkins, Agricultural Development, p. 13?

[5] Jan S. Prybyla, The Chinese Economy: Problems and Policies, p. 30.

[6] See Leslie T.C. Kuo, The Technical Transformation of Agriculture in Communist China, pp. 72-79 for further detail on China's specific flood control measures.

[7] See Kang Chao, Agricultural Production in Communist China 1949-1965, Chapter 5, pp. 120-38 for a deeper discussion of these disasters.

[8] James E. Nickum, "The Organization of Water Resource Development in the People's Republic of China," Agricultural Administration 6 (July 1979):170.

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[10] Nickum, "Water Resource Development," p. 170.

[11] Anthony M. Tang, "Food and Agriculture," pp. 29 and 47.

[12] Ibid., p. 47.

[13] "Expanding Sources of Fertilizer and Using It Rationally," China Reconstructs 26 (June 1977):19.

[14] Ibid., p. 19.

[15] Tang, "Food and Agriculture," p. 29.

[16] Alva Lewis Erisman, "China: Agriculture in the 1970's," in China: A Reassessment of the Economy, J.E.C. papers, pp. 33-34. Multiply by five to obtain fertilizer imports in standard tonnage.

[17] Prybyla, The Chinese Economy, p. 37.

[18] Leslie T.C. Kuo, The Technical Transformation, p. 171.

[19] Leslie T.C. Kuo, The Technical Transformation, p. 173.

[20] Ibid., p. 180.

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[22] "How Hybrid Rice Was Developed in China," China Reconstructs 29 (May 1980):41.

[23] Kuo, The Technical Transformation, p. 134, quoting official figures.

[24] John Lossing Buck, Land Utilization in China, p. 274.

[25] Tang, "Food and Agriculture," p. 51.

[26] Groen and Kilpatrick, "Chinese Agricultural Production," p. 627.

[27] Kuo, The Technical Transformation, p. 135.

[28] Frank Leeming, "Triple Cropping in China," Asian Survey 19 (May 1979):464.

[29] Ibid., p. 465.

[30] Kuo, The Technical Transformation, p. 136.

[31] Ibid., p. 136.

[32] Kang Chao, Agricultural Production, p. 170.

[33] Ibid., p. 171.

[34] Erisman, "China in the 1970's," p. 339.

[35] "Rational Close Planting," China Reconstructs 27 (February 1978):29.

[36] Kuo, The Technical Transformation, pp. 162-67.

[37] "Rational Close Planting," China Reconstructs, p. 28.

[38] Kuo, The Technical Transformation, pp. 137-38.

[39] "Inquiry into Guidelines for Agriculture," Beijing Review 28 January 1980, p. 20.

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[41] Ibid., p. 37, quoting official figures.

[42] "Restructuring the Agricultural Economy," Beijing Review 23 (June 1980):4.

[43] Kuo, The Technical Transformation, p. 38.

[44] Chao, Agricultural Production, p. 71.

[45] "Bright Prospects for State Farms," Beijing Review 21 April 1980, p. 4.

[46] Kuo, The Technical Transformation, pp. 119 and 124.

[47] Ibid., p. 125.

[48] Ibid., p. 127, 1963 figure.

[49] "Flood Again in Sichuan," Beijing Review 7 September 1981, p. 7.

[50] "Afforestation on the Plains," Beijing Review 3 November 1980, p. 5.

[51] Kuo, The Technical Transformation, pp. 127 and 129. And M.B. Dickerman et al, "Forestry Today in China," Journal of Forestry 79 (February 1981):64.

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[54] "How China Solved Her Food Problem," China Reconstructs 24 (January 1975) p. 6.

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CHAPTER THREE

GRAIN MARKETING IN CHINA

I. INTRODUCTION

Whereas Chapter Two discusses the factors involved in producing China's grain, marketing involves the processes, institutions, and pricing policies for the grain after it has been produced to the time of its eventual consumption. An overview of marketing procedures and policies is first given for pre-war China. Grain marketing policy and structure are then discussed for post-war China. Grain reserves, transportation, and the banking system are all included due to their vital role in gaining an overall picture of China's domestic and foreign trade in grains.

II. MARKETING IN PRE-WAR CHINA

A. Policy

Marketing did not play a major role in China's traditional agriculture. Rural families and villages were largely self-sufficient and remain so to a large extent today. Chinese farmers have had little surplus produce and therefore limited purchasing power. While payments of rent and taxes in kind created a flow of grain towards the cities, the services received in return were not consumable items. Money does not appear to have become the principal means of exchange in rural China until sometime in the late nineteenth and early twentieth centuries.

Moreover traders were placed at the lowest end of the Confucian social order. A Chinese proverb says, "shi, nong, gong, shang", meaning officials, farmers, workers, buyers and sellers. The elite classes were the government officials and landowners. Farming was respectable and honest, but those involved in commerce were viewed as cheating and exploiting the poorer classes.

China's distrust for traders is evidenced by her reaction to the commercial initiatives of Western nations. Only by force were the treaty ports opened. The Communist emphasis on self-reliance is a carryover of China's proud past, combined with the social distaste for commerce. As China's farmers gradually became receptive to market forces in the past century, so modern China is learning the gains to be made from international trade today.

B. Structure

Transportation has been the greatest impediment to trade within China. In the 1930's transportation averaged 85% and taxes 12% of the marketing cost to distant destinations.[1] Farmers grew grain due to the high freight expense of buying it elsewhere. This led to inefficiencies of land use in remote areas.

Many losses occurred through improper storage and handling of goods. Storage facilities and roads for grain carts were lacking. Grading standards were non-existent for most products, although export commodities such as tung oil, silk, hog bristles, and tea were tested and graded by government bureaus. Dishonest weights and measures and the adulteration of products by middlemen were common.

Local or rural markets, held on certain designated days, existed

for produce trade among villagers. Town markets existed for trade between villagers and sellers of consumer items, and a larger network existed for collecting rice in major cities of the producing areas for shipment to coastal urban centers. In general rice was moved from producing areas to rice collection centers by junk and from collection markets to urban consumer markets by steamship or railroad. The difficulty and expense of obtaining grain from inland areas led traders in coastal cities to import rice and wheat from abroad.

III. POST-WAR MARKETING POLICY

In a free enterprise system prices change to equate the demand for goods and services with the existing supply. Workers receive wages according to their productivity which will bring an unequal distribution of wealth due to the differing abilities and desires of individuals. The communist system, in seeking an equal distribution of goods and services, faces the awkward decision of how to provide incentives to work. Unable to motivate the people except through economic incentives, the Chinese government has decided to sacrifice strict equality in wealth to achieve a greater goal of socialist prosperity. Marketing policy in China follows the early use of price incentives, through the attempts at strict central planning, to current procedures of grain procurement.

A. Pricing and Taxation in the Early Years

In pre-war years, Chinese farmers were heavily oriented to the market and the prices paid for their produce. While increasing grain production was a major priority for the early Communist regime,

agricultural products for industry and export, such as cotton, silk, tea, and tobacco, had suffered the greatest damage during the war and therefore rated top priority for the development of industry. Without an established state commercial network, the free market was used to bring about this recovery. Purchase prices for cotton were set favorably in terms of grain throughout the country. By signing advance purchase contracts, farmers could receive a partial payment in the spring for their fall crops which they agreed to sell to the government purchasing agency. Purchase pricing methods were successful in raising output for key items, but were abandoned when production returned to acceptable levels. The government did not want to favor industrial and export crops too long for fear of endangering the more important grain production.

Grain pricing and taxation have been closely connected in post-war China. Agriculture was the earliest source of government revenue for many reasons. Grain taxes had been the traditional source of revenue, and, with disorder and rampant inflation in 1949, it was also the easiest source of income. Government power was centered in the rural areas, and grain was needed to feed the army and urban workers. So, without an established monetary system, the agricultural tax, paid in kind, was reintroduced. Fixed in quantity after 1953, the tax continues to be paid in kind today.

While most important for a few years, the agricultural tax was not the only source of rural revenue for the government. From 1952 on, the sale of industrial products to the farmers, including profits of state enterprises, became a greater source of funds than the grain tax. By 1953 the income from industrial sales to agriculture was over three

times that of the basic grain tax.[2]

With grain prices being set low in relation to other crops the government soon found great difficulty in obtaining adequate amounts of marketed produce. Grain exports were needed to pay for industrial imports. The growing urban population and a poor harvest in 1953 brought a crisis in securing grain supplies. State grain sales were far ahead of grain purchases, so, with few options, compulsory grain delivery quotas were introduced.

Grain quotas were similar to the agricultural tax except quota grain was compensated for. The agricultural tax was based on the 'normal' yield of the land in an ordinary year, and was payable in the predominant crop of the area. The amount of the tax was fixed for three years to minimize resistance by farmers. Quotas were also based on the normal yield. Any surplus households had above the normal yield and after meeting consumption and planting needs was taxable. The quota was fixed for three years at eighty to ninety per cent of this surplus quantity in the 1955 harvest year.[3] A farmer was free to sell any additional grain beyond the quota to the government, on a state market, or privately to villagers, but few farmers had any surplus beyond the quota.

Compulsory quotas for other products soon followed the grain quotas, putting an end to free market, purchase-price policy. The price paid for quota grain was undoubtedly lower than that which would have held under a free market system. Grain prices ceased to play a direct role in marketing, but were not set abnormally low. A higher price would have increased rural income, and the demand for consumer items which were in short supply, while a lower price would dangerously

discouraged grain production. Grain was in high demand, reversing the earlier crop priorities, but without material incentives for raising production.

B. Collective Agriculture and the Return to Market Forces

National agricultural plans have been formed since the beginning of the present regime. In the early years the government could only rely on price policy and land reform to achieve its goals, but collective agriculture enabled the use of more direct measures. It was written into basic cooperative regulations that each unit should draw up a plan of production, sown area, sales, manpower, and so forth, to accord with production and purchase plans of the state. Target figures could be broken down at various administrative levels to eventually reach each cooperative, which would then have a basic set of physical output and sown area targets. Price and income effects need not be considered as they were replaced by these target figures.

However, with unrealistically high goals set and plans often uncoordinated, the state targets were either ignored or applied mechanically regardless of their effects on production. The government emphasized flexibility at lower levels to adjust for local situations and needs, but in 1958 decided instead to abandon direct planning and substitute purchase quotas as the main method of control. The reintroduction of price policy was complicated by the discovery that collective agriculture was not receptive to price changes. Many crops in 1957 had their prices raised to encourage production, but actually suffered a drop in output.[4] As cadres were motivated more by physical output targets and crash programs, and not so much by price and income

considerations, the success of using price policy to raise output meant that decision making had to be centered in smaller units, the teams, where farmers carried more influence.

Subsidiary operations, such as hog and poultry raising, and vegetable crops, had suffered the most during the collective movement. The abolition of rural markets during the establishment of the communes caused extensive disruptions to local trading. The inefficiency of agricultural decisions being made at the commune level was obscured by inaccurate reporting. All backward moves met with resistance and criticism, and so proceeded slowly. The free market was reintroduced through trade fairs in 1959, private plots were again allowed in 1960, while ownership and resource control were returned to the team level after 1961. The rural markets were tolerated in the early 1960's, criticized during the Cultural Revolution, and eventually manipulated in the 1970's.

C. Present Grain Procurement and Policy

Twenty to twenty three per cent of the Chinese grain harvest was marketed in the mid-1970's compared to 28% in 1953-57.[5] The current portion is almost identical to the percentage of population in the urban areas. Table 3-1 gives an example of state grain procurement and prices for Fugang Xian (County) in Guangdong (Canton). Four types of grain procurement are indicated, progressively differing in the degree of willingness with which the units sell to the state. The agricultural tax and the 'fixed quota' purchase are described as compulsory. The grain tax is fixed in absolute terms, and has declined from about 12% of output in 1952 to about 5% in 1974.[6] The fixed quota purchase is set in level during and for the duration of the five year plans.

Above quota purchases were introduced in 1957 and are set

TABLE 3-1

Grain Procurement in
Fugang Xian, Guangdong Province (1978)

	Grain Quantity (10,000 jin)	Purchase Price (Yuan per jin)
Agricultural Tax	1,054	n/a
Fixed Quota Purchase	2,825	.098
Above Quota Purchase	112	.136
Discussion Purchase	14	.196
Total State Purchase	4,005	n/a
Total Grain Output	19,410	n/a

SOURCE: Neville Maxwell and Peter Nolan, "Reports from China: The Procurement of Grain," The China Quarterly 82 (June 1980):306.

annually in light of each unit's planting plan and state needs. Units are required to deliver the designated portion of their output, but are not penalized for failure to do so. Once farmers have met these first three obligations then they are eligible to make a 'discussion' purchase with the state. The discussion purchases were introduced in 1972-73 to induce farmers to sell more grain to the state than they would otherwise be willing to give up at the less than market prices. Farmers are also free to sell this surplus grain in the village markets, where prices are closely monitored by the state for negotiating discussion prices.

Production units are only required to sell above quota grain when their per capita supplies have reached designated levels. If supplies are extremely low, the units are exempted from fixed quota deliveries as well, while the required grain is sold back to the collectives at the same fixed purchase price.[7] Loans or grants are extended to very poor

areas to cover grain costs.

From 1957 to the early 1970's above quota purchases received the same state prices as fixed quota purchases.[8] In 1972-73 the above quota purchase price was set 20 to 30% above the fixed quota grain price, and was raised to a 50% premium in 1979.[9] The procurement prices for rice and wheat rose by 19.5% and 78.1% respectively between 1956 and 1972.[10] The fixed quota purchase price is reported in 1978 to be twice the grain price of 1949, with a further 20% increase to occur in 1979.[11] In 1965-75 the average wheat import price was about two-thirds of the voluntary procurement price and 80% of the average procurement price.[12] The grain imports have allowed the government to stabilize and reduce state grain purchases as an incentive to farmers.[13]

Further policy changes are also providing farmers with greater work incentives. Those who are successful in sideline pursuits are now commended for their industry rather than being branded as capitalists. A responsibility system has begun to contract production with individual households by granting them stewardship over field plots. Draft animals and larger implements remain collective property, and planning is still done by team leaders, but households keep money or produce remaining after the contract is fulfilled. The 'new' system is helping to raise China's agricultural production.

IV. THE STRUCTURE FOR INTERNAL TRADE AND CONSUMPTION

Trade and commerce have been unpopular terms in communist ideology. Monetary exchanges were seen as leading to corruption and the unequal division of wealth. For a time it was debated whether any monetary transactions at all should be allowed. Barter arrangements,

however, have proved impractical. Rather than trade in a Western sense, the distribution of goods in a communist society is 'planned' at various levels of government. Such planning should theoretically balance the available supply of goods with what are needed and desired by the people. While China has been able to plan the distribution of goods in short supply, waste has also occurred through unwanted stockpiles when consumer preferences have been neglected. The organizations for distribution and procurement of goods in general are first discussed, while planned purchase and supply of agricultural commodities are examined in more detail.

A. Organization For Domestic Trade

China has continued to use planning to allocate priority goods such as energy, key raw materials, capital goods, important export items, goods transferred between provinces, staple good products, and cotton. Markets and prices, however, have been allowed to allocate other goods which do not rate as high a priority. Most market activity is evidenced through the rural trade fairs which meet about once every five days. Collective commerce occurs through stores and procurement stations run by the supply and marketing cooperatives located either in rural production brigades or commune towns. Urban trade is dominated by state-owned commercial enterprises.

The private ownership of domestic commerce in 1950 was changed to a socialist ownership by ~~1957~~. Direct takeover, discriminatory and confiscatory taxation, control of essential inputs, output price restrictions, credit controls, audits, and various threats and political pressure were among the means used to accomplish this transition.

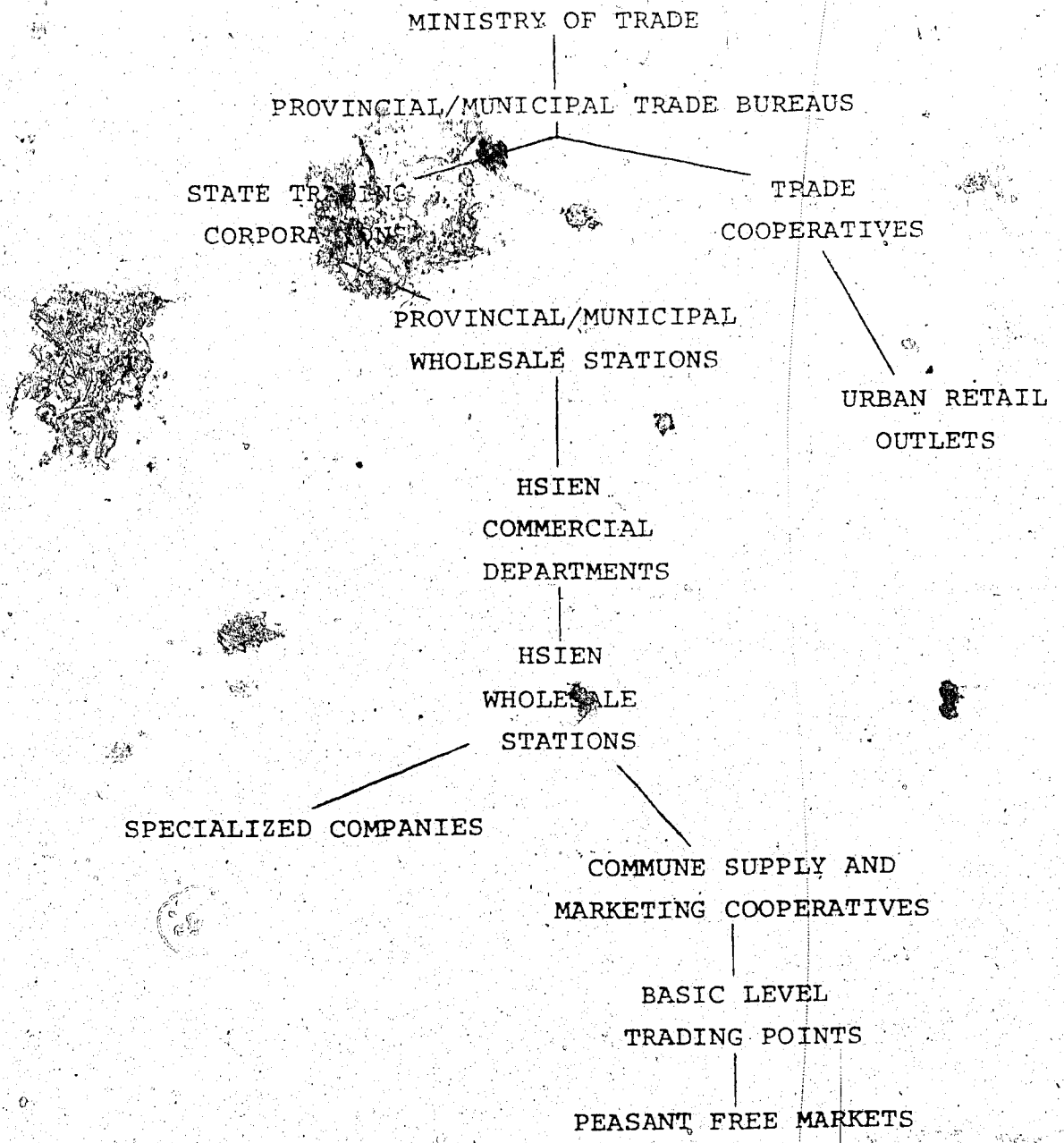
Wholesale trade was socialized first with retail trade following. State-capitalist commerce used the private partner in the business for technical expertise until cadres could be trained. The capitalist partners were then relegated to labor work.

State enterprises are distinct from collective operations in that they are owned by the state (ie. all the people). They are directly subject to state planning, managers are appointed by the government, and their output is state property, distributed at officially set prices. Profits of the enterprises are thus returned to the state treasury. Collectives or cooperatives are owned by the people making up that group. Workers in collective undertakings receive a share of the residual income after expenses and taxes have been deducted.

Supply and marketing cooperatives basically exist in the rural areas, with 90% of the 1954 membership being peasants.[14] Their development was initially encouraged by preferential treatment in taxation, loans, and transport of goods. These cooperatives sell consumer goods, supplies, and equipment to the farmers. They also represent the state in purchasing many agricultural commodities from the farmers. Much of the processing of agricultural produce is also handled by the supply and marketing cooperatives. These cooperatives are distinct from the producer cooperatives (teams and brigades), and coexist with handicraft and credit cooperatives. The commune movement in 1958 set out to amalgamate all these cooperatives into various departments of the commune itself. Although nominally a collective body, the supply and marketing cooperatives have close state supervision and are basically state organs, despite on occasion having strained relations with the higher state commercial organs.

FIGURE 3-1

ORGANIZATION OF DOMESTIC TRADE



SOURCE: Jan S. Prybyla, The Chinese Economy: Problems and Policies, (Columbia: The University of South Carolina Press, 1978), p.172.

Figure 3-1 is an organizational chart for domestic commerce today. The Ministry of Trade is responsible for all domestic trade, coordinating this trade with other government ministries in conjunction with the national plan. Once the plan has been prepared, the operational details become the responsibility of provincial, municipal, and lower level trade bodies. The spirit of decentralization, as set out during the commune movement, gives these lower level bodies some degree of flexibility in carrying out the plan. Commodity circulation is now looked upon as a proper activity, to be promoted with certain safeguards. A large number of lower level retail outlets and purchase points in both urban and rural areas reduces crowding in stores and helps state traders determine consumer preferences.

In 1950 the Ministry of Trade established specialized and separate corporations for internal and external trade in major items. Grain, cotton, general goods, salt, coal and building materials, and native products were the original six corporations for internal trade. Regional corporations for these commodities were set up under the jurisdiction of the national corporation. For grain, general goods, and native products separate corporations were formed in each province under the supervision of the regional body and the provincial department of commerce. The regional and provincial departments of trade, besides coordinating the operations of the commodity corporations in their respective areas, also fix prices at the smaller centres and control private trade. The formation of the supply and marketing cooperatives extended state control of commerce to the local levels.

B. Planned Purchase and Supply

In 1953 the state commercial organs gained a monopoly in the dealing of many important commodities through the introduction of 'planned purchase and planned supply' and 'unified purchase'. The commercial departments of the state together with the supply and marketing cooperatives became the sole authorized buyers of the specified commodities.

Goods under 'planned supply' were rationed to consumers. These essential commodities included grains, edible oils, raw cotton, yarn, and cloth, ie. all goods under the control of state corporations. Presently grains, edible oils, and cotton are classified as 'first category' goods.[15] Their collection and purchase is handled by a commune procurement station and the state tax office, both located at commune headquarters. Collection of the agricultural tax will involve both these offices, while only the purchasing station will be involved for quota purchases. The team is responsible for making its own contracted delivery of first category goods to the commune purchasing station, thus bypassing the supply and marketing cooperatives.

The 1953 plan for 'unified purchase' covered items significant to the national economy for consumption or for export. These 'second category' goods include poultry, pigs, eggs, fruit, and vegetables. These commodities are not rationed,[16] but are purchased from teams, brigades, or households through the supply and marketing cooperatives at the commune or brigade level. These purchases can be made directly with farmers on contract terms or through the rural markets which the commune supervises. 'Unified purchase' in 1953 meant monopoly control by the state, but now second category goods are also sold privately.

Other goods would come under a third category, not subject to central distribution, but controlled by local authorities when necessary.

C. Rationing

Dwight H. Perkins distinguishes between formal and 'de facto' rationing,[17] which would correspond somewhat to first and second category goods. Formal rationing refers to distribution by means of specially issued coupons or other devices that must be presented along with money at the time of purchase. In the rural teams a basic grain ration is guaranteed. Rationing of grain, vegetable oil, and soy sauce to urban residents continues in China today. 'De facto' rationing means that a consumer can buy all he wants of a commodity when it is available, but since it has a limited supply this will lead to queuing up and distribution by 'first come, first served'.

Rationing began with the introduction of compulsory grain purchase quotas in 1953. With grain becoming short in supply this was the easiest way for the state to handle distribution. Raising prices was politically unacceptable due to the hyperinflation experienced during the final years of Nationalist rule. Since grain demand is price inelastic,[18] raising prices would only have led to greater inequality in distribution. Rationing also ensured that producers of industrial crops such as cotton would not switch to grain instead. The introduction of communal mess halls in 1958 briefly changed the method of grain distribution, but these were soon abandoned. Rationing was particularly important during the famine years of 1960-62 when the equitable distribution of food was the only thing preventing widespread

starvation.

Perkins estimates that commodities not formally rationed made up over half of all consumer expenditures in the initial years.[19] Prices were set for some commodities with a steady supply, but a general freedom in pricing of residual items was followed to avoid queuing up. Often, however, the market would be disrupted when capitalism needed to be controlled. De facto rationing became universal for commodities at official prices during the heavy inflationary pressure of 1960-62. Black marketing became common in this period. General purpose ration coupons for buying many items were introduced at this time.

The growth of urban population has been the principal reason for rising grain demands in the cities. Chinese grain demand is probably income inelastic,[20] so rising urban incomes have not necessarily raised urban grain demand. China has limited urban populations somewhat by sending youth back to rural areas, and not issuing them grain rations if they return unlawfully. The unemployment of urban youth has been a problem, but with less rigid restrictions many are now occupied in city sideline operations. Much of the rationing has been done away with due to the more prosperous agricultural economy. Grain rations are sufficient for good health, but the tool remains in place should troubled times recur.

V. CHINA'S BANKING SYSTEM

After the question of the proper role for 'capitalistic' rural markets and market prices, the leading debate in the domestic commerce area has been over decentralization and local autonomy.[21] Each commune was encouraged to look after its own needs as best possible. The

variable sales taxes introduced in the 1950's and the state control of commerce has isolated major sectors such as agriculture, industry, and the urban market for consumer goods.[22] While more direct exchanges between regions and between economic sectors are now encouraged, domestic trade and specialization are still restricted by continued efforts of self-reliance. The greatest bottleneck to interregional trade is still the high cost of transportation.

Contrary to the 'cellular' nature of China's commercial economy,[23] China's banking system illustrates a countrywide intricacy. This section first discusses the operations of the People's Bank, followed by China's currency, agricultural loans, and the international financing performed by the Bank of China.

A. The People's Bank

Since centrally planned countries such as China have considered money to be the root of all evil, a strict control over banking is to be expected. China's monetary and financial system is summarized by saying 'the People's Bank, the sole autonomous financial institution, receives the deposits of private individuals, enterprises, people's communes, and state departments, and it grants loans to enterprises.'[24] The People's Bank has performed an integrating and unifying function in China's economy, as well as providing a system of checks on the flow of funds.

The People's Bank originated with the Communist Party, officially being formed through a merger of existing banks in 1948. The dominant banks at that time were the modern Chinese banks, some of which were owned by the Nationalist Government, and some owned by private interests.

These modern banks were confiscated and either incorporated into the People's Bank or abolished. Smaller banks became part of the Joint-State Private Bank under the control of the People's Bank, and foreign banks were virtually eliminated. An exception for the foreign banks is two British banks still operating branches in Shanghai. These branches, however, engage solely in the financing of foreign trade and exchange transactions, neither accepting savings accounts nor granting loans.

The People's Bank reports directly to the State Council, and thus is separated from the jurisdiction of the Ministry of Finance. This is an important feature because it has enabled the People's Bank to maintain a centralized control while other government ministries became decentralized during the commune movement. It holds the accounts of all state organs and public institutions. All state financial transactions must be made exclusively by bank book transfers. The collection of taxes, however, is handled by other state departments. State credit balances do not earn interest.

The bank performs a control and audit function on the state administration. Budget allocations of capital to state enterprises are entered as expenditures in the state's accounts. The bank is responsible to see that revenues and expenditures are balanced, and in accord with the state financial plan. Transactions of state enterprises are closely watched and all profits remitted to state revenue. With a full picture of the operations of every enterprise and institution in the country, the People's Bank can thus act as a universal economic supervisor, advising customers and government alike.

The People's Bank is simultaneously the central bank and the largest bank in direct contact with consumers.

B. The People's Currency

China's currency is known either as renminbi or yuan. These equivalent terms are Romanized from the Chinese words and mean 'people's currency' and 'dollar' respectively. When referring to the cost of anything this is usually quoted in yuan. When comparing China's currency with that of other nations, renminbi will often be used. For simplicity, only the yuan will be referred to in this paper.

The yuan is the sole legal tender in China, but has no exchange rate with gold. The government sets the official exchange rate with the U.S. dollar. In 1973 the Yuan was worth $.50 U.S., a significant undervaluation, but has since appreciated to a 1980 exchange value of $.67 U.S.[25]

One of the most important accomplishments of the People's Government after coming to power was to bring inflation under control. Since then Chinese monetary policy has constantly sought to match the money supply to the quantity of available goods.

Currency circulation in China is severly restricted. Only about 10% of all transactions are made in cash, with other transactions being book transfers through the People's Bank.[26] Most currency released is for payment of wages and thus is spent on consumer goods and services, and minor agricultural equipment. The circulation of the yuan has a low velocity. Consumer purchases are on a cash basis, so money must first be saved before it is spent. In general the purchasing power of the yuan has remained stable over the years. Inflationary imbalances have been handled more often by rationing, encouragement of savings, and adjustments to wages than by raising prices.

C. Loans to Agriculture

Neither individuals nor government departments can obtain bank loans. Short term credit does not exceed twelve months, and is only for the purpose of working capital for industry, commerce, and agriculture. Industry and commerce pay 5% interest on these credits, while agriculture pays 4.3% annual interest.[27] The bank also extends medium term credits for five years at the most to communes for the purchase of farm equipment, water conservation, or the acquisition of livestock. Communes must have their financial plans approved by the bank to obtain a loan. Investment occurs only under the state investment plan, through which funds will be allocated to the enterprises concerned. Since the 1960's, credit has played an increasingly important role in China's economy.

Agricultural Banks were set up in 1951, in 1955, and again in 1963 to undertake the provision of rural credit and to be responsible for state investment in agriculture. The earlier ventures failed because the functions of the bank did not distinguish it well enough from the People's Bank and the responsibilities of the Ministry of Agriculture. Trained personnel were in too short a supply for such a duplication of duties. In the early 1960's the renewed emphasis on investment in agriculture led to the third organization of the Agricultural Bank. This time it was directly responsible to the State Council, and directly staffed by trained personnel from the People's Bank and the various ministries.

Credit cooperatives are involved with extending rural credit at the grass roots level. These cooperatives existed before the Communist era, but were overshadowed by the landlord class and merchants as

credit sources. Receiving renewed emphasis after the land reform in 1950, credit cooperatives were formed all over the country and assisted in forming the agricultural producer's cooperatives. The establishment of communes in 1958 merged these cooperatives into the commune's credit department, where they acted as local offices of the People's Bank. The return to smaller accounting units in agriculture has also brought the reemergence of the local credit cooperatives, now as extended arms of the People's Bank. In giving credit to farmers the cooperatives are to first meet the needs of the peasants before making loans to production teams.

D. The Bank of China

The Bank of China is subordinate to the People's Bank, and handles China's foreign finances. The Bank of China originated as early as 1904. It was one of the Nationalist banks which became part of the People's Bank after the war. The People's Government thus took over the operations of the Bank of China in many branches throughout the world, while the Taiwan government retained banking operations in those countries not recognizing the mainland regime. Those Chinese banks owned by overseas Chinese also remained after the war, now handling funds remitted by relatives living abroad to their families still in China. The Bank of China supervises the operations of these branches, and thus the flow of overseas remittances as well.

VI. TRANSPORTATION

Transportation problems continue to restrict domestic trade providing further economic incentives to import grain. While China

has made major breakthroughs in building ocean vessels and railway systems, general transport facilities are still described as backwards.[28] Local transport is primitive with a limited use of modern vehicles. The economy is characterized, however, by diversified modes of transport, showing a balanced approach to development. Railways, the major component of China's modern transport, are discussed briefly, followed by local land transport, waterways, and ocean shipping which are more relevant to grain trade.

A. Railways For Industry

China's modern transport system has grown rapidly, as indicated by the breakdown of freight turnover in selected years recorded in Table 3-2. Railways grew most rapidly in the first decade and have carried about 80% of China's recorded freight. The government completed rail networks begun under Nationalist rule, correcting the lopsided track distribution built by foreign powers, and extending military control to remote areas. China has developed her own production of railway cars and locomotives, complementing this with imported engines. Major rail and highway bridges, which were lacking in pre-war times, have been constructed across the Yangtze and other rivers.

The railways are used primarily for the benefit of industry, but are becoming increasingly important for agriculture as the means by which farmers receive fertilizers and farm machinery. Since the early 1960's freight rates have been lower for agricultural related products than for industrial goods.[29]

TABLE 3-2

Freight Turnover by Modern Means of Transport

(Billion ton-kilometers)

Year	Railways	Motor Vehicles	Ships and Barges	Total
Pre-1949 peak	40.2	.5	12.8	53.4
1952	59.8	.8	10.5	71.1
1958	184.4	6.9	43.7	235.0
1975	460	15.5	nav.	nav.

SOURCES: Victor D. Lippit, "Development of Transportation in Communist China," The China Quarterly 27 (July-September 1966): 113, and Jan S. Prybyla, The Chinese Economy: Problems and Policies, p. 157.

B. Improvements in Local Transport for Agriculture

While village life underwent many changes in the first decade, agricultural transport appeared to stagnate. Local units were occupied in road building during the Great Leap Forward, but human labor continued to be a major means of transporting goods. The excessive amounts of labor time used in transport caused a bottleneck in rural distribution. With government attention turned to agriculture in the early 1960's, the development of short distance transport was emphasized. Roads were built by provincial governments, but mostly on local initiative. While rarely fit for motor traffic, the better roads could accommodate horses and ox carts, while handcarts could be pushed or pulled on the poorer routes.[30] Improving road surfaces encouraged the use of better vehicles. Rubber-tired wheel barrows, improved carts, and bicycles all were produced to aid in local transport.

Wu Yuan-Li points out that a 1949 estimate of the carrying

capacity of the native transport sector would place it at four times the annual volume of freight carried by the modern sector.[31] The major role of native transport, however, is overstated considering the high opportunity cost of the workers thus occupied.

Almost nonexistent in pre-war times, the use of motor vehicles has grown significantly in post-war China. In the 1950's three major highways were built to connect Tibet with its adjoining provinces. Major road work was limited to maintenance and repair in the early 1960's as carried out by the provincial and local units of government. However by 1971 the total mileage of highways open to traffic was nine times that of 1949.[32] All market towns were linked by modern transport to industrial centers by 1964, eighty per cent of the people's communes were accessible by all-weather roads in 1977, and motor traffic is to reach all communes by 1985.[33] The major roads are primarily used by domestically produced trucks for freight, while local road networks are used by traditional modes of transport for relatively short hauls. Animal, human, and motorized means of traffic reflect the dual nature of China's economy.

C. Waterways and Coastal Shipping

By table 3-2, approximately one quarter of China's freight in pre-war times was carried by ships and barges. This dropped to only 15% in 1952 and rose to 19% in 1958. However water transport was designated in 1953 to be the means of exporting surplus grain from Szechuan to the middle and lower reaches of the Yangtze.[34] In all probability, water and native transport remain the primary methods for grain movement in the Chinese interior, as water routes are most

economical for bulk cargo.

China had 24, 182 km. of waterways that were navigable by steamers in 1949, and this was increased to about 40,000 km. in 1958. The total length of navigable waterways is highly uncertain, but was reported in 1960 to be over twice that of 1949.[35] Most improvements in inland water systems appear to be concentrated in central and southern China. The Yellow and other northern rivers are still of limited use for navigation due to considerable silting and low water during winter and spring. The Grand Canal is the only major north-south connection by water, but has also been plagued by silting. Much work is being done to restore the Grand Canal both for irrigation and for transportation purposes.

Improvement of waterways has been most noticeable for the Yangtze River. Silt has been removed by dredging, shoals have been blasted, and beacon lights were installed for night navigation, so that ships can travel as far inland as Wuhan. Wuhan and other ports along the Yangtze have been completely refurbished and equipped with modern wharves, shipbuilding yards, and mechanized loading and unloading facilities. Further inland, a formerly dangerous section known as the Three Gorges has been opened to water traffic.

The development of Chinese shipping was stalled in the 1950's for various reasons. Most bilateral trade was conducted with the Soviet Union by rail, with only a limited requirement for ocean freight. In their departure the Nationalists had destroyed many of the mainland ports, taking with them what vessels China had at the time. A naval blockade was set up by Nationalist and U.S. forces over the Formosa Strait, and disrupted north-south shipping routes.[36] This forced China to charter foreign merchant ships to carry domestic goods between

north and south ports.

The sea ports remind the Chinese of the indignation suffered earlier at the hands of the foreign powers. The redirection of China's trade to the West after 1960 brought a quickened pace in the construction of port and shipping facilities. However this apparent return to capitalism was condemned in the Cultural Revolution. Both ports and railways were disrupted by assaults from Maoist supporters. In spite of this, port improvements appear to have continued throughout this period.

In 1973, Premier Chou An-Lai called for a mammoth, three-year port construction program. By mid-1976 forty deep water berths had been built in nine of China's major ports.[38] Storage, loading, and other port facilities were provided in detail. Mechanized systems for bulk grain were installed in Shanghai and other ports. Chinese experts were able to solve a silting problem in Shanghai harbour without foreign assistance. Tientsin, one of China's major ports in the north, was struck by an earthquake in 1976, but whether the facilities were badly damaged has not been revealed by the Chinese press.

China built her first ocean freighter in 1959, but was more in the habit of purchasing foreign vessels until the early 1970's. Even with these additions, PRC ships handled only a third of China's ocean transport needs in 1973, with foreign carriers chartered for the remainder.[39] The buying and chartering of foreign vessels was criticized as becoming dependent on foreign powers. This led to an upsurge in China's production of ocean vessels beginning in 1970, and centered in Shanghai and Talien. China is now exporting ocean vessels to Hong

Kong, and has signed contracts for deliveries to the U.S., Italy, West Germany, and Yugoslavia.[40]

VI. GRAIN RESERVES

Two systems of granaries existed in traditional China. As early as the Han Dynasty (206 B.C. to 220 A.D.) the government maintained state granaries (constantly normal granaries) to fix grain prices in times of surplus and to provide food in times of famine. A higher price was charged for the grain sold in poor harvest years to cover the costs of storage. As a rule the state granaries were located in the larger cities, and were beset by administration problems. Government granaries were widespread in the early nineteenth century, but were gradually discontinued after 1875.

In the sixth century A.D. a free granary system was proposed to be more effective in relieving famines. These were to be established in each village through the cooperation of the common people and the soldiers. Farmers made voluntary contributions according to the size of their crop, while a village committee handled collection, storage, and bookkeeping. Government revenues were not required for grain purchases. It is not clear whether grain contributions were entirely voluntary or whether they were compulsory and administered by government officials. Both could have occurred at different times. However as granaries came under government control they tended to be in the cities and unable to meet the needs of villagers in times of famine. Local granaries operated through voluntary cooperation were more successful in relieving famines.

This system of dual reserves has been continued in modern China. Agricultural cooperatives were urged in 1956 and 1957 to build up a

surplus of grain that, in addition to holdings by each family, would meet consumption needs for three, six, twelve, or eighteen months. The people were encouraged to store more grain in better years, but to set aside some grain even during poor harvests. Only 20 to 30% of all farm households held a reserve in 1957, but the stores of grain rose sharply in 1958.[41] After 1962 production teams were allowed to keep their own grain reserves without commune interference, but the annual set asides could not exceed 1 to 2% of the team's nonmarketed crop.[42] These rules must have altered somewhat over the years as an exemplary production team in the bumper year of 1979 was reported to have set aside 50 tons for local reserves out of a total production of 1195 tons.[43] This is approximately 5% of nonmarketed grain and would indicate an upper limit of 4% of total grain output being used for local reserves in surplus years.

State and provincial reserves have been more important. The government was determined to build up stocks for one to two years of consumption by storing ten to fifteen tons of grain each year.[44] Kang Chao calculates that state reserves were 12.7 million tons in July of 1953, reached 20.8 million tons by June of 1957, and could have surpassed 30 million tons by June of 1959.[45] All these supplies were virtually exhausted by mid-1961. The large grain imports have undoubtedly been used in part for the rebuilding of grain reserves, but the exact disposition of grain imports and the size of reserves are unknown. Wheat could be imported for consumption to allow rice, with its better keeping qualities, to be stored.[46] Zhou En-lai announced grain reserves for the mid-1970's to be 40 million metric tons, while Li Xian-nian has stated a long term target of 80 million metric tons.

Anthony M. Tang roughly estimates 1977 reserves to be 48 million metric tons, which is close to total net grain imports since 1952.[47]

VIII. SUMMARY

In pre-war times China's rural trade development was inhibited by high transportation costs, by subsistence living among farmers, and by a general distrust for traders. These features continue to be true of China's marketing system under communism.

Agriculture paid comparatively high taxes in early post-war years, mainly disguised through compulsory grain quotas with low purchase prices, and high prices for industrial inputs to farming. This imbalance has improved over the years. Recent policies of limiting quotas and raising grain procurement prices are helping to raise China's grain output.

China's commerce and banking have been strictly controlled by the socialist state. Supply and marketing cooperatives are state organs which handle rural purchasing and sales to farmers. Special state corporations have been set up as monopolies over trade in grains and other major items. Grain for state purchase is delivered by teams, under contract, to commune procurement stations, while other agricultural commodieties may be purchased from the farmers by the supply and marketing cooperatives. Grain and other vital commodities are rationed to consumers through special coupons. Rations have improved with better food production, but have also been used to control urban population growth.

The People's Bank, with a centralized control, is used to audit state enterprises and government administration. Currency has been

strictly controlled to keep inflation at negligible levels. Agricultural credit has been limited but is playing an increasingly important role for production units. The Bank of China, taken over from the previous government, handles China's international finances overseeing remittance funds from Chinese relatives living abroad.

China's transport system has steadily improved to accommodate industry and foreign trade, but has been slow in the local sector where motorized vehicles coexist with animal and human powered traffic. Grain transportation costs are still high. Improvements have been made in China's waterways which are still used to export rice from central China to the coastal cities. China's ports and shipbuilding industry have grown rapidly in the 1970's with the end of the Cultural Revolution and renewed growth of trade.

Similar to earlier periods China has operated a dual system of state and local reserves. State reserves have been a major priority for the Chinese, but the quantities involved are cloudy at best. A close connection could exist between China's storage program and grain imports. Local reserves are encouraged, but are small, variable, and in some cases nonexistent.

NOTES TO CHAPTER THREE

[1] John Lossing Buck, Land Utilization in China, p. 354.

[2] Dwight H. Perkins, Market Control and Planning in Communist China, pp. 42-43.

[3] Perkins, Market Control, p. 51.

[4] Ibid., p. 68.

[5] Ng Gek-boo, "Incentive policy in Chinese collective agriculture," Food Policy 4 (May 1979):80.

[6] Ng Gek-boo, "Incentive policy," p. 75.

[7] This would appear to contradict the implied penalty for non-fullfillment of fixed grain quotas.

[8] Neville Maxwell and Peter Nolan, "Reports from China: The Procurement of Grain," The China Quarterly 82 (June 1980):304.

[9] Ibid., p. 305, and "Food Grain for China's Millions," China Reconstructs 29 (April 1980):4.

[10] Shigeru Ishikawa, "China's food and agriculture: a turning point," Food Policy 2 (May 1977):101.

[11] "Food Grain for China's Millions," op. cit., p. 4.

[12] Ng Gek-boo, "Incentive policy," p. 81.

[13] "The Agricultural Development Program," Beijing Review 24 March 1980, p. 17.

[14] Audrey Donnithorne, China's Economic System, p. 279.

[15] The clearest explanation for the procurement of first and second category goods is in Jan S. Prybyla, The Chinese Economy, p. 48.

[16] Some of these commodities, such as pork, were rationed in 1959 to 1962.

[17] Perkins, Market Control, p. 177.

[18] Ibid., p. 183.

[19] Ibid., p. 194.

[20] Ibid., p. 183.

[21] See Gordón Bennett, China's Finance and Trade, p. 75.

[22] See Dwight H. Perkins, Market Control, pp. 9-20, and pp. 202-3.

[23] Audrey Donnithorne has coined the term 'cellular' in describing China's economy. See China's Economic System, pp. 605-19.

[24] Pierre-Henri Cassou, "The Chinese Monetary System," The China Quarterly 9 (July/September 1974):559

[25] Prybyla, The Chinese Economy, p. 138, and the International Monetary Fund, International Financial Statistics 1981: Supplement on Exchange Rates, p. 45.

[26] Prybyla, The Chinese Economy, p. 138.

[27] Ibid., p. 144.

[28] "Readjusting the National Economy: Why and How?" Beijing Review 29 June 1979, p. 16.

[29] Victor D. Lippit, "Development of Transportation in Communist China," The China Quarterly 27 (July September 1966):116.

[30] G. William Skinner, "Marketing and Social Structure in Rural China: Part III," Journal of Asian Studies 24 (1964-65):378.

[31] Wu Yuan-Li, The Spatial Economy of Communist China, p. 125.

[32] "Transportation," Peking Review 1 December 1972, p. 16.

[33] Skinner, "Marketing and Social Structure," p. 378; Jan S. Prybyla, The Chinese Economy, p. 157; and "The Agricultural Development Programme," Beijing Review 24 March 1980, p. 20.

[34] Wu Yuan-Li, The Spatial Economy, pp. 101-2.

[35] Ibid., pp. 110 and 163.

[36] Whether this blockade has been maintained by Nationalist naval forces since the withdrawl of U.S. troops from Taiwan is not known.

[37] Prybyla comments on the strategic nature of the transportation system in The Chinese Economy, p. 155.

[38] Ibid., p. 162; and "Ports of China," Peking Review 11 March 1977, pp. 14-17.

[39] "PRC Ocean Transport," Current Scene 12 (November 1974):15.

[40] "More Vessels for Export," Beijing Review 13 July 1981, p. 6.

[41] Kang Chao, Agricultural Production in Communist China, p. 247.

[42] Ho Chu-fen, "A Review of the Maoist Campaign to Store Grain in Preparation for War," Issues & Studies 6 (October 1969):54.

[43] "Food Grain for China's Millions," China Reconstructs 29 (April 1980):3.

[44] Ho Chu-fen, "Maoist Campaign," p. 53.

[45] Kang Chao, Agricultural Production, pp. 247-8. Grain reserve figures are measured in husked grain, whereas output is given in unhusked grain, with an 85 to 100 conversion ration. Ho Chu-fen estimates the 1959 grain reserves to have reached only 25 million tons. "Maoist Campaign," p. 53.

[46] Ho Chu-fen, "Maoist Campaign," p. 59.

[47] Anthony M. Tang, "Food and Agriculture in China," in Food Production in the People's Republic of China, by Anthony M. Tang and Bruce Stone, IFPRI, p. 30.

CHAPTER FOUR

GRAIN TRADE

I. INTRODUCTION

The purpose of this chapter, and of Part I, is to provide a background for understanding the context of China's grain trade. Trade is only the surface result of many underlying factors and decisions. While a fuller explanation will require a more specialized knowledge, the study of available literature provides some useful insights. Discussion begins with trade policy and patterns in the modern era, followed briefly by the foreign trade structure, and the balance of payments. Grain trade is divided into sections on wheat and coarse grain imports, supplying countries and agreements, rice exports, and the determinants of grain trade.

II. TRADE POLICY AND PATTERNS

A. Pre-1949 Beginnings

China's contact with the West in the late nineteenth and early twentieth centuries acted as a catalyst propelling China into a modernized world, and bringing the disintegration of traditional society. While European expansion and trade had reached China as early as the sixteenth century, the foreign presence in China had been largely confined to the Canton area. Foreign trade grew rapidly in the early nineteenth century, but became far more of an influence on Chinese life after the opening of the treaty ports in 1842.

This trade, however, was conducted in, rather than with, China. China regarded herself as self-sufficient and was suspicious of the European trade intentions. Although the West was eager to purchase tea, silk, and art goods, there was little that China initially desired in exchange. At the end of the nineteenth century 80% of China's exports were tea and silk, while opium and cotton manufactures were about 60% of her imports.[1]

The demeaning treatment accorded to China during these formative years stirred resentment among Chinese of all political convictions. Foreigners were in charge of customs and the post office. Import and export duties were kept low, while the revenue collected often bypassed the Chinese government.[2] China attempted to counter foreign encroachments through the Sino-Japanese war of 1894-95 and the Boxer Rebellion in 1900, but her government was weak, and traditional fighting methods were no match for the modern techniques of her oppressors. Nationalism grew after 1900 in an effort to free China from foreign domination.

Foreign priveleges were most extensive after China's defeat by Japan and before World War I. The Japanese obtained the right to set up industries in the treaty ports, and this right was extended to other nations by an earlier most-favored-nation clause. China's balance of payments sunk to all time lows as heavy repayments were required for railroad loans and for damages incurred during the Boxer Rebellion. The first World War gave a boost to China's economy. Exports grew and imports from Europe fell, improving China's trade deficit, but not reversing it due to increased imports from Asia. When China declared war with the central powers, all but Russia agreed to suspend payments of the Boxer indemnity from 1917 to 1920.

China's progress in reducing foreign influence was inhibited by the absence of a stable government. After 1927 Western nations backed China's return to control of her own affairs, but Japan did not. China regained her tariff autonomy in 1929, although high tariffs set in 1934 led to intensive smuggling. After 1930 Chinese firms began to undertake the business of import and export on their own, purchasing directly from Western producers. Up to then trade financing was controlled by the foreign banks. Foreign industrial and commercial investments were large and concentrated in the treaty ports.

China's opium imports were eliminated by 1918, while imports of cotton goods declined steadily with the rapid growth of China's own industry. The textile industry, in turn, required imports of raw cotton, while China's demand for cereals and industrial products continued to grow. China's tea exports had declined since 1890 due to foreign competition. Beginning in the 1920's, silk exports fell due to Japanese competition, the lack of proper inspection procedures, and a switch to synthetic materials by factories in the United States. Manchurian soybean exports to Europe and the U.S. became large in 1909, and grew steadily through the 1920's until the Japanese seizure of Manchuria in 1931-32. Prior to the war with Japan, China was the only important source of tung oil in the world. A variety of traditional goods including eggs and egg products, hog bristles, and feathers have played a major export role in both pre and post-war China.

Japan replaced Europe as China's supplier of manufactured goods during and after World War I, a domination broken only by the Second World War itself. Table 4-1 shows China's trade with major partners

TABLE 4-1

China's Total Trade With Principal Countries

In Selected Pre-1949 Years

	1921[a]	1926[a]	1931[a]	1936[b]	1948[c]
Germany	20.1	63.4	106.7	189.4	3.3
Great Britain	180.9	173.1	184.5	175.4	147.9
Hong Kong	384.0	218.3	370.4	124.3[d]	456.9
India	45.1	95.1	103.3	43.4	176.5
Japan	382.5	548.7	539.5	255.9	88.1
U.S.	265.3	337.8	441.5	371.8	842.3
U.S.S.R.	31.6	86.8	79.6	5.4	56.6

SOURCE: Hsiao Liang-lin, China's Foreign Trade Statistics, 1864-1949, East Asian Research Center, (Cambridge: Harvard University Press, 1974), Table 6.

[a] Haikwan taels. [b] Chinese dollars. [c] Gold yuan.

[d] See statistical note for Hong Kong in Hsiao's introduction, p. 10.

in selected years before and immediately after World War II. Hong Kong has consistently been important as an intermediary in China's trade, being more prominent as an import source in pre-war times. The U.S. was important both as a source of cotton, and as a market for China's products. Imports from the U.S. were especially high during and immediately after World War II. Trade with Great Britain has been consistent throughout China's political fluctuations.

B. Post-War Isolation

Foreign trade soon became a state monopoly under the People's Republic of China. As with commerce this was accomplished in stages. Japanese firms were nationalized at the end of World War II. Middlemen were either eliminated or incorporated into the state trade companies.

Foreign merchant houses were edged out through market, credit, and labor restrictions, while foreign firms trading with China were unable to maintain branch offices or keep resident representatives in the country. Foreign trade was not formally declared a state monopoly as the government wished to make use of the private trader's experience and overseas contacts. Private interests handled nearly a third of China's trade in 1950, but by 1956 were all transformed into joint state-private undertakings under the close direction of the state corporations.[3]

The principal goal of Chinese Communist trade policy has been to quicken the pace of China's industrialization. Along with this, trade has been used for political leverage, often as a precursor to China's diplomatic recognition by non-socialist states. While not playing a central role in the formation of China's economic plans, trade has been used as the balancing sector to overcome domestic shortages, whether of raw materials, grain, or technical know-how.

Attempting to form a political and economic bloc, China's trade in the 1950's was mostly with the Soviet Union and other Communist countries. Rice was exported to pay for imports of equipment, machinery, and technology. A Western trade embargo was imposed after China's involvement in the Korean war, which was partially lifted by the late fifties. However close trade ties with Communist countries would probably have occurred even without this barrier. Throughout the 1950's about one-half of China's trade was with the Soviet Union, about 20% with other Communist countries, and about 30% with Western Europe.[4]

Soviet loans to China paid for a large part of China's imports until 1957, when their sudden termination marked the beginning of the

Sino-Soviet split. Soviet technicians were withdrawn from China in a power play which also saw a sharp drop in China's imports from Russia. The post-Leap Forward agricultural crisis severly cut China's ability to export grain. Despite this, China ran a heavy trade surplus with the U.S.S.R. from 1960 to 1966 to repay debts ahead of schedule. The split with the Soviets marked the end of China's 'lean to one side' policy. China has since endeavored to diversify the sources of her imports without becoming too reliant upon any one country.

C. Reorientation to the West

The Western embargo was applied strictly by the United States while Japan and NATO countries were less rigid in their controls. Trade with China was more restricted than with other Communist countries, so goods were often transshipped to China via her socialist allies, making their procurement more expensive. After 1954 the control lists for Communist countries were shortened, and exceptions were made for China until the differential was abandoned in 1957, treating all socialist countries alike.

Imports from China were not as restricted, so China maintained a trade surplus with non-socialist countries as a whole from 1950 to 1957. West Germany and the United Kingdom were by far the largest markets for mainland Chinese products in Europe. However, deficits in trade with Europe grew larger in the late 1950's, being made up for with surpluses in trade with Asia. Vital grain imports from Canada and Australia in 1961 became a permanent part of China's redirection towards the West. The economic troubles of the early 1960's, prevented a rapid expansion of trade volume, but by 1967 the composition of China's trade was

significantly altered, three quarters being with the West, and only 3% with the Soviet Union.[5]

The recovery of trade with Japan, while holding great benefits for each, was restricted by political events. Japan did not want to sacrifice trade with the United States and Taiwan, and was criticized by both sides for trying to separate politics from economics. China attempted to obtain de facto diplomatic recognition from the Japanese through trade treaties, but, when unsuccessful, seized upon a local flag incident to break off trade in 1958 in the hopes of swaying Japanese elections. Trade between the two soon recovered in the early sixties, but did not become large until diplomatic relations were established in 1972.[6]

China's post-war trade with major partners (ordered by the value of trade in 1977-79) is given for selected years in Table 4-2. A major change from China's pre-war trade patterns has been the crucial importance of Hong Kong and Macao as sources of foreign exchange, through exports, profits of PRC businesses, and overseas remittances. Malaysia and Singapore have been most prominent of China's other exchange-earning partners in Southeast Asia. The surpluses built up in trade with the West, Hong Kong, and elsewhere have enabled China to pay for the much-needed grain imports. Trade with Eastern Europe dropped somewhat in the 1960's, but not as sharply as with Russia.

D. The Cultural Revolution

While the Cultural Revolution had only minimal effects on domestic agriculture, foreign trade became a major subject of attack, both verbally and physically, causing disruption to transportation

TABLE 4-2

CHINA'S POST-WAR TRADE WITH MAJOR PARTNERS AND AREAS IN SELECTED YEARS [1]

(Million U.S. Dollars)

Exports to	1952	1957	1962	1967	1972	1977-79[a]
Hong Kong[2]	87	137	183	310[b]	535[b]	2123
Japan	14	76	43	266	468	1981
Western Europe	54	141	176	310	460	1455
Malaysia/Singapore	37	49	62	135	190	487[c]
Eastern Europe	165	240	105	110	230	382[d]
United States	23	. . .	. . .	. . .	32	374
Soviet Union	415	750	515	55	135	nav.

Imports from	1952	1957	1962	1967	1972	1977-79[a]
Japan	. . .	61	39	303	640	3191
Western Europe	51	236	149	720	605	2530
Canada/Australia	. . .	22	199	322[e]	346[e]	1106
United States	. . .	. . .	. . .	. . .	79	997
Latin America	. . .	4	27	10	210	533
Eastern Europe	155	285	65	135	265	376[d]
Soviet Union	550	545	235	50	120	nav.

SOURCES: Alexander Eckstein, Communist China's Economic Growth and Foreign Trade (New York: McGraw-Hill, 1966), Table B-1, pp.280-85; Chen Nai-Ruenn, "China's Foreign Trade, 1950-74," in China: A Reassessment of the Economy, U.S. Joint Economic Committee (Washington, D.C.: 1975), Tables A.5. and A.6., pp.648-50; and International Monetary Fund, Direction of Trade Yearbook (Washington, D.C.: IMF, 1980), pp.119-20.

[1] All data originate with China's trading partners. Except for the 1952 to 1962 trade of non-socialist countries which have not been changed, all other data have been adjusted to use FOB values for China's exports and CIF values for China's imports.

[2] Net of re-exports.

[a] Average value. [b] Including Macao. [c] Could be double counting.

[d] Romania only. [e] Including New Zealand.

nav. - Not available.

facilities. A restoration to order in 1970 brought renewed emphasis on trade as a means of spurring economic development. The need for capital imports from the West led to the expansion of export markets, while credit was used again for purchases. Petroleum was exported at world prices to Japan to gain hard currency. China's trade with Communist countries, including the U.S.S.R., also grew as economics took priority over politics. Rice exports reached new highs as China expanded trade with Third World countries. Imports from Latin America grew considerably. A poor 1972 harvest, and the thawing of relations with the United States, brought large imports of U.S. grain, soybeans, and cotton in the early 1970's.

Unfortunately China's entrance into world trade and politics came at a time of high and rising world prices. Despite higher prices for her exports, and import cutbacks, China was caught in a foreign exchange squeeze, fanning left wing criticism. Rampant Western inflation and the resultant slowdown in the Western economies left China with high import costs, but reduced export sales. Combined with rising repayments of grain credits, China's balance of trade went from bad to worse. Contracts for agricultural products were cancelled or postponed, while plant and equipment purchases were trimmed. China's non-oil exports had become overpriced so that sales dropped, while more oil was exported to make up the difference.

In the midst of reducing trade imbalances, China's economy was disrupted by the deaths of Chou En-lai and Mao Tse-tung in 1976. While trade remained in the hands of political moderates, left wing criticism of the heavy import bills stalemated any immediate initiatives by the trade companies. Continued exports turned the balance of trade in

China's favor. The ouster of the Gang of Four opened the road for a return to moderate government bringing an end to the Cultural Revolution.

E. Post-Mao Trade Expansion

The post-Mao regime soon committed itself to trade expansion and 'agriculture first' policies. Imports, however, did not rise dramatically until Teng Hsiao-ping gained political control. Showing its first signs of improvement in 1977, the value of Chinese trade rose by 1980 to two and a half times the 1977 level.[7] Plant and equipment purchases for industry have been large with priority given to the development of export earning and import displacing industries. Imports of fertilizers, consumer goods, iron and steel, and raw materials such as cotton, chemical fibres, and pulp, for textiles and light industries have also been large. A reduced harvest in 1977 led to sharp rises in agricultural imports from the U.S. and Brazil. U.S. recognition of China in 1978 and the signing of a bilateral agreement in 1979 have brought rapid trade expansion with China's long time opponent.[8]

While oil exports have played a prominent role in earning exchange, China has had some difficulty in meeting all her export commitments. Japan has imported both oil and an increasing amount of coal from China. The Philippines have agreed to export sugar to China in exchange for oil. Textiles and light industrial goods, however, have grown to lead the list of exchange earners. These are emphasized by the Chinese because they require less investment, less construction time, and fewer energy resources for profits earned. However, heavy industrial and mineral products have reportedly risen to 51.8% of

exports in 1980. Exchange earnings from tourism and Chinese business profits in Hong Kong have continued to grow.

III. TRADE STRUCTURE[9]

The Ministry of Foreign Trade was established in 1952. Under the jurisdiction of the State Council, it plans the use of foreign exchange for imports, issues licenses, and administers customs, quality control, and the Kwang Chou trade fair. Outside of China it appoints commercial counselors to diplomatic missions, designates officials for trade delegations, and enters commercial negotiations and trade treaties with foreign governments on the behalf of the People's Republic. The China Council for the Promotion of International Trade was established in 1952 to represent China and enter into non-governmental trade agreements with foreign partners who do not recognize the People's Republic.

China's grain trade is handled by the China National Cereals, Oils, and Foodstuffs Import and Export Corporation. The foreign trade corporations engage directly in trade and, as state enterprises, are responsible for their own profits and losses. They act as middlemen in the planned economy. As such they possess no fixed assets such as factories and machines, but do possess property under their own control to carry out their business. Working capital is appropriated to them by the state, under the control of the People's Bank. The People's Bank handles all financial transactions with socialist countries, while the Bank of China handles foreign exchange dealings with non-socialist partners.

Both state and private trade enterprises must apply for import or export permits with the ministry or local foreign trade bureaus.

Schedules must then be prepared for the custom's office to examine and release the cargo. For private trade these schedules must also be endorsed by the Bank of China. While China continues to collect import duties, the protective function of these duties is meaningless under the state trade monopoly. The same end could be achieved by raising the domestic sales price of imports. However, the import duties do control the nature and volume of China's foreign trade to some extent, with low rates or exemptions applied to needed goods, higher duties for goods which are or could be produced domestically, and prohibitively high rates applied to non-essential goods. The customs house decides the interpretation of tariffs, the classification of goods, and their dutiable value.

IV. BALANCE OF TRADE AND PAYMENTS

A. Pre-War Period

While having a balance of trade surplus from 1872 to 1876, growing imports turned this into a deficit in the late nineteenth century. China's finances, however, were sound until the first Sino-Japanese war required China to borrow heavily from other countries. Railroad loans between 1901 and 1911, and further loans after the Nationalist Revolution, made a heavy load of repayment for China between 1896 and 1913. With a short reprieve during the First World War, China's balance of trade remained unfavorable every year to 1940.[10]

The financing of this long term trade deficit came in various ways. Normally an export of specie could counterbalance this deficit. However, with her currency based on silver, and with silver prices declining rapidly between 1864 and 1913, China had to import silver to

supply trade demands. Gold and silver exports only became large in the 1930's, both through customs and by smuggling.[11]

While foreign investment is often an invisible form of meeting balance of payment deficits, this was not generally the case for China. Foreign investment financed part of this deficit between 1912 and 1923, but represented a net outflow of funds after 1928.[12] The foreign loans often did not result in an inflow of foreign capital, as they were used to pay for interest in arrears or else represented a transfer of Chinese resources to foreign countries.

Service transactions did counterbalance exchange deficits, as foreign expenditures in China considerably outweighed China's expenditures abroad. The largest of the foreign expenditures were for military purposes, as well as diplomatic missions, merchant marines, tourism, and the purchase of properties by non-business organizations.

A large and significant source of foreign exchange peculiar to China is that of overseas remittances. Large numbers of southern Chinese have emigrated to southeast Asia, America, and other countries. The closeness of the Chinese family gives these family members a responsibility of assisting their relatives at home. Some of the remittances were investments in Chinese business undertakings. While the individual sums are small, the aggregate remittances make a large contribution to China's invisible balance of payments.

In 1903-9, China's trade deficit was mostly covered by overseas remittances. While silver imports represented a further outpayment in 1912-13, foreign investment had become the largest source of exchange. The large trade deficits and specie imports of 1920-23 were also financed by foreign investment, foreign expenditures, and overseas

remittances. After 1928 foreign expenditures in China balanced the outflow of interest and dividends with a moderate surplus. The trade deficit after 1931 was generally balanced by remittances and specie exports, while the transfer of government and private funds to other currencies became a large payments deficit.[1]

B. Post-1949 Balance of Payments

While coming under state control with the People's Republic, foreign trade has continued to exhibit long term trade deficits, which have been large in post-Mao years. The recent trends and cumulative financing of these deficits are recorded in Table 4-3. While often showing a surplus in barter trade with Communist countries, China has had a trade deficit in 21 of the 31 years up to 1980. The government has generally tried to balance imports with exports, with some exceptions. Trade and foreign aid deficits have been largely financed by overseas remittances, credit, and service earnings.

Overseas remittances have been encouraged in post-war China by granting special priveleges to the Chinese recipients. When priveleges were withdrawn during the Great Leap Forward and the Cultural Revolution, remittances also fell, so the government has taken pains to assure benefactors that families will receive the funds forwarded. The remittances more than offset China's trade deficits up to 1970, helping to build up an exchange reserve. In the early 1970's they were still able to cover over half of the trade imbalance, and have probably grown in post-Mao years.

The unhappy experience with Soviet loans has dictated a more careful use of credit since then. The Western grain imports

TABLE 4-3

BALANCE OF TRADE AND PAYMENTS
IN POST WAR CHINA
(Million U.S. Dollars)

A. Post-Mao Balance of Trade

	1977	1978	1979	1980
Total Trade	14667	21162	29366	37506
Exports(FOB)	7519	9996	13636	18120
Imports(CIF)	7148	11166	15630	19386
Trade Balance	+371	-1170	-1994	-1266
Exchange Earned by Tourism	. . .	+269	+451	+613

B. Cumulative Financing of Trade Deficit[1]

	1950-59	1960-69	1970-76
Trade Balance	-440	-630	-2325
Foreign Aid	-55	-420	-1200
Overseas Remittances	+945	+860	+1250
Net Credits and Interest Payments	. . .	+260	+1480
Net Service Earnings	+50	+130	+410
Expropriation of Foreign Currencies	+250	. . .	. . .
Addition to Reserves	+750	+220	+385

SOURCES: Far Eastern Economic Review, "China-Economy," in Asia 1981 Yearbook (Hong Kong: South China Morning Post,1981), pp.123-29; PRC State Statistical Bureau, "Communique on Fulfillment of China's 1980 National Economic Plan," Beijing Review 11 May 1981, p.18; International Monetary Fund, International Financial Statistics: Supplement on Exchange Rates (Washinton,D.C.: IMF, 1981), p.45; and Chen Nai-Ruenn, "China's Balance of Payments: The Experience of Financing a Long Term Trade Deficit in the Twentieth Century," in Modern Chinese Economic History, edited by Chi-ming Hou and Tzong-shian Yu (Taipei, Taiwan: The Institute of Economics, Academia Sinica, 1979), p.403.

[1] Trade is with non-Communist countries, but includes hard currency settlements with Communist partners.

necessitated the use of short-term commercial credits. The large plant imports of the 1970's have used five year credits granted by Japanese and European government banks as well as inter-bank deposits, with China paying market interest rates on hard currency deposits. While China's use of credit has grown, she has left many credit lines unused, being careful of financial commitments. China has sought to balance trade bilaterally by setting up joint bank accounts with individual nations, and cautioning each other when the indebtedness of either party exceeds pre-set limits. Large trade imbalances, however, have been permitted with Canada, Australia, and the United States. Trade with hard currency nations is often handled on a cash basis.

Foreign investment has been prohibited in the People's Republic. However, some changes to this policy have recently been made by granting 'reasonable' profits to foreigners undertaking joint operations with the Chinese. Service earnings from tourism, shipping, and ports have been large, with considerable growth in recent years. Business earnings in Hong Kong have also grown rapidly in the past decade.

Having a surplus in invisibles while striving to balance trade itself, has allowed China to build up a large reserve of gold and foreign exchange. A recent official release has indicated China's monetary reserves at the end of 1980 to be $7.66 billion U.S., consisting of $5.4 billion of gold and $2.26 billion of foreign currencies. Foreign currency reserves have reportedly grown to $3.8 billion U.S. by mid-1981.[14] This would indicate a larger balance of payments surplus than had been previously estimated. Gold reserves have been added to by domestic production, with some international gold sales reported. In 1959-62 China exported $106.7 million U.S. worth of silver to

finance her wheat imports.[15]

V. TRADE IN GRAINS

A. Grain Import Patterns

China began importing rice to coastal cities in the late nineteenth century. These imports became consistently large in the 1921 to 1935 period when they averaged about one million metric tons annually. Wheat flour imports began in the early twentieth century reaching a peak of .72 million tons in 1929. Originally smaller than the flour imports, wheat imports grew to pass them peaking at 1.4 million tons in 1931.[16] While some grain was imported during the war, this trade ceased with the establishment of the People's Republic.

About 80% of foreign wheat in pre-war China was imported into Shanghai, where much of this was milled into flour and shipped north to be resold in Tientsin.[17] Wheat is the major grain consumed in northern China, in contrast to southern diets which center on rice. With U.S. assistance the construction of a model bakery to instruct the Chinese in western baking practices could further influence China's grain consumption patterns.

In the post-war period, Canada made a small sale of .12 million tons of wheat to China in 1958, before the large scale trade began in 1961.[18] Averaging 4.7 million tons in the 1960's, China's wheat imports peaked at 6.4 million tons in 1965/66, and gradually fell with improved harvests to only 3 million tons in the 1971/72 cropping year. A poor harvest again in 1972, along with a high rice/wheat exchange price, saw wheat imports rise again to the 5 to 6 million ton level in 1972/73 to 1974/75. A further recovery in production, criticism of trade deficits, and the unstable political situation during the deaths of Chou and Mao,

brought imports down in 1975 and 1976 to 2 to 3 million tons per year. Wheat imports dropped in average amounts to 4.1 million tons per year between 1971 and 1976. However the most dramatic shift in policy has been the unprecedented high imports of over 8 million tons a year since 1977/78. Despite record breaking grain production in 1978 and 1979, China has continued to import both wheat and coarse grains, apparently due to a relaxation in grain consumption controls. Barley and corn were imported in the early 1960's for human consumption, but recent corn purchases are likely used for animal feed as well.

B. Grain Suppliers and Agreements

Source countries for China's wheat imports are given in Table 4-4. Table 4-5 shows the distribution of these imports over the periods of 1960 to 1969/70, 1970 to 1976/77, and 1977 to 1979/80. The middle period is distinguished from the 1960's by lower average imports, higher variability, and the cutoff of imports from Australia.

While Australia and Canada have been the principal sources for China's wheat, Argentina and France were also turned to in the early 1960's. The U.S. and Argentina have become important again in recent years. Australia sold slightly more wheat to China in the 1960's than did Canada, but was disfavored in 1971 to 1972 on political grounds,[19] leaving Canada as the single supplier. Both Australia and the U.S. have gained large shares of the Chinese market in post-Mao years, while Canada's wheat exports have been large, but diminishing since 1977/78. The U.S. exported about 4 million tons of wheat to China in calendar year 1980.[20]

Canada's share of the Chinese market is higher in value terms as

TABLE 4-4

CHINA'S WHEAT AND WHEAT FLOUR IMPORTS
FROM SUPPLYING COUNTRIES[1]

(Million Tons)

Year	Argentina	Australia	Canada	U.S.	EEC	Total
1960/61	. . .	1.2	.8	. . .	. . .	2.0
1961/62	.1	2.0	2.0	. . .	.6	4.7
1962/63	.1	2.1	1.7	. . .	1.0	4.9
1963/64	1.0	2.5	1.0	. . .	.2	5.2
1964/65	.6	2.3	1.8	. . .	.4	5.1
1965/66	2.2	2.0	2.1	. . .	.1	6.4
1966/67	. . .	2.2	2.5	. . .	.1	5.0
1967/68	.01	2.42	1.37	. . .	.36	4.16
1968/69	. . .	1.40	2.13	. . .	.25	3.78
1969/70	. . .	2.45	1.83	. . .	.76	5.04
1970/71	. . .	1.31	2.35	. . .	. . .	3.66
1971/72	. . .	. . .	2.97	. . .	. . .	2.97
1972/73	. . .	.32	4.37	.59	. . .	5.29
1973/74	. . .	1.24	1.37	3.19	.03	5.83
1974/75	.21	1.24	2.37	1.50	.18	5.50
1975/76	. . .	1.13	1.20	. . .	. . .	2.33
1976/77	.48	.75	1.93	. . .	. . .	3.16
1977/78	.37	4.60	3.32	.25	. . .	8.55
1978/79	.89	1.38	3.18	2.61	. . .	8.06
1979/80	.47	3.58	2.65	1.93	.09	8.71

SOURCES: International Wheat Council, "Exports of Wheat and Wheat Flour - Source and Primary Destination," Appendix Tables in Review of the World Wheat Situation 1967/68 to 1979/80 (London: IWC, 1968 to 1980); and International Wheat Council, "The Grain Economy of China," Review of the World Wheat Situation 1976/77 (London: IWC,1977), Table 43, p.84.

[1] Preliminary figures for each cropping year (July to June).

TABLE 4-5

Distribution of Source Countries for

Wheat Imports in Selected Periods

Country	1960 to 1969/70		1970 to 1976/77		1977 to 1979/80	
	M Tons[1]	%	M Tons[1]	%	M Tons	%
Argentina	.40	8.7	.09	2.4	.57	6.8
Australia	2.06	44.4	.86	20.8	3.19	37.8
Canada	1.72	37.2	2.37	57.6	3.05	36.2
EEC	.38	8.1	.03	0.7	.03	0.4
U.S.	. . .	. . .	.75	18.4	1.60	18.9
Total[1]	4.63	n/a	4.10	n/a	8.44	n/a

SOURCE: See Table 4-4.

[1] Average shipment. n/a - Not applicable.

Canadian trade prices for wheat have been higher than U.S. prices since 1978.[21] Canadian exports to China have remained relatively constant in quantity, whereas Australia and the U.S. have been used more as residual suppliers. On the other hand, the U.S. has received relatively constant prices for their wheat, while Canadian trade prices have risen or fallen according to China's need for grain.

On October 21, 1980, the United States and China signed a long term grain agreement over four years beginning January 1, 1981. The U.S. is to supply China with six to eight million tons of wheat and corn annually. The grain supply agreement follows the general trade agreement signed between the two countries in 1979, which extended each other most-favored-nation tariff status.

Similarly the EEC and Argentina have signed three-year grain agreements with China announced in September of 1980. Argentina is to

supply 0.7 to 0.9 million tons of wheat and 0.3 to 0.6 million tons of coarse grain annually from 1981 to 1984. The European Community has agreed in principle to deliver 0.5 to 0.7 million tons of wheat per year beginning 1980/81. Argentina's agreement replaces an earlier one to supply 3.0 million tons of wheat and maize during the 1979 to 1981 period.

The present grain agreements, outlined in Table 4-6, commit China to purchase 2.8 to 3.5 million tons per year from Canada, 2.5 million tons from Australia, 1.0 to 1.5 million tons from Argentina, 6.0 to 9.0 million tons from the U.S., and 0.5 to 0.7 million tons per year from the European Economic Community (France). A strict summation of all agreements indicates China will purchase 12.8 to 16.2 million tons of wheat and corn in 1981, a significant jump from earlier years. Preliminary figures would indicate China did import 13.0 million tons of grain in 1980, compared to 9.3 and 10.5 million tons in 1978 and 1979 respectively.

A word of caution, however, is in order for using agreements alone to predict China's grain imports. When China wants to import grain, many agreements are entered into. Should the expense of these commitments later worry the Chinese leadership, there are ways to fulfill the grain agreements without importing the full annual quantities indicated. By importing close to the beginning and end of each agreement China can spread the grain purchases and fill her needs over a period one year longer than the agreement itself. This could, for example, reduce imports in 1981 to as low as 10 million tons while yet honoring contract terms.

Canada has had three-year wheat agreements with China from

TABLE 4-6

China's Current Grain Agreements

Country	Period	Annual Quantity (million tons)
Argentina	1981-84 (January)	1.0 to 1.5
Australia	1979-82 (January)	2.5
Canada	1979-82 (August)	2.8 to 3.5
EEC	1980-83 (July)	0.5 to 0.7
United States	1981-85 (January)	6.0 to 9.0
All Suppliers	(1981)	12.8 to 16.2

SOURCE: International Wheat Council, "Selected Bilateral Long-Term Agreements," Appendix Table VIII in Review of the World Wheat Situation 1979/80 (London: IWC, 1980), p. 121.

1961 to 1969, from 1974 to 1976, and from 1979 to 1982.[22] Although wheat imports continued on a regular basis in the interim years, these were handled through specific contracts rather than under a formal agreement. Similarly Australia exported wheat to China in the 1960's under a series of contracts which were terminated in 1970. China imported no wheat from Australia in 1971 or 1972, and none from Argentina between 1967 and 1972. Three-year agreements were made with all three countries for 1974 to 1976, although the Argentine agreement was never ratified. It appears the change in Chinese leadership inhibited the renewing of these agreements The purchases of 1977 to 1978 were made under specific contrac long term agreements established again in 1979-82 for a ries.

Australia and Canada's initia eat sales to China in early 1961 were paid for in cash. In May of 1961, China entered into credit terms for wheat purchases. With Australia 10% was paid in cash, 40%

in six months, and 50% after 12 months with interest. In October of 1962 the six month payment was split into two payments of 20% at the six and nine month intervals, forming a payment schedule which has been followed since for Australian purchases. Canada's credit terms in 1961 were 25% cash with the remainder in nine months including interest. In April of 1963 this was changed to 25% cash and the remainder in 18 months with interest, also followed to date for Canadian purchases. China has paid cash for grain imports from Argentina, the U.S., and France. The U.S. has extended credits to the Chinese, but these have not been used due to the high interest rates.

From 1961 to 1976, China stipulated that grain payments were to be in sterling.[23] Accepting this risk Canada and Australia both were shortchanged with the devaluation of the pound in 1966. While Canada originally hedged to cover some of this risk, after 1966 it became increasingly difficult, if not impossible, to sell sterling forward. The Canadian Wheat Board estimates this cost of trade to be about $81.5 million Canadian, which amounts to less than one cent per bushel sold. All Canadian wheat sales to China are now designated in either U.S. or Canadian dollars.[24]

China has generally purchased lower grades of wheat, often weather damaged in the 1960's. Partly for this reason the trade prices of Canada's wheat exports to China have been substantially less than for Canada's wheat exports to the United Kingdom, Japan, or the Soviet Union (in most years). This was most noticeable in 1973 and 1975 to 1978. Canadian wheat prices to China have been negotiated, whereas set prices are quoted for regular markets such as Japan and the United Kingdom. China has imported higher grades of wheat in the 1970's.

TABLE 4-7

PRC Coarse Grain Imports

(Thousand Tons)

Year	Argentina	Australia	Thailand	U.S.	Total
1972	14	. . .	. . .	376	390
1973	158	. . .	. . .	1500	1658
1974	590	. . .	. . .	854	1444
1975	95	. . .	. . .	. . .	95
1976	. . .	. . .	. . .	. . .	. . .
1977	. . .	. . .	. . .	. . .	. . .
1978	191	. . .	60	1073	1324
1979	27	65	37	2390	2519
1980[a]	nav.	nav.	nav.	1788	1788

SOURCE: U.S. Department of Agriculture, Foreign Agriculture Service, Foreign Agriculture, February, 1981, p. 22.

[a] Preliminary nav. - Not available.

Recent Canadian sales include Nos. 1, 2, and 3 Canada Western Red Spring Wheat, plus small quantities of utility and Western Red Winter Wheat.[25] China is mostly importing soft red winter wheats from the U.S., followed by hard red winter, western white, and some hard red spring and mixed wheats.[26]

Table 4-7 gives the sources and quantities for China's coarse grain imports in recent calendar years. These are almost all corn purchases coming from the United States, with irregular amounts coming from Argentina.

C. Rice Exports

China did not export rice until the early 1950's. These exports did not represent free market forces in response to favorable prices,

but were part of state planning, taxing agriculture to pay for needed industrial imports. Rice exports rose gradually, peaking at 1.57 million tons in 1959 and dropping to .44 million tons in 1960. Despite the need for food within China, rice exports were maintained in the early sixties to pay for previous imports. Most early rice trade was through bilateral exchange with socialist allies, with the direction of trade changing after the Sino-Soviet split. Rice was exchanged in barter agreements for sugar from Cuba, and for rubber from Sri Lanka. For a time rice was exported to the Philipines for coconut oil, but the Philipines has since become self-sufficient in rice. After 1960, China's rice trade became mostly commercial transactions with far eastern nations, taking advantage of the rice/wheat price differential.

Table 4-8 lists China's rice sales to major markets in Southeast Asia. Hong Kong, Malaysia, Singapore, Macau, and Sri Lanka have all been consistent rice purchasers. China has an agreement to supply a certain portion of Hong Kong's total rice imports. These have, however, dropped somewhat in proportion to total food imports as Hong Kong has diversified her consumption patterns. Hong Kong has paid comparatively higher prices for her rice imports from China.

Japan made some large rice purchases from China in the mid-1960's but these dropped off as Japan began to export rice herself. Pakistan's rice imports also dropped off after 1972. Indonesia had large rice imports from China in 1958 to 1960, dropping to nothing in the late 1960's, and then becoming China's largest market in the mid-1970's.[27] China also expanded rice exports to developing countries in the 1973 to 1975 period when China was the world's largest rice exporter. Some of this trade was in the form of food aid. Senegal was the

TABLE 4-8

CHINA'S RICE EXPORTS TO THE FAR EAST

(Thousand Tons)

Year	Hong Kong	Indonesia	Japan	Macau	Malaysia	Pakistan	Philipines	Singapore	Sri Lanka
1966	116	30[a]	313	19	108	100	. . .	65	227
1967	86	. . .	203	18	120	100	. . .	83	183
1968	105	. . .	105	14	80	29	. . .	78	200
1969	87	. . .	. . .	14	91	. . .	. . .	46	221
1970	93	. . .	. . .	15	139	99	. . .	48	343
1971	111	. . .	. . .	15	84	120[a]	8	35	129
1972	182	28	. . .	17	61	17	75	38	23
1973	221	470	4	14	208	. . .	160	45	212
1974	154	427	29	12	206	. . .	51	14	136
1975	184	320	13	12	111	. . .	43	11	238
1976	194	91	4	14	61	. . .	. . .	7	nav.
1977	178	162	. . .	15	84	. . .	. . .	1	98
1978	185	69	31	11	nav.	. . .	. . .	9	nav.

SOURCES: Riley H. Kirby, Agricultural Trade of the People's Republic of China 1935-1969, Foreign Agriculture Economic Report No. 83, U.S. Department of Agriculture, Economic Research Service (Washington,D.C.: USDA, 1972), Table 46, pp.64-65; Food and Agriculture Organization of the United Nations, FAO Rice Report 1974/75, Commodities and Trade Division, Economic and Social Policy Department,(Rome: FAO, 1975), Table 8, pp.26-27; and the United Nations, Department of International Economic and Social Affairs, Commodity Trade Statistics (New York: UN, various years to 1980).

[a] Estimated.

nav. - Not available.

largest importer in Africa, while isolated sales were made to Syria, Turkey, and Iraq in the Middle East, and to Chile, Mexico, and Peru in Latin America. Rice exports to Czechoslovakia, Poland, and Romania grew considerably after 1968. Sales of rice to non-reporting countries such as Vietnam and Cuba have been large.[28] In 1971 China officially reported rice exports of 3 to 3.5 million tons.

The U.S. Department of Agriculture reports China's rice exports to have dropped in post-Mao years from 1.4 million tons in 1978 to 1.1 and 1.0 million tons in 1979 and 1980 respectively. The 1981 rice exports are expected to be only .6 million tons, the lowest level since 1962.[29] Lower rice production in 1980 and 1981 can explain this trend in part. However the relaxed grain procurement policies, allowing farmers to retain more of their harvest, is the most likely cause, while higher grain rations have undoubtedly raised domestic consumption. China has participated most in rice trade when prices are high and domestic production is normal to good. Although the rice/wheat price differential has dropped, it should be high enough to attract China's exports if making money was the only reason for the sales. Rice exports, however, seem to be continued for the sake of keeping up appearances. Transportation problems continue to play some role in China's rice trade as it is easier to export Canton's surpluses, than to ship them to deficit central areas.

VI. DETERMINANTS OF GRAIN IMPORTS

China's purchases of wheat and barley in 1961 to 1964 were undoubtedly made due to crop failures. This was a difficult decision for the Chinese to make, as it conceded failure after they had advertised agricultural breakthroughs during their first decade. Once

initiated, however, the economic advantages of importing grain outweighed the disadvantages of abandoning self-reliance.

To begin with, China has a goal to become a major world power in the near future. While wanting to achieve this on their own, not participating in world trade would work against reaching this goal at all. It is easier for economic progress to come to China by trade participation, however unsettling that trade may be to China's pride. With a dense and numerous population China will not find agriculture to be the most promising pursuit of her people. Comparative advantage as dictated by China's resources, favors the importation of food and the export of labor intensive commodities.

Secondly China's geography and gradual economic progress continue to make transportation costs high. As China participates in world trade, the exchange of learning, and the inflow of foreign tourists, population tends to grow in the coastal areas, while impinging upon agriculture through urban expansion. By geography and history, northern China has generally been deficient in grain production, while southern China has had surpluses. The ease of coastal shipping, in comparison to local transport, thus favors the importation of food from abroad. This was true in pre-war times, and still is true today.

Thirdly, the military context of becoming a world power necessitates the maintenance of food reserves. With relatively high proportions of the harvest already being siphoned out of rural areas to support the needs of government, military, and civic life, the opportunity and marginal cost of obtaining an additional amount of grain from the farmers, under collective control, as opposed to importing grain under central control, is very high.[30] Greater food needs for military and strategic purposes are easier met from abroad.

China's present patterns of grain trade fit closely with the above logic. Rice is exported when it is profitable to do so, but held back for domestic consumption when world prices are low. Industries using greater amounts of labor input are developed for the export of light industrial goods. The acreage of food crops has been reduced in favor of industrial crops. Coarse grains are imported to feed hogs for export. Thus the anomaly of China importing more grain despite record crops of her own, becomes somewhat clearer.

Self-sufficiency is still important to the Chinese, but it is defined differently. It no longer means existing on one's own, but being capable of existing alone. Importing grain allows reserves to be kept. Exporting goods helps build supplies of foreign exchange. China's grain imports are small compared to the total domestic output, and the Chinese boast they can manage even without any grain imports at all. The machinery to limit domestic consumption is still in place should this need arise.

Long run Chinese grain imports should continue. In the short run, however, the size of these imports can vary. The greatest single factor affecting short run changes is the political situation. While pragmatists favor the imports, and are now in control, the fear of left wing criticism could restrict imports in particular circumstances. The most common cause for such criticism is a widening balance of trade deficit. In reality this is only as dangerous as the lack of an invisible trade surplus to support it. Since the Chinese are continually gaining foreign exchange they need not fear on this account, but would probably cut back on grain imports if a large deficit and ensuing criticism did arise.

The better the Chinese harvests and the bigger their grain

reserves the more dramatic could be their import cutbacks. At present the Chinese are reaping the benefits of improved technology in agriculture, and could do so for a time to come. Frequent disasters, however, are not yet under control and therefore continue to have an influence on production and imports. In normal harvest and political situations, the most likely factor to affect China's grain imports is the world wheat price. With ample grain reserves, China can afford to sit out high grain price situations and import more when prices are lower. If they can do this they will be a stabilizing factor in world grain trade.

Chapter six will discuss the determinants of grain trade in more analytical detail.

VII. SUMMARY

Abused by foreign powers, China developed an early resentment to foreign trade, and resolved to control her own affairs. However modernization and the development of China's industries required the import of foreign technology and equipment, a modernization which has been sought by China since the early twentieth century. Pre-war trade patterns became established with Japan, Europe, and the United States. Hong Kong has formed a doorway for China to the outside world, being previously used for imports and since World War II as an export market.

Striving for a rapid development of industry the People's Replublic associated first with the Communist bloc, while trade with the West was curtailed by a trade embargo. After splitting with the Soviets, trade became redirected to the West with a policy of diversifying import sources. China's trade participation grew with international recognition, and was often a means to achieving this. While criticized

during the Cultural Revolution, expanding international trade has become a firm policy of post-Mao China.

Trade is a government monopoly in China, with state trade companies allowed to act on their own, but within government plans, and relying on state purse strings.

While having a long term trade deficit throughout the twentieth century China has accumulated a large foreign exchange reserve in post-war times through invisible flows of overseas remittances, business profits in Hong Kong, tourism, credits, and the occasional sale of gold and silver. Contrary to pre-war times China has earned a credit worthy reputation by tying loans to actual imports, striving to balance imports with exports, and maintaining control of her own economy.

Continuing pre-war patterns, China has made large grain imports since 1961, which have grown rapidly in post-Mao years. Signing three to four year agreements with grain suppliers China has committed herself to import about 13 million tons of grain in both 1980 and 1981. Short term credits and the use of sterling have characterized China's method of payment. Purchasing lower grades of wheat has allowed China to obtain better grain prices.

Rice has been exported to Southeast Asia, originally to pay for capital imports and later as an exchange for cheaper wheat imports. Rice exports have been maintained even in poor production years to illustrate China's grain self-sufficiency. However, procurement constraints and increased domestic consumption have reduced rice exports in recent years.

China's grain imports are justified by comparative advantage, domestic transportation and procurement problems, and the need to build a grain reserve for strategic and emergency use. China no longer seeks

to produce her food alone, but could restrict imports under large balance of trade deficits due to political pressure. Domestic production has not grown rapidly enough for China to abandon grain imports in the near future. While China justifies the imports by her rice exports, this explanation does not hold in post-Mao years due to the large difference in quantities involved.

NOTES TO CHAPTER FOUR

[1] Pauline Lewin, The Foreign Trade of Communist China: Its Impact on the Free World, p. 7.

[2] In fairness to the foreign powers, the British Inspector General, appointed in the latter part of the nineteenth century, acted in good trust with the Chinese government, bridging barriers of language and China's introduction to trade practises. See Hsiao Liang-lin, China's Foreign Trade Statistics, 1864-1949, pp. 3-6.

[3] Audrey Donnithorne, China's Economic System, p. 321.

[4] Feng-hwa Mah, The Foreign Trade of Mainland China, p. 19.

[5] Ibid., p. 24.

[6] The political affairs of China's trade with Japan are discussed by Gene T. Hsiao in "The Case of Japan," chapter 3 of The Foreign Trade of China: Policy, Law, and Practice.

[7] See Table 4-3.

[8] A previous difficulty for U.S.-China trade, that of property claims by U.S. citizens and the blockage of Chinese assets in the U.S., was resolved with the signing of the trade agreement.

[9] Further details of China's trade structure are given by Gene T. Hsiao in "The Ministry of Foreign Trade," chapter 4 of The Foreign Trade of China.

[10] For an early description of China's balance of payments to the post-World War I period see Tang Chi Yu, "An Economic Study of Chinese Agriculture," chapter 20.

[11] Chen Nai-ruenn, "China's Balance of Payments: The Experience of Financing a Long-Term Trade Deficit in the Twentieth Century," in Modern Chinese Economic History, edited by Chi-ming Hou and Tzong-shian Yu, Table 2, pp. 396-97.

[12] Ibid.

[13] Ibid., Table 3, p. 403.

[14] "China reserves at $7.6 billion," The Toronto Globe and Mail: Report on Business 4 July 1981, p. B8; and "Gold and Foreign Exchange Reserves," Beijing Review 28 September 1981, p. 6.

[15] Feng-hwa Mah, The Foreign Trade of Mainland China, p. 179.

[16] Hsiao Liang-lin, China's Foreign Trade Statistics 1864-1949, Table 2, pp. 32-33.

[17] T.H. Shen, Agricultural Resources of China, pp. 340-41.

[18] Riley H. Kirby, Agricultural Trade of the People's Republic of China 1935-1969, Foreign Agriculture Economic Report No. 83, U.S. Department of Agriculture, Economic Research Service, p. 48.

[19] See Arthur A Stahnke, China's Trade with the West, p. 124.

[20] U.S. Department of Agriculture, Foreign Agriculture Service, "China Captures No. 4 Spot Among U.S. Farm Markets, Grain Agreement Points to a Bright Future," Foreign Agriculture December 1980, p. 9.

[21] See Table 5-7.

[22] For details of China's grain agreements and contracts see the U.S. Department of Agriculture, Economic Research Service, The Agricultural Situation in the People's Republic of China and Other Communist Asian Countries (Title changes from year to year) Review of 1975 and Outlook for 1976, Table 5, p. 37; Review of 1973 and Outlook for 1974, Table 4, pp. 13-14; and Review of 1970 and Outlook for 1971, Table 22, pp. 35-36.

[23] Canada was paid in sterling until 1976, although how long sterling was used to pay Australia and other suppliers is not known.

[24] Canadian Wheat Board, "Sterling and wheat sales to China," Grain Matters April 1978 (pp. 5-6, not numbered).

[25] "China Wheat Sale," (two articles) Agriweek 17 September 1979, p. 3; and 9 June 1980, p. 3.

[26] U.S. Department of Agriculture, Economic Research Service, Wheat Outlook and Situation July 1981, Table 6, p. 16.

[27] Indonesia did import some rice from China in the late 1960's, but this was recorded as coming from Hong Kong.

[28] See Food and Agriculture Organization of the United Nations, FAO Rice Report 1974/75, Table 8, pp. 26-27 for estimates of Cuba's rice imports from China. These range from .130 million tons in 1966 to .230 million tons in 1972.

[29] U.S. Department of Agriculture, Foreign Agriculture Service, "World Rice Production, Trade To Hit New Highs This Year; Stocks to Rise," Foreign Agriculture May 1981, p. 7; and "China: Rice Exports May Drop in 1981," Foreign Agriculture August 1981, p. 14.

[30] Problems of grain distribution rather than production leading to imports are discussed by Dwight H. Perkins, "Constraints Influencing China's Agricultural Performance," in China: A Reassessment of the Economy, U.S. Joint Economic Committee papers, p. 364.

CHAPTER FIVE

THE DATA BASE FOR TRADE MODELLING

1. INTRODUCTION

Most of the data required for analyzing China's grain trade are unavailable from Chinese sources. Since 1960, there has been a statistical blackout which has only recently begun to lift with some general economic data of the State Statistical Bureau appearing in the Beijing Review. These data cover current years, but do not as yet fill the gaps of the past twenty years. Using occasional statements by Chinese officials, the U.S. Department of Agriculture (USDA) and other specialists have made valuable estimates of the missing information. This chapter discusses the estimates and official figures available, and some of the problems presented in both. It is divided into sections on grain output, China's population, and trade statistics as these three areas are relevant to trade models.

Statistics are widely used in China to political ends, and thus a degree of caution is required in their interpretation. There is, however, no evidence that official figures are deliberately falsified. Since the breakdown of the statistical system during the Great Leap Forward, China has been eager to keep accurate records for state planning. However, her ability to do so was hampered during the Cultural Revolution. The former reluctance to release information has lessened somewhat as recent data are more flattering to the present regime.

II. GRAIN PRODUCTION

Grain output is the most difficult information for the Chinese to measure and for specialists to reconstruct. Yet it is of central significance to grain trade patterns. The methods of calculating grain output are discussed first, followed by the controversial Chinese definition of grains, and a comparison of production estimates.

A. Calculation of Grain Production

In the pre-war years of 1931-37, official grain production data were collected by voluntary crop reporters throughout China proper. In a special survey the percentage of cultivated land in each crop was determined. Multiplying these percentages by the total cultivated land in China gave the sown crop area. This, in turn, was multiplied by the observed harvest yield to estimate total grain output.[1]

In a separate study, John Lossing Buck discovered that the official figure for cultivated land area was significantly in error.[2] Much of the land area had been underreported by farmers to avoid paying taxes. Attempts to correct this figure by the Nationalist government proved faulty and incomplete. Errors in cultivated land area were gradually found by the Communists, but were accounted for as successes of land reclamation. Since the first post-1949 estimates of grain output apparently used uncorrected figures for cultivated land area, many experts have felt these early estimates are too low and have attempted various means of improvement.[3] Most, however, accept that official figures are reliable for 1957, the year used to reconstruct estimates for the earlier years.

After the formation of the State Statistical Bureau, a model

survey method was introduced in 1953 to improve estimates of grain output. The sown area was still determined by inspection of crops in the field. Yields, however, were obtained by choosing model farms to represent a larger district. Careful measurement of grain output on the model farm was used to calculate a yield per sown area for the larger district.[4] The choice of model farms was at the discretion of local leaders. Output could be exaggerated by choosing high yield rather than typical farms as models.

Criticized during the Great Leap Forward for holding back the movement, the State Statistical Bureau was disbanded and its work assigned to local units. With no one to check on accuracy, much higher outputs were claimed than in fact existed. A national movement was undertaken in 1959 to restore accuracy to official statistics. The size of the 1958 harvest remained uncertain, but the reliability of Chinese statistics began to improve steadily. While having its work disrupted again during the Cultural Revolution, the Statistical Bureau has been functioning and publishing statistics since 1977.[5]

In 1960, it was decided to use the barn output of grain, as measured after losses from reaping and threshing.[6] Previously the product of yield and sown area had given the biological output of the grain while it was still in the fields. Barn and biological yields were essentially identical prior to collectivization. However, the sweeping changes of the commune system removed the traditional Chinese care in saving every particle of grain, so that substantial harvest losses were incurred.

The model survey itself is no longer used in China for estimating agricultural output. Each unit of account (generally the team) has an accountant who records all aspects of collective production

and its disposal. The unit data are then aggregated at the brigade, commune, county, provincial, and national levels to give the respective totals for grain output. Model farms need not be chosen as the sample has become the universe.[7]

Provincial statisticians are assigned to review the work of the local accountants. State quotas for grain procurement are based on the previous year's output. This discourages overreporting, but gives substantial reason for underreporting. The large increases in output of 1978 to 1980 could be partly due to grain concealment in earlier years.[8] Nonetheless, the checks by visiting cadres and the fact that all collective accounts are open to scrutiny by the collective's members make it difficult to falsify production records.

B. Definition of Grain

A bothersome technicality in estimating grain output is that the Chinese do not always explain what they include in their definition of grains. Rice, wheat, coarse grains, tubers, and pulses have always been included. Soybeans, however, have alternately been excluded and included. Potatoes have at times been converted to grain equivalent by a ratio of four tons of potatoes equals one ton of grain, and at other times on a five to one ratio.

The data released up to the end of 1955 included soybeans, while potatoes were converted to a grain equivalent by a four to one ratio. Beginning in 1956, soybeans were excluded as grains. With no further explanations given, this definition was assumed to apply to grain output references during the blackout years. Erisman, in his 1975 estimates, also excluded soybeans and used the four to one ratio for

potatoes. In their 1978 paper, Field and Kilpatrick demonstrated that the current Chinese grain definition included soybeans while converting potatoes to a grain equivalent on a five to one basis.[9] Using various reports, they postulated that soybeans had been included since 1964 in official references to grain output, while the potato-grain ratio had changed in 1970. Accepting Erisman's estimates concerning growing conditions, they changed his figures to accord with the grain definition used in each year, and thus accounted for inconsistencies in the figures released by the Chinese.

Noting the grain output figures which the Chinese have published since 1978, A.M. Tang concludes that the Chinese indeed include soybeans as grains, but that potatoes are converted on a four to one ratio.[10] He bases this latter conclusion on the strength of the 1952 output figure quoted by the Chinese in their 1979 release. However, in the 1981 communique of the State Statistical Bureau, the Chinese explicitly state that tubers are converted on a five to one basis, thus substantiating Field and Kilpatrick's postulate.[11] How long this definition has been used is not known, so uncertainty remains for figures quoted during the blackout years.[12]

C. Comparison of Estimates

Table 5-1 summarizes relevant estimates of China's grain output. The official output figures for 1949 to 1957 appeared in the Chinese publication Ten Great Years, and were used by Erisman for those years. Chao's figures for 1949 to 1957 are a reconstruction of output using the 1957 figure which is believed to be the most reliable. From 1958 on, the various estimates of China's grain output have been based on

TABLE 5-1

ESTIMATES OF CHINA'S TOTAL GRAIN OUTPUT

(MILLION METRIC TONS)

Year	Kang Chao[1]	Erisman[1]	USDA[1]	Field And Kilpatrick[2]	Official Revisions[2]	FAO[3]
1949	134.2	108	. . .	111	. . .	110
1950	143.6	125	. . .	130	. . .	122
1951	155.4	135	. . .	141	143.7	133
1952	166.2	154	154.4	161	. . .	152
1953	169.9	157	156.9	164	. . .	152
1954	175.8	160	160.5	166	. . .	157
1955	181.8	175	174.8	180	. . .	172
1956	188.3	182	182.5	188	. . .	183
1957	186.5	185	185.0	191	195.1	185
1958	205	200	200.0	206	200.0	198
1959	170	165	165.0	171	. . .	183
1960	150	160	150.0	156	143.5	171
1961	160	160	162.0	168	. . .	169
1962	170	180	174.0	180	160.0	182
1963	182	185	183.0	190	. . .	187
1964	195	195	200.0	194	. . .	197
1965	200	210	200.0	194	194.5	208
1966	. . .	215	215.0	215	. . .	206
1967	. . .	230	230.0	225	. . .	215
1968	. . .	215	215.0	210	. . .	213
1969	. . .	220	220.0	215	. . .	222
1970	. . .	240	240.0	243	. . .	240
1971	. . .	246	246.0	246	. . .	250
1972	. . .	240	240.0	240	. . .	242
1973	. . .	250	250.0	266	. . .	257
1974	. . .	255	265.0	275	. . .	264
1975	. . .	. . .	270.0	284	. . .	273
1976	. . .	. . .	272.0	285	. . .	278
1977	. . .	. . .	270.0	285	282.8	275
1978	. . .	. . .	279.0	. . .	304.8	297
1979	. . .	. . .	. . .	. . .	324.9	323

[1] Excluding soybeans, with potatoes converted on a four to one grain equivalent.

[2] Including soybeans, with potatoes converted on a five to one grain equivalent.

[3] Excluding soybeans and pulses, tuber conversion ratio unknown.

TABLE 5-1--Continued

SOURCES: Kang Chao, Agricultural Production in Communist China 1949-1965, Table 8.15, p.227, and p.246; Alva Lewis Erisman, "China: Agriculture in the 1970's" in China: A Reassessment of the Economy, U.S. Joint Economic Committee papers, Table 1, pp.328-29; U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Agricultural Situation: People's Republic of China: Review of 1978 and Outlook for 1979, Appendix Table 2, p.30; Robert Michael Field and James A. Kilpatrick, "Chinese Grain Production: An Interpretation of the Data," The China Quarterly 74 (June 1978): 372; Kang Chao, "The China Watchers Tested," The China Quarterly 81 (March 1980):102-3; Kenneth R. Walker, "Chinese Grain Production Statistics: A Comment on Kang Chao's Research Note," The China Quarterly 82 (June 1980):342-43; "Communique on Fulfillment of China's 1978 National Economic Plan," Beijing Review 6 July 1979, p.38; "Communique on Fulfillment of China's 1979 National Economic Plan," Beijing Review 12 May 1980, p.14; International Wheat Council, "The Grain Economy of China," in Review of the World Wheat Situation 1976/77, Table 39, p.81; and Food and Agricultural Organization of the United Nations, FAO Production Yearbook 1979, Table 9, p.94.

scattered official statements, and reflect the haziness of the figures quoted.[13]

The USDA series, as given in 1979, replaces an earlier series prepared by their Hong Kong office, and is used by Anthony M. Tang in his 1980 report on China's grain production.[14] The reliability of the USDA's earlier series is questioned by Thomas B. Wiens.[15] While the origin of the 1979 USDA series is not clearly explained, it coincides with Erisman's figures for 1965 to 1973. Chao, Erisman, and the USDA all exclude soybeans as grains while using the 4:1 ratio for potatoes.

Some Chinese releases for the blackout years have been reported in research notes by Kang Chao and Kenneth R. Walker in The China Quarterly. The State Statistical Bureau of the PRC has given output figures since 1977 in its communiques on the fulfillment of the National Economic Plan, reported each year in the Beijing Review. All recent references to China's grain output quote the Chinese figures.[16] The USDA also revised its output series in 1980 for the years 1977 to 1979 (See Table 5-3).

Tang states that the FAO data leave much to be desired, "mainly because of lack of documentation of sources, methods of estimation, and assumptions made."[17] The major objection to FAO data could be that Chinese figures include Taiwan. Since 1972, this has been required by the Chinese government for all United Nations statistical coverage.[18] FAO data, however, do not vary greatly from the other estimates, except for between 1959 and 1962. The FAO includes tubers as grains, presumably on a four to one equivalent, but excludes both soybeans and pulses.

USDA and FAO are the only sources to give production of

TABLE 5-2

CHINA'S OUTPUT OF GRAINS
(MILLION METRIC TONS)

Year	Rice	Wheat	Coarse Grains[1]	Tubers[2]	Soybeans	Total Grains[3]
1952	68.5	18.1	51.5	16.4	9.5	154.4
1953	71.3	18.3	50.7	16.7	9.9	156.9
1954	70.9	23.4	49.3	17.0	9.1	160.5
1955	78.0	23.0	55.0	18.9	9.1	174.8
1956	62.5	24.8	53.4	21.9	10.2	182.5
1957	86.8	23.7	52.7	21.9	10.0	185.0
1958	93.0	25.0	52.0	30.0	10.5	200.0
1959	79.0	24.0	41.0	21.0	11.5	165.0
1960	73.0	21.0	36.0	20.0	8.2	150.0
1961	78.0	16.0	44.0	24.0	7.9	162.0
1962	78.0	20.0	53.0	23.0	7.7	174.0
1963	80.0	22.0	56.0	25.0	7.0	183.0
1964	90.0	25.0	59.0	26.0	6.9	200.0
1965	90.0	25.0	60.0	25.0	6.8	200.0
1966	96.0	28.0	66.0	25.0	6.8	215.0
1967	100.0	28.0	76.0	26.0	6.9	230.0
1968	95.0	25.0	70.0	25.0	6.5	215.0
1969	99.0	27.0	69.0	25.0	6.2	220.0
1970	110.0	31.0	75.0	24.0	6.9	240.0
1971	117.0	31.0	75.0	23.0	7.9	246.0
1972	112.0	36.0	69.0	23.0	8.7	240.0
1973	118.0	35.0	73.0	24.0	10.0	250.0
1974	127.5	38.0	74.5	25.0	9.5	265.0
1975	126.5	41.0	77.5	25.0	10.0	270.0
1976	125.5	45.0	76.5	25.0	9.0	272.0
1977	126.5	40.5	76.5	26.5	9.5	270.0
1978	125.5	44.0	81.0	28.5	10.5	279.0

SOURCES: Anthony M. Tang, "Food and Agriculture in China," in Food Production in the People's Republic of China, by Anthony M. Tang and Bruce Stone, IFPRI Research Report No.15, (Washington, D.C.: IFPRI, 1980), Table 3, p.26; and U.S. Department of Agriculture, Economics, Statistics, and Co-operatives Service, Agricultural Situation: People's Republic of China: Review of 1978 and Outlook for 1979 (Washington, D.C.: USDA, 1979), Appendix Table 2, p.30.

[1] Coarse grains include corn, millet, barley, sorghum, pulses, and other grains.

[2] Tubers converted to grain equivalent by 4:1 ratio.

[3] Total grains do not include soybeans.

TABLE 5-3

COMPARISON OF OUTPUT BY GRAINS IN RECENT YEARS
(Million Metric Tons)

Grain	U.S. Department of Agriculture			State Statistical Bureau (PRC)	
	1977	1978	1979	1979	1980
Rice	129.0	137.0	140.5	143.6	139.3
Wheat	41.0	54.0	60.5	61.6	54.2
Coarse Grains	74.5	76.5	77.5	. . .	. . .
Tubers	. . .	. . .	. . .	28.5	27.8
Soybeans	. . .	. . .	. . .	7.4	7.9
Others[1]	38.3	37.3	37.0	90.5	89.1
Total[2]	282.8	304.8	315.5	331.6	318.2

SOURCES: U.S. Department of Agriculture, Economics, Statistics, and Co-operatives Service, Agricultural Situation: People's Republic of China: Review of 1979 and Outlook for 1980, Table 4; and People's Republic of China, State Statistical Bureau, "Communique on Fulfillment of China's 1980 National Economic Plan," Beijing Review 11 May 1981, p.25.

[1] For the U.S. Department of Agriculture, other grains include soybeans and tubers, while for the State Statistical Bureau, other grains include coarse grains and pulses.

[2] U.S. Department of Agriculture figures correspond with the Chinese figures released at that time. The 1979 total grain output was revised by the State Statistical Bureau in their 1981 communique.

individual grains. Table 5-2 records the USDA (1979) output of grains as required for regression purposes. However, in the State Statistical Bureau communique of 1981, grain production has been broken down into its component parts. A comparison of the official figures with that of the USDA (1980) appears in Table 5-3.

III. POPULATION

China has not had a detailed census since 1953. The 1953 figure is generally held to be correct, with varying assumptions applied to postulate growth since then. Until recently, China's statements about population size have been inconsistent and lacked precision. At one time, Li Hsien-nien (a Chinese leader) confessed that China had no accurate population figures.[19] The rounded figures quoted by Chinese officials for visitors have been taken as a sign that China was lacking this basic information. The difficulty arises from the fact that Chinese population data are not gathered for their own sake, but as an appendage to other statistics. The local personnel handling this task are not well trained, and probably do not place high priority on population data.

Much evidence seems to indicate that birth control measures have not been as effective in China as government programs have sought. Unreported births could be significant. The traditional Chinese desire for posterity has not been eliminated, resulting in stricter laws on family planning. For this reason Aird and other demographers estimate China's population to be higher than that given by Chinese officials.

John S. Aird is the major Western expert on China's population and has devoted many years of study to it. In his 1978 paper to the

TABLE 5-4

ESTIMATES OF CHINA'S POPULATION
(MILLIONS)

Year	Aird(1)[1]	Aird(2)[1]	Official[3]	U.N.[2]	Orleans[1]
1953	576.0	576.0	576.0	. . .	. . .
1954	589.2	589.2	. . .	. . .	588.0
1955	602.9	602.9	. . .	. . .	600.3
1956	617.2	617.1	. . .	. . .	612.9
1957	632.7	632.0	. . .	. . .	625.8
1958	647.8	646.5	. . .	. . .	638.3
1959	662.6	660.5	. . .	. . .	651.1
1960	676.9	673.7	. . .	. . .	662.8
1961	689.3	686.4	. . .	. . .	674.1
1962	699.9	698.5	. . .	. . .	685.6
1963	714.1	712.3	. . .	. . .	697.9
1964	729.4	726.7	. . .	. . .	710.5
1965	745.5	741.4	. . .	. . .	723.3
1966	762.6	757.3	. . .	. . .	736.3
1967	779.6	773.1	. . .	. . .	748.8
1968	797.8	789.7	. . .	. . .	761.5
1969	816.8	807.1	. . .	811.6	774.4
1970	836.5	825.1	. . .	825.8	787.6
1971	856.6	843.4	. . .	840.0	800.2
1972	876.7	860.9	. . .	854.2	813.0
1973	896.2	877.3	. . .	868.3	825.2
1974	915.2	892.8	. . .	882.0	837.6
1975	933.7	907.3	. . .	895.3	850.2
1976	952.4	922.0	. . .	908.3	863.0
1977	971.4	937.4	. . .	920.8	875.1
1978	993.6	956.0	958.1	933.0	887.4
1979	1014.1	972.5	970.9	945.0	898.9
1980	1033.1	987.4	982.6	956.9	910.6

SOURCES: John S. Aird,"Population Growth in the People's Republic of China," in Chinese Economy Post Mao, p.465; Leo A. Orleans, "China's Population: Can the Contradictions Be Resolved?" in China: A Reassessment of the Economy,p.77; PRC, State Statistical Bureau, Beijing Review, 19 May 1980, p.24, and 18 May 1981, p.20; United Nations, Monthly Bulletin of Statistics, various issues to 1981.

[1] Totaled as of January 1.

[2] Mid year population figures, revised series.

[3] End of year population totals for 1978-80.

Joint Economic Committee of the U.S. Congress, he prepared a low and high population model. The low model (Table 5-4) used official provincial totals as a minimum estimate. The high model took a conservative approach to dropping fertility rates. A third intermediate model incorporated no basic assumptions on population growth, but was simply the mean of the other two models. Tang uses Aird's intermediate model (at mid-year), confessing that although it is in the higher range of estimates, it "is believed to be based on the most careful, sophisticated, and extensive methodology."[20] The intermediate model (for January 1 of each year) has also been used in trade modelling and is recorded in Table 5-4. The low model, as expected, is very close to the official Chinese population figures in 1978-80.

Orleans' estimates, similar to an earlier U.N. series, are very low compared to China's official population statistics. China reported a population of 975.2 million (including Taiwan) as of December 31, 1978, so in July of 1979 the United Nations revised its figures upward.[21] U.N. data have included Taiwan since the early 1970's. However, the populations reported by the State Statistical Bureau do not include Taiwan. A one billion population began to be quoted in the Beijing Review in the beginning of 1981, although by official figures the population should not reach the one billion mark even by the end of this year.

IV. TRADE DATA

Although China's trade data are available and have been calculated from the reports of trade partners, the procedure poses many problems.[22] Many countries such as Vietnam do not report trade

statistics, leaving a considerable degree of uncertainty in the final figures obtained. The delay in obtaining information from each of China's trade partners is often lengthy, as well as being laborious and time consuming. Quantity figures recorded by the partners will not be identical to China's figures due to the lag in shipping. The values of trade figures need adjustment from free-on-board for exports to cost-insurance-freight for imports and vice versa. The hard currency balance of trade is preferable for analyzing grain trade, is probably more reliable and should be easier to obtain than the total balance of trade, but is not as frequently reported.

The various trade data used in modelling are grain imports and exports, wheat and rice prices, and the balance of trade.

A. Grain Imports and Exports (Tables 5-5 and 5-6)

Fortunately, China's grain imports involve only a few trading partners. While U.S. and Canadian export statistics are readily accessible, Australian exports are not. The USDA gives estimates of China's total grain imports in its annual report on the PRC agricultural situation. More up to date information can be gleaned from the USDA's Foreign Agriculture monthly and USDA circulars on grains. Since the grain suppliers are well known, China's grain import figures do not suffer from constant updating, other than revisions of preliminary figures.

Surprisingly, the U.N. does not record exports to China, although it does include imports from China. FAO gives estimates of China's grain imports, but these figures include Taiwan.[23] This becomes much more significant in trade figures because small nations participate comparatively more in trade than do large nations, and

TABLE 5-5

CHINA'S GRAIN IMPORTS
(Thousand Metric Tons)

Year	Wheat[1]	Corn	Barley	Rice	Coarse Grains	Total Grains
1961	4093	44	1237	62	1446	5601
1962	3957	492	350	5	1160	5122
1963	5455	13	25	97	65	5617
1964	5107	377	570	77	1110	6293
1965	5774	72	24	112	138	6024
1966	5743	20	. . .	51	20	5815
1967	4133	160	. . .	61	160	4354
1968	4340	20	. . .	33	20	4393
1969	3928	5	. . .	5	6	3939
1970	4950	13	. . .	. . .	13	4963
1971	3022	107	. . .	6	107	3135
1972	4252	390	. . .	13	390	4655
1973	5982	1626	. . .	2	1658	7642
1974	5345	1428	. . .	. . .	1428	6700
1975	3339	95	. . .	25	95	3459
1976	1921	. . .	. . .	140	. . .	2061
1977	6838	. . .	. . .	. . .	. . .	6838
1978	7985	1324	. . .	. . .	1324	9309
1979[a]	7976	n.a.	. . .	. . .	2519	10512
1980[a]	11300	n.a.	. . .	. . .	1788	13000

SOURCES: Frederick M. Surls, "China's Grain Trade," in Chinese Economy Post Mao, U.S. Joint Economic Committee papers, (Washington, D.C.: USDA, 1978), Table 1 and Appendix Table 1, pp.655 and 669; U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Agricultural Situation: People's Republic of China, Review of 1978 and Outlook for 1979, Table 9, and Review of 1979 and Outlook for 1980, Table 9; U.S. Department of Agriculture, Foreign Agriculture Service, Foreign Agriculture December 1980, p.9.

[1] Includes wheat flour converted to whole grain equivalent.

[a] Preliminary. n.a. - Not available.

TABLE 5-6

CHINA'S GRAIN EXPORTS
(Thousand Metric Tons)

Year	Rice[1]	Wheat	Corn	Wheat and Coarse Grains	Total Grain Exports	Revised Rice Exports
1961	444	121	30	154	598	. . .
1962	578	89	1	90	668	. . .
1963	640	110	110	222	862	. . .
1964	784	111	170	289	1073	. . .
1965	753	. . .	254	264	1017	. . .
1966	1264	. . .	227	239	1503	. . .
1967	1198	23	75	114	1312	. . .
1968	967	. . .	51	69	1036	. . .
1969	811	. . .	. . .	20	831	. . .
1970	986	4	1	47	1033	. . .
1971	924	3	93	119	1043	. . .
1972	899	17	99	159	1058	1556
1973	2142	7	26	68	2210	2592
1974	1983	29	77	138	2121	2552
1975	1440	. . .	115	181	1621	1964
1976	900	. . .	126	168	1068	1446
1977	1000	. . .	58	100	1100	1023
1978	1400	. . .	. . .	. . .	nav.	1210
1979	900	. . .	. . .	. . .	nav.	1200[a]

SOURCES: Frederick M. Surls, "China's Grain Trade," in Chinese Economy Post-Mao, U.S. Joint Economic Committee papers, Table 1 and Appendix Table 1, pp.655 and 669; U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Agricultural Situation: People's Republic of China: Review of 1978 and Outlook for 1979, Table 9, and Review of 1979 and Outlook for 1980, Table 9.

[1] Milled weight.

[a] Preliminary. nav. - Not available.

Taiwan has considerable imports of wheat and coarse grains. The trade statistics of Taiwan itself were unavailable. Apparently Taiwan's exports of rice have diminished greatly in recent years, so the FAO rice exports for China could be more reliable than the grain imports.

China's grain exports are possibly the most frustrating statistic to determine. As an example of this, the USDA, in its 1979 report on the PRC agricultural situation, listed China's rice exports as given in the first column of Table 5-6. In 1979-80, however, the entire series from 1973 on was updated and revised, probably because more records from China's trading partners became available. Unlike imports, China's grain exports go to an entire spectrum of developing nations. Large exports to Vietnam are not recorded at all. Other nations keep poor records of commodity trade, which are often delayed in submission to the UN statistics office. Czechoslavakia and other Eastern European Communist nations release the value of trade, but not the quantity. The U.N.'s Commodity Trade Statistics record each nation's imports of rice from China, but this is incomplete at best, and may be unreliable unless data are carefully compiled by experts on Chinese trade.

Surls has calculated China's exports of wheat and coarse grains from trade partner statistics. These are needed to determine net wheat and coarse grain imports. Unfortunately there is no ready source from which to obtain an update of wheat and coarse grain exports, so this data must be tabulated again for each country if it is to be included in trade analysis.

B. Wheat and Rice Prices

While grain prices seem well defined in theory, they change rapidly in practise. Spot market prices exist at any point in time for the major grains of world trade. These are recorded by day, month, and yearly averages. Wholesale prices in Tables 5-7 and 5-8 are reported by the International Monetary Fund in their yearbook on financial statistics. Prices differ by the point of in-store purchase. While it would be better to use Canadian wheat at Vancouver, these prices are averaged by the International Wheat Council for the cropping year rather than the calendar year, so the Fort William price as given by the IMF is used instead for comparison. Different grades of grain also have different prices.[24]

For regression purposes, the actual price of grain traded (value divided by quantity) is used. Trade prices lag behind market prices due to the time in shipment. When assessing the actual cost of China's imports and receipts from China's exports, it is necessary to change free-on-board prices reported by the exporting nations to cost-insurance-freight prices paid by China, and vice versa for rice exports. Surls adjusts wheat trade values upwards by 10 percent and rice trade downwards by 7.5 percent due to China's proximity to its rice purchasers.

In estimating trade prices for recent years, special procedures have been followed. As noted, trade prices can differ considerably from market prices although the general pattern is followed. For grain imports it would not be difficult to continue the total trade to 1980 if export statistics for Australia, the EEC, Argentina, and Thailand were available. Even the addition of Australia would give

TABLE 5-7

WHEAT IMPORT PRICES

($U.S. PER TON)

Year	Market Prices[1]		Trade Prices[2]			
	Australia Sydney	Canada Ft.William	Total Grain Trade(CIF)	Canada Wheat	U.S. Wheat	U.S. Corn
1961	56.95	63.93	58.9[illegible]	nav.	. . .	. . .
1962	60.63	66.87	66.38	nav.	. . .	. . .
1963	59.53	67.24	64.98	nav.	. . .	. . .
1964	63.93	69.81	66.73	nav.	. . .	. . .
1965	55.85	66.14	64.74	39.9	. . .	. . .
1966	62.83	70.55	65.3[illegible]	40.7	. . .	. . .
1967	61.73	69.45	70.05	46.0	. . .	. . .
1968	58.42	66.51	66.01	44.1	. . .	. . .
1969	56.95	64.30	62.20	42.9	. . .	. . .
1970	54.75	62.83	56.42	60.5	. . .	. . .
1971	57.69	64.30	68.58	63.8	. . .	. . .
1972	67.98	70.92	68.74	61.9	. . .	. . .
1973	144.77	146.98	101.41	78.6	64.5	72.0
1974	195.48	209.44	157.98	188.0	106.0	107.3
1975	148.08	181.25	164.79	159.7	126.5	110.8
1976	126.03	149.18	160.12	144.9	. . .	. . .
1977	106.56	115.38	104.3[illegible]	103.1	. . .	. . .
1978	136.32	134.85	116.6*	106.0	128.7	104.1
1979	157.63	173.43	136.5*	149.2	132.0	105.9
1980	. . .	. . .	174.6*	197.7	166.4	126.1

SOURCES: Market prices from the International Monetary Fund, Bureau of Statistics, International Financial Statistics (Washington D.C.: IMF, 1980); Total grain import values from Frederick M. Surls, "China's Grain Trade," Chinese Economy Post Mao, Table 3, p.658; Canadian wheat exports and export values from Statistics Canada, Exports By Commodities (65-004) Ottawa, 1965 to 1980; U.S. wheat and corn exports and export values from the U.S. Department of Agriculture, Economics and Statistics Service, U.S. Foreign Agricultural Trade, calendar year statistical reports for 1973 to 1980.

[1] Wholesale market prices.

[2] Trade price = value of grain traded / quantity (also known as the unit price). Partner trade statistics use free-on-board values. A 10% upward adjustment is made to determine the cost-insurance-freight import price paid by China.

nav. - Not available.

* Estimation using known imports from Canada and the United States. See Appendix Three, Table A-2.

TABLE 5-8

RICE EXPORT PRICES

($U.S. PER TON)

Year	Market Prices		Trade Prices[1]			
	Thailand White 5%	China 35% Brokens	Total Trade Price (FOB)	Hong Kong (CIF)	Partial Tr.[2] Price (FOB)	Tr. Price Estimate
1961	136.5	91.3	104.82	113.3	. . .	. . .
1962	152.8	91.1	129.53	138.4	. . .	. . .
1963	143.4	93.7	113.03	143.1	. . .	. . .
1964	137.7	100.4	103.95	132.4	. . .	. . .
1965	136.3	100.8	98.33	145.0	. . .	. . .
1966	163.2	100.8	119.76	160.6	. . .	. . .
1967	206.0	133.0	139.64	224.3	. . .	. . .
1968	201.6	158.2	164.09	214.8	. . .	. . .
1969	186.9	122.4	150.42	227.8	. . .	. . .
1970	144.0	103.8	131.20	205.3	. . .	. . .
1971	129.0	83.4	134.62	176.8	. . .	. . .
1972	147.1	79.3	110.47	155.0	123.8	. . .
1973	330.4	[illegible]	236.04	366.0	251.7	224.6
1974	542.0	[illegible]	389.58	590.5	397.2	372.5
1975	363.1	294.0	363.97	[illegible]	382.5	375.2
1976	254.6	209.6	290.26[p]	[illegible]	324.1	308.4
1977	272.2	196.8	275.00[p]	320.4	290.2	260.0
1978	367.5	202.0[p]	. . .	364.3	332.4	315.0
1979	334.2	. . .	. . .	344.9	. . .	. . .

SOURCES: Thailand market prices from the International Monetary Fund, International Financial Statistics Yearbook (1980); Chinese market prices from the Food and Agricultural Organization of the United Nations, FAO Rice Report(Rome: FAO, 1961 to 1971), and reports of the Intergovernmental Group on Rice(Rome: FAO,1976, and Manila: FAO, 1979); Total grain export values from Frederick M. Surls, "China's Grain Trade," in Chinese Economy Post Mao, Table 3,p.658; Rice exports and export values to Hong Kong and other nations included in the calculation of partial trade prices are from the United Nations, Department of International Economic and Social Affairs, Commodity Trade Statistics (New York: UN, 1972 to 1978).

[1] Trade or unit price = value of grain traded / quantity. Trade partner statistics record CIF values of rice imports. A 7.5% downward adjustment is made to determine China's FOB rice export price.

[2] See Appendix Three, Table A-3. Estimated trade price equals the total trade price of the previous year times the partial trade price ratio of the current and previous years.

* Estimated with incomplete information.

[p] Preliminary value.

a very close approximation of at least the grain import price, if not the total import quantity. However, using the records of Canada and the U.S. only, a partial trade price can be calculated by summing the total grain imports from these two sources and dividing the value by the quantity. Since Canada and the U.S. form such a large portion of China's sources in recent years, this does not give a bad approximation when revised upwards to CIF values (see Appendix Three, Table A-2).

Rice export prices can follow a similar procedure with a slight variation due to increasing uncertainty. Rice trade quantities and values are unavailable for many nations for the years 1972 to 1978. Acquiring recent data is delayed by the greater number of reporting nations.[25] Using data available for some of China's major rice purchasers, partial rice trade prices are calculated in Appendix Three, Table A-3 for 1972 to 1978. Similar to grain imports, the rice export values and quantities are summed for each year and divided to obtain a partial trade price. When compared to Table 5-8, however, it is noticed that the partial trade price is consistently higher than the total trade price obtained when all nations are included in the sums. This is because much of China's remaining trade goes to developing nations as food aid at reduced prices. To estimate rice export prices in 1978, the total trade price of the previous year is multiplied by a ratio of the current and previous year's partial trade prices (already adjusted from CIF to FOB).

C. The Balance of Trade (Table 5-9)

Batsavage and Davie report China's balance of trade using data compiled by the Central Intelligence Agency in its annual publication

TABLE 5-9

CHINA'S BALANCE OF TRADE
(MILLION U.S. DOLLARS)

Year	Total Trade	Imports	Exports	Trade Balance	Hard Currency Trade Balance	IMF Trade Balance [1]
1960	3990	2030	1960	-70	-120	. . .
1961	3015	1490	1525	+35	-215	. . .
1962	2670	1150	1520	+370	-55	. . .
1963	2775	1200	1575	+375	-15	. . .
1964	3220	1470	1750	+280	-40	. . .
1965	3880	1845	2035	+190	+55	. . .
1966	4245	2035	2210	+175	+95	. . .
1967	3915	1955	1960	+5	-135	. . .
1968	3785	1825	1960	+135	-25	. . .
1969	3895	1835	2060	+225	+30	. . .
1970	4365	2210	2155	-55	-250	. . .
1971	4850	2315	2535	+220	+60	. . .
1972	6020	2800	3220	+420	+95	. . .
1973	10125	5025	5100	+75	-440	-224
1974	14105	7375	6730	-645	-1185	-1304
1975	14520	7400	7120	-280	-585	-795
1976	13305	6035	7270	+1235	+1120	+870
1977	14667	7148	7519	+371	+630	+572
1978	21162	11166	9996	-1170	. . .	-1162
1979	29266	15630	13636	-1994	. . .	-2305
1980[a]	37506	19386	18120	-1266	. . .	. . .

SOURCES: Richard E. Batsavage and John L. Davie, "China's International Trade and Finance," in Chinese Economy Post Mao, Table A-1, p.733; U.S. Department of Agriculture, Economics, Statistics, and Cooperatives Service, Agricultural Situation: People's Republic of China: Review of 1979 and Outlook for 1980, p.24, and Review of 1978 and Outlook for 1979, p.22; Far Eastern Economic Review, "China - Economy," in Asia 1981 Yearbook; PRC, State Statistical Bureau, "Communique on Fulfillment of China's 1980 National Economic Plan," Beijing Review, 18 May 1981, p.18; International Monetary Fund, International Financial Statistics: Supplement on Exchange Rates(1981), p.45, and Direction of Trade Yearbook (1980), pp.119-20.

[1] Trade with other Communist countries is not included.

[a] Converted to $U.S. using 1$U.S. = 1.5011 Yuan.

China: International Trade, 1976-77. The CIA data are also used by the USDA, but could not be obtained for recent estimates of China's hard currency balance of trade. While the USDA in its 1979 report gives China's estimated hard currency balance of trade, only the total balance of trade is included in the 1980 issue. The Chinese have included balance of trade figures in their recent statistical releases, and could soon be submitting more detailed financial reports to the International Monetary Fund as part of their entry requirements.[26] This may include data on China's total foreign exchange reserves.[27] The International Monetary Fund includes balance of trade figures for the People's Republic of China in its 1980 Direction of Trade Yearbook, but does not include trade with Communist countries. Some differences do exist between the various series quoted.

V. SUMMARY

While data on China's population, grain output, grain trade, and balance of payments are available, their reliability is very questionable. With recent releases by the State Statistical Bureau, the data base is considerably better. China's official population data may be unreliable due to a lack of care or honesty in local reporting. Grain output data have been released since 1977, but are missing or confused by grain definitions in the blackout period (1959 to 1976). The output of individual grains is less reliable than the total grain output. China's grain imports and import prices are well reported by the exporting partners. Significant data problems exist for the rice export quantities and prices due to the lack of figures for non-reporting nations, and the constant revision as records are received

from smaller nations. China is reporting balance of trade figures, and reasonable estimates of the trade balance can be made for earlier years. Some difficulties exist in obtaining recent data for the hard currency balance of trade.

NOTES TO CHAPTER FIVE

[1] John Lossing Buck, "Food Grain Production in Mainland China Before and During the Communist Regime," in Food and Agriculture in Communist China, by John Lossing Buck, Owen L. Dawson, and Wu Yuan-Li, p. 5.

[2] Buck, "Food Grain Production," pp. 9 and 12.

[3] See Kang Chao, Agricultural Production in Communist China 1949-1965, chapter 8.

[4] See Chen Nai-ruenn, Chinese Economic Statistics, pp. 54-56; and Li Choh-Ming, The Statistical System of Communist China, pp. 123-24.

[5] The USDA reported in 1980 that the State Statistical Bureau had just begun to function again the last two years after having been a casualty of the Cultural Revolution. Thus official data for 1958 to 1977 are incomplete and of uncertain quality. U.S. Department of Agriculture, Economics, Statistics, and Co-operatives Service (USDA, ESCS), Agricultural Situation: People's Republic of China: Review of 1979 and Outlook for 1980, pp. 6 and 8.

[6] Kang Chao questions whether the measurement of output by barn yield was ever implemented in full. Agricultural Production, pp. 242-43.

[7] Roger W. Hay, "Statistics on food and agriculture in China," Food Policy 4 (November 1979):295-99.

[8] Agriculture Canada, Regional Development and International Affairs Branch, "People's Republic of China," Agriculture Abroad October 1980:12.

[9] Robert Michael Field and James A. Kilpatrick, "Chinese Grain Production: An Interpretation of the Data," The China Quarterly 4 (June 1978):369-84.

[10] Anthony M. Tang, "Food and Agriculture in China," in Food Production in the People's Republic of China, by Anthony M. Tang and Bruce Stone, Research Report No. 15, International Food Policy Research Institute, footnote 22, pp. 22 and 24.

[11] "Communique on Fulfillment of China's 1980 National Economic Plan." Beijing Review 11 May 1981, p. 25.

[12] The recent output figures still leave some confusion in determining the final output. Calculating the previous year's output back by using the percentage changes quoted from the year before give different figures than those originally quoted by the Bureau. Thus,

the initial figures appear to be preliminary. See also the comments by the USDA,ESCS in Agricultural Situation (1980), footnote 3, p. 8. Table 5-1 records the official Chinese grain output figures as originally given.

[13] Thomas B. Wiens describes the reconstruction of grain output since 1958 as "building castles in quicksand." The scattered statements on which these series are based are summarized by Wiens in Appendix F of Quantitative Measures of China's Economic Output, edited by Alexander Eckstein, pp. 324-26.

[14] "Food and Agriculture in China," Table 3.

[15] "Agricultural Statistics in the People's Republic of China," in Quantitative Measures, Table 12, p. 80.

[16] The U.S. Department of Commerce, in its publication China's Economy and Foreign Trade 1978-79 by Chen Nai-ruenn quotes the following grain output series for China:

(Million Metric Tons)

Year	1972	1973	1974	1975	1976	1977	1978
Output	240	266	275	284	285	283	305

Chen lists his source for these statistics as: "Communique on the Fulfillment of China's 1978 Economic Plan," 27 June 1979. This communique does not appear to be that usually published in the Beijing Review. It is not known whether all the figures in the above series are of Chinese origin, or whether figures since 1977 have simply been incorporated into the existing USDA output data.

[17] Tang, Food Production, p. 22.

[18] John Wong, "China's wheat import programme," Food Policy 5 (May 1980):121.

[19] Leo A. Orleans, "China's Population: Can the Contradictions Be Resolved?" in China: A Reassessment of the Economy, U.S. Joint Economic Committee papers, p. 71.

[20] Tang, Food Production, p. 44.

[21] Revised figures for 1954 to 1969 were unavailable.

[22] See Riley H. Kirby's comments in Agricultural Trade of the People's Republic of China 1935-1969, Foreign Agricultural Economic Report No. 83, U.S. Department of Agriculture, Economic Research Service, pp. 1-4.

[23] The inclusion of Taiwan in FAO statistics on China is noted in the FAO Production Yearbook, and was confirmed for FAO's trade data on China through personal correspondence.

[24] The lower grades of wheat bought by the Chinese account in part for the difference between world wheat prices and the price of China's wheat imports.

[25] The University of Alberta library receives only the Commodity Trade Statistics fascicles. Using UN microfiche or computer files could update trade data by about one year, due to earlier publications.

[26] Until 1979 the IMF published detailed financial accounts for Taiwan in its Balance of Payments Yearbook, but both Taiwan and the PRC were omitted in the 1980 yearbook.

[27] See chapter four, note 14.

CHAPTER SIX

AN ANALYSIS OF GRAIN TRADE MODELS

I. INTRODUCTION

Analyzing grain trade through trade models is useful both for understanding past trade patterns and for giving some quantitative measure to predict future trade levels. China's trade patterns can and do vary abruptly over time as government policies change. This makes it difficult to establish long term trade patterns, although significant trends do occur over shorter periods. Frederic M. Surls has presented some interesting regression results which note such a short term pattern for wheat imports over the 1969 to 1975 period of the Cultural Revolution.[1] His models for rice exports were not as successful as for wheat imports, but do show a significant relation to the cost of grain imports over the 1961 to 1975 period.

Stating that simultaneous exports of rice and imports of wheat are a good way of making money, the Chinese government has inferred a relation between grain trade and international grain prices. Despite this, Surls could find no significant relation between China's grain trade and either grain prices or the rice/wheat price ratio. While noting that rice exports were affected by the cost of grain imports, the reverse case of rice exports affecting grain imports was not found to hold.

The objective of this analysis is first to repeat the regression results reported by Surls, and then to attempt further modelling

improvements through the reintroduction of rice exports and the rice/wheat price ratio as a trade factor. A simultaneous equations model for grain imports and rice exports is also tested. The object of this modelling is to predict grain trade in the year following using trade factors determined in the current year. This chapter discusses Surls' models, the a priori reasoning for further trade models, the regression results obtained, and then compares grain trade predictions of successful models for the years 1976 to 1978.

II. A REPETITION OF SURLS' TRADE MODELS

Appendix 2 is an excerpt from Surls' paper giving his regression results for China's grain trade. These results have been repeated and are recorded in Table 6-1.[2] Y1 is the net per capita wheat and coarse grain imports. The regressors for the wheat import equation are: X1, the per capita grain production, excluding rice, lagged one year (kilograms per capita); X10, the per capita grain production, excluding rice, lagged two years (kilograms per capita); and X2, the hard currency balance of trade surplus in the preceding year (million $U.S.).

Equation (1) did not yield as significant results as those recorded by Surls. The grain production data may not have been identical for the two regressions as Surls records coefficients of .34 and .0736 for X1 and X10 respectively. Equation (1) also finds X2 to be insignificant at the .90 confidence level whereas Surls records it as significant at the .95 confidence level. The corrected coefficient of determination was found to be only .804, whereas .90 was reported in Surls' run.[3] Even with a high R^2 value of .90, this was not significant at the .95 level of confidence due to the small number of observations.

TABLE 6-1

REGRESSION RESULTS FOR REPETITION OF SURLS' GRAIN TRADE MODELS

Number	Equation	R^2	$\bar{R}^2$	f	dw	Period
Wheat Equation						
(1)	$Y1 = 85.68 - .459X1 - .0723X10 + .0019X2$ $(4.94)^* \quad (4.08)^* \quad (1.35) \quad (2.28)$	.902	.804	9.2**	2.74	1969-75
Rice Equation						
(2)	$Y20 = -2947 + 27.43X30 + 1.33Y4$ $(3.18)^* \quad (3.51)^* \quad (4.47)^*$	.821	.792	27.6*	2.26*	1961-75

* Significance at the .95 percent level.

** Significance at the .90 percent level.

f : F Statistic.

dw : Durbin-Watson Statistic.

$\bar{R}^2$: Corrected coefficient of determination.

Note: T values appear in parentheses.
All equations use ordinary least squares procedure.

Equation (2) regresses Y20, the net rice exports (thousand tons), on X30, the average per capita rice production in the current and previous years (kilograms per capita), and Y4, the cost of grain imports in the current year (million $U.S.). The rice export model is consistent over the longer observation period of 1961 to 1975. The results reported by Surls are repeated almost identically. Each coefficient is significant at the .95 confidence level, the coefficient of determination is significantly different from zero, and the Durbin-Watson statistic does not indicate problems with autocorrelation.

III. MODIFIED SPECIFICATION OF TRADE MODELS

This section gives the a priori reasoning for incorporation of the rice/wheat ratio in China's grain trade models.

Consider the position of the Chinese as they decide how much wheat to import. Information available to them consists of the domestic grain output, urban supplies, the prices for which wheat can be imported and rice exported, and the foreign exchange reserves on hand. An important factor in this decision is the current Chinese grain reserves and the desired level of reserves. Unfortunately, this information cannot be reliably estimated. Details of China's foreign exchange reserves over time are also unavailable, although estimating this by the hard currency balance of trade is valid considering the Chinese have a stated policy of balancing imports with exports.

Define:

Y1 = Quantity of grain to be imported.

p_w = International price of wheat.

p_r = International price of rice.

ΔW = Domestic grain shortfall.

ΔR = Rice available for export.

FER = Foreign exchange reserves on hand.

The exchange spent on grain imports, $p_w \cdot Y1$, should be a function of the cost to cover the shortfall, $p_w \cdot \Delta W$, the exchange which can be earned through exporting available rice supplies, $p_r \cdot \Delta R$, and the foreign exchange reserves on hand, FER.[4] This can be expressed in the following equations:

$$p_w \cdot Y1 = b_0 + b_1 \cdot p_w \cdot \Delta W + b_2 \cdot p_r \cdot \Delta R + b_3 \cdot FER \quad (3)$$

or $$Y1 = b_0' + b_1' \cdot \Delta W + b_2' \cdot \Delta R \cdot p_r/p_w + b_3' \cdot FER/p_w \quad (4)$$

($b_0, \ldots, b_3, b_0', \ldots b_3'$ are the regression parameters, error terms omitted.)

Equation 4 is very similar to Surls' formula. Trial and error has dictated the final form of the variables. Wheat and rice output figures were found to be preferable to estimates of production shortfall and expendible rice supplies. Dividing the foreign exchange variable by the price of wheat and thus obtaining similar units to the grain imports did not improve the models. The use of per capita grain trade and production was also tested and found to be correct. A priori reasoning can justify the form of some of the variables used in the models, but it cannot explain all the structural details.

The variable of interest in equation (4) is that which includes the rice/wheat price ratio. While the rice production times the price ratio could be of significance, the variable tested is the rice exports (per capita) times the rice/wheat price ratio. Since rice exports are concurrent with the wheat imports, they are both endogenous variables, and belong to a set of simultaneous equations. Both single and

simultaneous equation models have been tested. No new variables have been introduced in the rice equation, but variations of the previous factors, incorporating the rice/wheat price ratio, have been tested.

IV. REGRESSION RESULTS

A. Single Equation Models

The wheat and rice price ratio is the only new data variable required for the modified single and simultaneous equation models.[5]

Single equation regression results are recorded in Table 6-2. Y1 is the net per capita wheat and coarse grain imports of the current year; X1 is the grain production, excluding rice, lagged one year; and X2 is the hard currency balance of trade surplus lagged one year. Equation (5) includes only one new variable, Y2, which is the per capita rice exports in the current year times the rice/wheat price ratio (kilograms per capita). Exogenous variables are denoted with X's, while Y's are used to denote endogenous variables. A very high correlation is found by regressing Y1 over X1, X2 and Y2 for the years 1969 to 1975. The production variable turns out to have the least significance in the short run, while the foreign exchange and rice export-price ratio variables are of greater importance. Extending the run to 1966 to 1975 (the period of the Cultural Revolution) lessens the significance of the production variable considerably (equation 6). Similarly using two-variable runs over the 1969 to 1975 time period achieves the best results by omitting the production variable (equation 7).[6] However, in regressing all three variables for the longer run of 1961 to 1977, and over periods including the early 1960's, the production variable turns out to be the most significant.

TABLE 6-2

REGRESSION RESULTS FOR SINGLE EQUATION GRAIN TRADE MODELS

Number	Equation	R^2	$\bar{R}^2$	f	dw	Period
Wheat Imports						
(5)	Y1 = 32.36 - .192X1 + .00203X2 + .732Y2 (3.08)**(2.83)** (6.67)* (5.50)*	.986	.972	69.4*	1.87	1969-75
(6)	Y1 = 9.09 - .039X1 + .0025X2 + .941Y2 (1.42) (.98) (4.22)* (4.77)*	.877	.816	14.3*	2.38	1966-75
(7)	Y1 = 2.68 + .00238X2 + 1.03Y2 (5.48)* (5.14)* (7.52)*	.948	.922	36.4*	3.40	1969-75
Net Grain Imports						
(8)	Y3 = 25.55 - .080X11 + .00205X2 (6.33)* (5.39)* (3.05)*	.743	.706	20.2*	1.31[a]	1961-77
Rice Exports						
(9)	Y21 = -2897 + 14.84X3 + 3.134Y4 (5.03)* (5.51)* (5.90)*	.909	.893	59.6*	1.82*	1961-75

* Significance at the .95 percent level.

** Significance at the .90 percent level.

[a] Serial correlation indeterminate.

f: F statistic.

dw: Durbin-Watson statistic.

$\bar{R}^2$: Corrected coefficient of determination.

Note: T values appear in parentheses.
All equations use ordinary least squares procedure.

The coefficient of the Y2 variable should also be noted. If the Chinese were simply adding the exchange earned from rice exports and determining how much wheat could then be imported the coefficient of Y2 would be one. In many of these runs the Y2 parameter is very close to one. If all the rice export earnings are used in exchange for wheat, the net grain imports not paid for by rice exports should be a significant function of the production and balance of trade factors. This is tested in equation (8), where Y3, the 'net' grain imports, are defined to be Y1 -Y2; X11 is the total per capita grain production lagged one year (kilograms per capita); and X2 is the lagged hard currency balance of trade surplus. Equation (8) shows the highest correlation of regression runs over the longer run of 1961 to 1977. However the net import model can only be used to predict Y3, the grain imports not paid for by rice exports, and is not as useful for predicting grain imports directly.

Regression runs are not as successful over the longer run because it would appear the grain import policy changed after 1965. This is when the price ratio begins to become a significant variable and the production factor loses importance. Autocorrelation becomes a problem in the longer runs. While the Cochrane-Orcutt technique can be used to remedy this, and still provides a method of prediction, analyses and predictions are more precise over the shorter runs when more consistent trade policies apply.

The rice export model differs only from Surls' model by the inclusion of the rice/wheat price ratio multiplying the rice exports and the rice production factors. Y21 is the net rice exports times the rice/wheat price ration (thousand tons), X3 is the average of the current and previous year's per capita rice production times the rice/wheat

TABLE 6-3

REGRESSION RESULTS FOR SIMULTANEOUS EQUATION MODELS

Number	Equation	R^2	$\bar{R}^2$	f	dw	Period
	Reduced Form Equations					
(10)	Y1 = 60.81 - .392X1 + .00196X2 + .0136X32 (2.00) (2.19) (1.68) (.75)	.868	.735	6.55**	1.16	1969-75
(11)	Y2 = 28.17 - .216X1 - .000258X2 + .0267X32 (.82) (1.06) (.20) (1.31)	.762	.523	3.19	1.28	1969-75
	Structural Equations					
(12)	Y1 = 46.50 - .282X1 + .00183X2 + .508Y2F (.99) (.94) (1.73) (.75)	.868	.735	6.55**	1.16	1969-75
(13)	Y2 = -6.644 + .0279X32 + .3764Y1F (2.07) (2.29)** (1.53)	.749	.623	5.96**	.82	1969-75

* Significance at the .95 percent level.

** Significance at the .90 percent level.

f: F statistic.

dw: Durbin-Watson statistic.

$\bar{R}^2$: Corrected coefficient of determination.

Note: T values appear in parentheses. Two stage least squares procedure is used for the structural equations.

price ratio (kilograms per capita), and Y4, defined as before, is the cost of the grain imports. This simple addition improves the model considerably, giving a corrected R^2 of .893 compared to .792 for Surls' run. For the rice production variable it made very little difference whether the current or previous year was used or an average of the two. However, the use of grain imports, instead of the cost of grain imports, considerably lessened the effectiveness of the rice model.

B. Simultaneous Equation Models

Y1, Y2, and Y4 are endogenous variables determined by the system. On a priori grounds this leads to a dependency of right hand variables on the error terms. Two stage least squares procedure is used to remove this dependency and obtain consistent estimates of the structural coefficients.

A second reason for using simultaneous equations procedure is that rice exports are not known beforehand. Prediction for the current year could only then be made with a poor estimate of current year rice exports. The predetermined variables used for two stage least squares procedure are the grain and rice production of the previous year, as well as the hard currency trade balance lagged one year, all of which are available prior to China's trade decisions. Strictly speaking, the rice/wheat price ratio would have to be estimated as trade prices also are not known beforehand.

A major concern for the simultaneous equation model is the fact that the wheat and rice equations do not use identical variables. Using per capita variables in the rice equation gives:[7]

$$Y1 = g_{10} + g_{11} \cdot X1 + g_{12} \cdot X2 + b_1 \cdot Y2$$

$$Y2 = g_{20} + g_{23} \cdot X32 + b_2 \cdot Y1 \cdot p_w$$

using g for 'gamma', and b for 'beta' to designate the exogenous and endogenous parameters respectively. The presence of p_w, an exogenous variable, multiplying Y1 in the rice equation prevents the use of normal simultaneous equations procedure.[8] (X32 is the per capita rice production of the previous year times the rice/wheat price ratio.)

Table 6-3 gives the regression results for the reduced form and structural equations using Y1 for $p_w \cdot Y1$ in the rice equation.[9] Similar tests using the current year's rice production times the rice/wheat price ratio (defined to be X31) gave comparable results, but only those for X32 are reported. The results from the simultaneous equations procedure show no improvement over the single equation models. The Durbin-Watson statistics also show serial correlation to be a problem (probably due to the low number of observations). Thus, although these estimators should be consistent, the single equation models are more efficient for prediction purposes. From single equation models we can conclude there is a two way interrelation between China's grain import and rice export decisions, but simultaneous equations procedure can not confirm this as the regression results are statistically unreliable.

V. GRAIN TRADE PREDICTIONS

A. Data Problems and Adjustments

Surls has reported data for 1961 to 1977, making it simpler to duplicate his results and compare models for this time period. However, many of his 1976 and 1977 data are preliminary figures. This does not affect the model analysis which only covers up to 1975. Some of the

TABLE 6-4

INPUT AND OUTPUT VARIABLES[a]

	1975	1976	1977	1978
Population	933.7	952.4	971.4	993.6
Total Grain Production	270.0	272.0	282.8	304.8
Rice Production	126.5	125.5	129.0	137.0
Wheat and Coarse Grain Production	143.5	146.5	153.8	137.0
Hard Currency Balance of Trade	-585	1120	+630	-1170[b]
Grain Imports	3459	2061	6838	9930
Coarse Grain Exports	181	168	100	nav.
Net Grain Imports	3278	1893	6738	9309
Value of Grain Imports	570	330	720	nav.
Wheat Price	164.8	160.1	104.4	116.6
Rice Exports	1440	900	1023	1210
Rice Imports	. . .	25	140	nav.
Net Rice Exports	1440	875	883	1210
Value of Grain Exports	590	310	220	nav.
Rice Price	364.0	290.3	275.0	315.0
Rice/Wheat Price Ratio	2.208	1.813	2.635	2.702
X1 (kg./capita)	150.2	153.7	153.8	158.3
X11 (kg./capita)	289.6	289.2	285.6	291.1
X2 (million $ U.S.)	-1185	-585	+1120	+630
X3 (kg./capita)	303.5	242.2	348.6	365.6
X31 (kg./capita)	299.2	238.9	350.0	372.5
X32 (kg./capita)	307.7	245.6	347.3	358.8
Y1 (kg./capita)	3.511	1.988	6.936	9.369
Y2 (kg./capita)	3.406	1.665	2.396	3.290
Y21 (thousand tons)	3181	1586	2327	3269
Y3 (kg./capita)	.104	.322	4.541	6.079
Y4 (million $U.S.)	570	330	714	1085

[a] Input data are recorded in the same units as their respective tables in chapter five.

[b] Total trade balance. nav. = Not available.

1976 and 1977 data have been adjusted to accord with more recent estimates as reported in chapter five.

Table 6-4 lists all the input and output variables required for the models in the years 1976 to 1978. Population data present no difficulty. Grain production, however, was significantly changed in the U.S. Department of Agriculture estimates, having a very noticeable affect on trade prediction. The most recent (1980) revisions only extended back to 1977, so before this the previous USDA estimates were used. The 1978 hard currency balance of trade was very roughly estimated by the overall trade balance as officially reported. As no data since 1977 are available for coarse grain exports or rice imports these are omitted from net grain imports and net rice exports in 1978.

As total grain trade values are not available in 1978, the rice and wheat prices are instead estimated as shown in chapter five and Appendix 2. However, up to 1977 the rice and wheat prices are calculated from the preliminary trade figures reported by Surls. For this reason the Y4 variable (cost of grain imports) in 1977 and 1978 is calculated by multiplying the wheat price by the total grain imports. It differs from Surls' 1977 trade value figure due to a revision of grain imports in that year.

A major complication was the 1979 USDA revision of rice exports back to 1972. Since the complete historical series was not reported, it could not be substituted for the entire analysis. In addition it was necessary to keep variables close to those used by Surls. Therefore rice exports followed Surls' figures up to 1976, and the revised USDA series thereafter.

TABLE 6-5

Summary of Trade Predictions for

Single Equation Models

(Million Tons)

Equation	Model Description	1976	1977	1978
Wheat Imports				
	Actual	1.89	6.74	9.31[a]
(1)	Surls'	3.02	5.93	3.07
(5)	Price Ratio	2.71	6.62	5.88
Rice Exports				
	Actual	.88	.88	1.21[b]
(2)	Surls'	1.16	1.63	2.21
(9)	Price Ratio	.96	1.71	2.20

B. Comparison of Single Equation Models

While it is possible to use various models discussed in section IV for prediction, the single equation models of equations (5) and (9) are the most efficient. Simultaneous equations models are interesting and justified by logic, but are not reported here due to the inefficiency of the estimates obtained. Table 6-5 compares trade predictions for 1976 to 1978 of Surls' models and the modified price ratio equation with actual grain imports and rice exports. The data changes and inconsistencies become a problem for prediction in 1978 and after, so that 1979 is not even reported. The major inconsistency is the rapid rise in China's 1978 grain output, which could be due to more honest reporting.

Predictions of wheat imports are better than for rice exports, with a marked improvement using the modified price ratio model. These,

and the predictions of the other models tested, leave a clear impression that the post-Mao rise in grain imports cannot be explained simply by trade factors of the past. A major policy change has led to higher grain imports and lower rice exports than expected.

VI. CONCLUSIONS OF MODELLING

The modified trade models show that there was a close relation between China's rice exports and grain imports during the years of the Cultural Revolution (1966-1975). The rice/wheat price ratio did have a significant effect in this period, and better statistical results were obtained with the rice exports/price ratio variable included in the equations. However, there is no conclusive evidence that the trade decisions were made simultaneously. China's grain trade policies showed a marked change in the mid-1960's and in the post-Mao period. In the long run China's grain production has the most influence on grain trade. However grain prices and the hard currency trade balance were the most important short term factors during the Cultural Revolution.

New trade models and factors must be developed and modified for explaining China's grain trade policies in post-Mao years. It is unlikely that rice exports continue to play a large role in China's import decisions. Rice prices will play less of a role than international wheat prices. However political factors in trade decisions and the coincidence of rising imports with rising production will confuse attempted models in the post-Mao period. The lack of information on grain reserves is a serious handicap. While consumption patterns have undoubtedly changed since 1976 there is not yet enough data to do a more detailed analysis of grain supply and demand. Further analysis with newly released data, perhaps accounting for a shift in grain import use to livestock feeding, could prove to be informative.

NOTES TO CHAPTER SIX

[1] See Appendix 2.

[2] Care was taken to follow the exact variables as defined by Surls, although this was complicated by an omission of the units for the net rice exports. The USDA series was used for grain output, Aird's intermediate model was used for population, grain trade data were given by Surls, and CIA data were used for the hard currency balance of trade.

[3] The coefficient of determination was corrected for the degrees of freedom used up in estimating the parameters by the formula:

$$\bar{R}^2 = 1 - (1-R^2) \cdot (N-1) / (N-K) ,$$

where N is the number of observations, and K is the number of parameters estimated, including the intercept. If K were misunderstood to be the number of independent variables then an $\bar{R}^2$ of .85 would be found instead of .80 for Surls' wheat import equation.

[4] Intuitively, the international supply of grains and the domestic demand for imported grains should be equated here. However such an analysis is seriously handicapped by not knowing the size of China's grain reserves. A complete a priori analysis is not attempted.

[5] The wheat price is the value of China's grain imports divided by the quantity. Similarly the price of rice is the value of China's total grain exports divided by the quantity. To use rice exports alone in the calculation of rice prices would require further research, and is not considered necessary.

[6] However the best single-variable run for 1969 to 1975 was with the production variable.

[7] The single equation rice model was not significantly changed when all variables were run with per capita values.

[8] The fact that P_W, the price of the total grain imports, is multiplied by Y1, the net grain imports, is a further, but more minor problem.

[9] Indirect least squares can be used to determine the parameters of the wheat equation, but not the rice equation since it is over-identified. Since both methods give almost identical parameters for the wheat equation, only the two-stage least squares procedure is needed.

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CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

The object of analyzing China's grain trade is to understand why China imports grain and to estimate, if possible, how much grain China may want to import in the future. Rather than repeating many of the arguments which have already been given, this summary shall attempt to draw forth some of the pertinent information which has been gathered.

The first question which relates to grain trade is whether China can be expected to provide for her own needs in the near future. This is really two questions. First is whether China's grain production can be expected to rise significantly, and secondly, whether with an insufficient grain production China will choose to make large imports.

The answer to the latter question depends upon the Chinese policy makers in control. To date China has made her largest grain purchases with a moderate or 'right wing' government. The present administration appears to be more right wing than any of previous years, and China is also importing more grain now than at any time in the past. In periods when the administration has emphasized self reliance, this was usually the time when grain imports were cut back and rationing employed to reduce consumption.

Part of China's food production problems have stemmed from an improper use of resources. Some of the agricultural measures, most notably those introduced during the Great Leap Forward, were rash and even detrimental to agriculture in the long term. Internal political

disputes prevented agricultural scientists from making the type of contributions in research which have proved successful in other countries. Currently China is undertaking long term steps to improve agriculture as a whole, but no immediate success can be interpreted as fundamentally changing China's position as a net grain importer.

A basic cause of disequilibrium for China's agricultural economy is administered pricing. Despite the price increases of recent years, China's grain prices remain at lower than free market levels. This has caused problems for government policy since when the farmers are given the choice of what to grow they have opted for non-grain crops. The pricing policy prevents China's agricultural economy from making a full adjustment to market conditions and contributes to China's grain imports.

Apart from this three other factors favor China's decision to import grain. Transportation costs make it easier to import from abroad for coastal cities than to ship inland grain long distances. Military considerations favor the building of a grain reserve for strategic and emergency use. (If domestic grain is stored, more imported grain will be needed for consumption.) Finally it is politically easier to support a large government and military by imported grain than by further grain procurements from the already burdened farm sector.

One other reason for China's grain imports has been investigated further, that of exporting rice and importing wheat to gain foreign exchange. The empirical analysis appears to confirm that this did play a substantial role in China's grain trade decisions from 1969 to 1975. Since that time, however, rice exports have been considerably cut back, so it would appear this has not played a significant role in import

decisions of the post-Mao period.

There is no doubt that economic and strategic factors continue to favor grain imports for China. However if self-reliance were once again emphasized in China there remains a question of how much these grain imports could be cut back. Even though China claims she is capable of self-sufficiency in grain, there is no foreseeable reason that she would attempt this, and to the contrary has given every sign of increasing grain imports through the negotiated long-term supply agreements.

With every indication that China wishes to continue substantial grain imports in the future the question must be asked of how these imports are to be paid for. Contrary to the Soviet Union, China appears to have no difficulty in financing her purchases. Despite a large deficit trade balance, China's surplus in invisibles' trade is even larger and has enabled her to build a substantial foreign exchange reserve.

As to predicting the quantity of grain China will import, the long-term supply agreements are the best indication. While more reliable data is becoming available for modelling China's trade, econometric analysis is hampered by the small number of observations for grain imports under post-Mao trade policy. The marketing of grain to China may prove more successful than its prognostication.

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[1] Articles with unlisted authors are categorized first by the periodical title and secondly by the title of the article. This applies for Agriweek, Beijing Review, China Reconstructs, Current Scene, Foreign Agriculture, and the Toronto Globe and Mail.

APPENDIX ONE

International Trade Theory As Applied To China

Classical economic trade theory asks three basic questions about foreign trade: what goods does a country buy and sell; what determines the prices of international exchange (and who receives the gains from trade at those prices); and how do countries adjust when the pattern of trade is disturbed. The third question will not be discussed for China, but the difficulties in applying trade theory to China are evident in the laws of comparative advantage, and of international supply and demand.

The law of comparative advantage can be used to determine what goods a country will export or import as follows. First compare for two goods the quantity of good B which can be traded domestically for a standard quantity of good A. This will be the domestic comparative cost of good A. Then the comparative cost for good A in terms of good B can be determined for a prospective trading partner, and a comparison made between costs in the respective countries. If the comparative costs are the same in both countries no trade will occur. However, if the comparative cost of good A in terms of good B differs between the countries then each country will export the good in which it has the least comparative cost and import the good in which it has the highest comparative cost.

The difficulty in applying the law of comparative advantage (or comparative costs) to China is that the prices existing in China are administered prices and will not give a true reflection of comparative

costs between Chinese goods. This, however, is a problem for the Chinese government itself, and will only concern those trading with China to the extent of obtaining a more accurate assessment of the proper terms of trade.

The law of comparative advantage can be adjusted to apply to China as follows. The goods which China will choose to import are those with the greatest perceived opportunity cost for producing in China, while the goods which China will choose to export are those with the least perceived opportunity cost for producing in China. How is the 'perceived' opportunity cost determined? Import goods are priorized according to need and export goods are assessed according to availability. The quantity of a needed good at an established international cost is compared with the quantity of an available good which must be exported to earn the same currency value of foreign exchange. If the need for that quantity of the import good is assessed to be of greater worth than the loss of that quantity of the available good then the latter will be exported and trade will occur.

China will have a difficulty in applying this law since the assessment of which goods are worth more to China is subjective. Real costs, for objective assessment, are disguised, and different decision makers will have different views of import need and export availability. Some decision makers may assess rice as an import good, while others decide it should be an export good, and the real comparative cost factors, which could also be changing over time, appear to become less significant to trade than the question of which decision makers are in power.

Once China has chosen goods which she desires to trade, however, other countries need decide only whether to participate in this trade

or not. Trade partners may have difficulty gaining a profit from the trade as the terms of trade will almost of necessity be set by the prices prevailing abroad rather than within China. China will have an offer curve which will change with variations in the international prices of goods. The realities of world trade are anticipated to cause China to trade at terms favorable to herself for imports, but probably less favorable for her exports.

The law of comparative advantage was designed to enable a country to determine which goods to export and which to import. As it has been redefined for China, however, it is the import and export goods which are being chosen first, without a knowledge of real comparative opportunity costs in China, and comparative advantage is then determined on the subjective trade decisions as made. It is undoubtedly true in the real as well as the perceived sense that China does not have a comparative advantage in grains, but it is equally as true that the redefinition of comparative advantage in this manner has defeated the purpose for which it was designed in theory. Comparative advantage no longer determines trade, but trade determines comparative advantage. The theory of comparative advantage has had value in describing trade among nations with imperfect market pricing, but the extent to which it must be redefined for describing trade in a centrally planned economy defeats its original purpose, and renders it of little value for China.

It is for this reason that classical trade theory is not discussed for China. If the theory itself does not help to gain insights into trade which would be more difficult to gain through other means, if the theory is only redefining something which was already known, and adding nothing to further that knowledge, then it is confusing, rather than clarifying, trade issues, and is better left undiscussed.

APPENDIX TWO TABLE A-1

Pin-Yin Spelling of Familiar Chinese Places and Names[1]

Places	Pin-Yin	Names	Pin-Yin
Canton (City)	Guang Zhou	Chin (dynasty 221-206 B.C.)	Jin
Canton (Kwang Tung Province)	Guang Dong	ching ("#" water well)	jing
Chung King	Chongqing	Ching (dynasty 1645-1912 A.D.)	Qing
Hong Kong	Xianggang	Chou An-lai	Zhou En-lai
Hwai River	Huai He	Han (dynasty 206 B.C. - 220 A.D.)	Han
Macao	Aomen	kaoliang (grain sorghum)	gaoliang
Nan King	Nanjing	Kuomintang (Nationalist Party)	Guomindang
Pearl River (Si Jiang)	Xi Jiang	Liu Shao-chi	Liu Shao-qi
Peking	Beijing	Mao Tse-tung	Mao Ze-dong
Sin Jiang (Region)	Xin Jiang	Ming (dynasty 1368-1644 A.D.)	Ming
Szechuan (Province)	Sichuan	renminbi (people's currency)	renminbi
Tazhai (production brigade)	Dazhai	Sun Yat-sen	Sun Zhong-shan
Tientsin	Tianjin	Taiping (Rebellion)	Taiping
Tsin Ling (Mountains)	Qin Ling	Tang (dynasty 618-906 A.D.)	Tang
Yangtze River	Chang Jiang	Teng Hsiao-ping	Deng Xiao-ping
Yellow River	Huang He	yuan (dollar)	yuan

[1] Not included are familiar names such as Shanghai, Taiwan, and Hainan (Island) which are identical in pin-yin spelling, and any names which only appear in their pin-yin romanization.

APPENDIX THREE

ESTIMATION OF RECENT GRAIN PRICES USING AVAILABLE TRADE DATA

Table A -2

Grain Import Prices

a. Grain Exports From Source Countries (Million Tons)

	1973	1974	1975	1976	1977	1978	1979	1980
U.S. Wheat	.629	2.994	1.496	. . .		1.944	2.454	4.035
U.S. Corn	.841	1.759	.023	. . .	. . .	1.073	2.754	1.788
Canada Wheat	2.315	1.740	1.864	.940	3.003	3.226	2.712	2.644
Total	3.785	6.493	3.383	.940	3.003	6.243	7.920	8.467

b. Grain Export Values (Million U.S. Dollars)

U.S. Wheat	40.6	317.3	189.2	. . .	. . .	250.2	324.0	671.3
U.S. Corn	60.6	188.7	2.6	. . .	. . .	111.7	291.6	225.5
Canada Wheat	182.0	334.5	292.6	138.1	291.1	299.7	345.5	447.0
Total	283.2	840.5	484.4	138.1	291.1	661.6	982.6	1343.8

c. Partial Grain Import Prices (Free on-Board, $U.S./Ton)

Year	1973	1974	1975	1976	1977	1978	1979	1980
Price	74.8	129.4	142.3	146.9	96.0	106.0	124.1	158.7

d. Estimated Grain Import Prices (CIF = FOB + 10%, $U.S./Ton)

Price(*)	82.3	142.3	156.5	161.6	106.6	116.6	136.5	174.6

SOURCES: U.S. Department of Agriculture, Economics and Statistics Service, International Economics Division, U.S. Foreign Agricultural Trade Statistical Report (Calendar years 1973 to 1980); Statistics Canada, External Trade Division, Trade Of Canada: Exports By Commodities (65-004), December issue of 1973 to 1980.

(*) - See Table 1-7, "Wheat Import Prices".

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Table A -3

Rice Export Prices

a. Rice Imports By Purchasing Nations (Thouaand Tons)

	1972	1973	1974	1975	1976	1977	1978
Hong Kong	182.1	220.6	153.8	184.1	194.1	177.7	185.0
Indonesia	53.6	46.6	163.6	320.2	90.8	162.0	68.9
Malaysia	60.5	207.8	206.2	111.5	61.3	84.1	*
Sri Lanka	*	*	136.0	238.4	*	98.2	*
Japan	. . .	4.3	28.7	12.5	4.0	. . .	31.0
Singapore	36.9	44.7	14.0	11.2	6.7	0.7	8.8
Macau	*	13.7	11.9	12.0	14.0	15.0	10.8
Philippines	33.0	160.1	51.2	43.0	. . .	. . .	. . .
Madagascar	. . .	57.3	66.2	17.5	*	30.6	22.8
Mexico	. . .	30.6	71.2	. . .	. . .	. . .	*
Senegal	. . .	46.0	27.2	. . .	*	*	*
Syria	*	*	60.4	35.5	*	*	*
Total	366.1	831.6	990.4	985.8	370.8	568.2	327.3

b. Rice Import Values (Million U.S. Dollars)

Hong Kong	28.2	80.7	90.8	72.9	63.3	56.9	67.4
Indonesia	3.4	7.7	62.7	153.0	34.8	63.3	21.5
Malaysia	6.4	63.9	91.5	49.9	25.0	24.3	*
Sri Lanka	*	*	45.3	80.0	*	22.5	*
Japan	. . .	1.4	16.1	5.5	1.1	. . .	17.9
Singapore	3.7	14.0	7.0	3.7	1.9	0.1	3.1
Macau	*	1.9	1.6	2.7	3.9	3.9	3.5
Philippines	2.3	23.9	16.2	14.4	. . .	. . .	. . .
Madagascar	. . .	10.8	28.2	8.5	*	7.3	4.1
Mexico	. . .	9.1	26.8	. . .	. . .	. . .	*
Senegal	. . .	12.7	9.0	. . .	*	*	*
Syria	*	*	30.0	17.1	*	*	*
Total	49.0	226.3	425.3	407.6	129.9	178.3	117.6

c. Partial Rice Export Prices (FOB = CIF - 7.5%, $U.S./Ton)

Year	1972	1973	1974	1975	1976	1977	1978
CIF To Buyer	133.8	272.1	429.4	413.5	350.4	313.7	359.3
FOB In China	123.8	251.7	397.2	382.5	324.1	290.2	332.4

SOURCES: United Nations, Department of International Economic and Social Affairs, Commodity Trade Statistics (New York: UN, 1972 to 1978).

* - Data not available.

APPENDIX FOUR

FREDERIC M. SURLS

REGRESSION MODELS FOR CHINA'S GRAIN TRADE

The Major Determinants

Although the potentially important variables can be identified, it is quite another thing to assess their relative importance in influencing past behavior since most of the required data have not been released since the fifties. In particular, regional production data are scarce, and data on rural and urban population and livestock, stock, and procurement data are all unavailable. But, there are estimates of national grain production and population and trade data and world market price data are available.

If the procurement function is stable and stocks of grain are assumed to be relatively small and if other variables do not change rapidly over time, then the demand gap in the urban sector and exportable supplies of rice should vary with per capita grain production. Balance of payments pressures can be approximated in a rough way by the size of the hard currency trade surplus in the preceding year. World market prices or actual unit values of PRC trade can be used to assess world market prices effects.

On this simplified basis, grain imports should vary inversely with production per capita and world market grain prices and directly with the balance of trade surplus. Rice exports should vary directly with per capita production and world market rice prices. Additionally, the PRC explanations outlined above imply, depending on the interpretation, a direct relationship between export levels and either the rice-wheat price relative or the cost of grain imports.

Ordinary least squares regression techniques were used to test the relationships outlined above for the 1961–75 period and for selected subperiods. As might be expected, the results were not conclusive; there are simply too many important factors omitted. Additionally, there are numerous statistical problems and a very limited number of observations. Nonetheless, the results, if viewed cautiously, are suggestive and of some interest, particularly for grain imports.

Net wheat and coarse grain imports.—For purposes of this analysis, wheat and coarse grain imports were combined since the two are substitutes in human consumption. The relevant production measure was taken as total grain production, excluding rice, since of the available production estimates this most closely approximates wheat and coarse grain production and grain production in northern China.

For the period 1961–75 as a whole and for the subperiod of the 1960's, no significant relationship was found to exist between imports and the variables outlined above. There is no significant correlation between production measures and trade.

Since the Cultural Revolution, however, the preceding year's per capita grain production—excluding rice—and balance of trade surplus appear to explain most of net per capita imports of wheat and coarse grains (table 6, equation 1). The equation fits closely for all years in the 1969–75 period and picks up each turning point in this period. It also predicts the direction of trade movements in 1976 and 1977. However, annual fluctuations in imports for these years are understated (table 7). No relationship was found between imports and absolute or relative prices.

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TABLE 6.—REGRESSION RESULTS

	Equation	Corrected R^2	D.W.	Period
Number:				
1	$Y1 = 68.80 - 0.34X1 - 0.736X2 + 0.0019X3$	0.90	2.35	1969-75
	(9.44)* (.060)* (.0368) (0.0006)*			
2	$Y2 = -2918.6 + 27.48X4 + 1.27X5$	.81	2.29	1961-75
	(857.9)* (7.80)* (.292)*			

Y1 = Net per capita wheat and coarse grain imports in kilogram per capita. The population series from table 4, alternative 1 was used in this analysis.
Y2 = Net rice exports.
X1 = Per capita grain production (excluding rice) lagged 1 year, in kilograms per capita.
X2 = Per capita grain production (excluding rice) lagged 2 years, in kilograms per capita.
X3 = Hard currency balance of trade surplus in the preceeding year, in million of U.S. dollars.
X4 = Average of current and previous year's per capita rice production, in kilograms per capita.
X5 = Cost of grain imports, in million U.S. dollars.
Values in parentheses are standard errors of the coefficient. (*) indicates that the coefficient is statistically significant at the 0.95 level.
D.W. = Durbin-Watson statistics.

TABLE 7.—FITTED, PROJECTED, AND ACTUAL NET WHEAT AND COARSE GRAIN IMPORTS, 1969-78

[In million tons]

Year	Fitted/projected net imports [1]	Actual net imports
1969	3.84	3.91
1970	5.60	4.92
1971	2.83	3.01
1972	4.41	4.88
1973	7.37	7.57
1974	6.25	6.64
1975	3.44	3.25
1976	3.08	1.75
1977	5.80	6.80
1978	7.52	(2)

[1] 1969-75 fitted values, 1976-78 projected. Based on equation 1 of table 6.
[2] Not available.

As noted above, this should be viewed cautiously. But, the apparent increase in the responsiveness of imports to production fluctuations since the late sixties is striking, suggesting less willingness or ability in recent years to hold down consumption during years of production shortfalls. This would account for the increased variability of PRC grain imports during the seventies.

Several qualifications are in order, however. Stock changes may have had some effect on import demand during this period. No meaningful responsiveness to world market grain prices was observed. But, Chinese grain purchases must respond somewhat to changes in market prices. For example, it seems likely that low world wheat prices will tend to raise imports by reducing the foreign exchange costs of a given level of imports. The low world wheat prices during spring and early summer of 1977, for example, likely influenced both the timing of wheat purchases—the PRC filled import requirements through mid-1978 at that time with two large contracts with Canada and Australia—and also most likely the total quantity slated for import as well.

Moreover, the focus on national production may overlook important but temporarily offsetting trends, including declining or slowly growing marketable surplus in major grain surplus areas and faster-than-average growth of production in traditionally deficit areas of the North China Plain. Future changes in regional production trends could play a role in trade that does not show up with national production data.

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Net rice exports.—Attempts to explain rice exports were less satisfactory. A major problem is lack of information on rice exports to Communist Asian countries. For the period 1961–75 as a whole, there appears to be a rough relationship between net rice exports, per capita rice production, and the costs of the grain import program (table 6, equation 2). Balance-of-payments pressures as measured by the lagged hard currency trade deficit and the relative price of rice and wheat were not found to be significant.

In addition, the statistical importance of these variables changes over time. Costs of grain imports were not significant during much of the sixties, while production and rice prices seem to be important. During the seventies, however, costs seem to best explain the level of exports, and production drops out as a significant variable. High correlation between rice prices and the cost of grain imports makes it difficult to choose between these.

Finally, these relationships do not do a very effective job of tracking year-to-year fluctuations in export levels. Although production, prices, and the cost of grain imports appear important, their relative importance and precise roles cannot be sorted out.

Tentative conclusions suggested by this analysis include the following:

(1) The determinants of grain imports presented by equation (1) seem reasonable as a first approximation although there are clearly other factors at work as well. Production in the previous year determines procurements and hence urban grain supplies for the current year.

(2) Links between rice production and trade are weak, in part because full trade data are not available. Also, rice production per capita has risen substantially since the sixties; this has likely resulted in an increase in State rice stocks sufficient to weaken direct production-procurement-export links. But, declining or stagnant production over a period of time can result in stock drawdowns and restore a production-export linkage. This was probably an important factor in the low export levels during 1976 and 1977 as rice production stagnated in the 1974–77 period.

(3) Either or both rice prices or the cost of grain imports have an effect on rice exports, but their separate effects are difficult to disentangle. The net cost of grain imports has tended to remain stable for several years at a time (table 2). This suggests a foreign exchange budget for grain imports with rice exports adjusted as far as possible to meet grain import costs. Relative rice-wheat prices do not seem to be important to either grain imports or rice exports.

(4) Wheat import decisions seem to be largely independent of rice export decisions, at least during the 1970's. However, the reverse may not be true. Part of the reason for this lies in timing. Wheat import decisions have typically been made in advance as production and procurements from the preceding year's crop becomes apparent. Rice export decisions, on the other hand, appear to be made with a shorter lag. Stocks, anticipated current-year rice production, costs of grain imports, and world market rice prices all enter into the export decision.

SOURCE: Frederic M. Surls, "China's Grain Trade," in Chinese Economy Post Mao, papers submitted to the Joint Economic Committee of the U.S. Congress (Washington: U.S. Government Printing Office, 1978), pp.663-66.

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