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Rural Credit Markets, Investments and Agricultural Productivity in China (RPO # 674-34)
1v

THE WORLD BANK/IFC/MIGA
OFFICE MEMORANDUM

DATE: September 11, 1989

TO: Avishay Braverman, Chief, AGRAP

FROM: Phi Anh Plesch, RAD PAP

EXTENSION: 31063

SUBJECT: Extension of RPO 674-34: "Rural Credit Markets, Investment and Agricultural Productivity in China"

In reference to Mr. Knudsen's memo of August 16, 1989 requesting a six-month extension for RPO 674-34, please be advised that there is no need for such extension as this project was not scheduled to be closed until May 30, 1990 (see attached copy of the original decision memorandum). As you know, financial commitments for the project may be made up to this closing date, and to allow disbursement of any outstanding commitments after that date, the RPO account will remain open for another six months, i.e. until November 30, 1990. Note however that sponsors are required to file a completion report by the closing date of their project.

attachment

cc: Messrs. Knudsen, Feder, Ody, de Tray

THE WORLD BANK / INTERNATIONAL [illegible] CORPORATION

OFFICE MEMORANDUM

DATE: September 30, 1988

TO: Messrs. A. Braverman, Chief, AGRAP and P. M. Cadario, Acting Chief, AS3CO

FROM: Dennis de Tray, Deputy Chairman, Research Committee

EXTENSION: 33480

SUBJECT: Research Project 674-34 : Rural Financial Markets, Investment and Productivity in China - Phase II -

Thank you for submitting to the Research Committee the materials related to work accomplished during Phase I of project 674-34. I have reviewed these materials and agree with you that project sponsors have met the requirements spelled out in my decision memorandum of Septenber 29, 1987. I am therefore pleased to release the remaining funds previously authorized for Phase II as you requested ($71,600). The budget of project 674-34 is now revised as follows:

	Authorizations	
	Previously	Now
i) FY88 Authorization	$98,000	$98,000
ii) FY89 Authorization	---	$71,600
iii) Total Authorization	$98,000	$169,600

Please note that since the project is scheduled for completion on November 30, 1989, according to the rules, it will be closed on May 30, 1990. Projects sponsors will be required to file a completion report no later than the project's closing date.

cc: Messrs./Mmes. M. Petit, G. Feder, B. McLaughlin, AGR
R. Deshpande, A. Ody, J. Goldberg, AS3
E. Rodriguez, M. Tonson, PBD
J. Fernandez, K. Hannemann, CTR
V. Mataac, RAD
Research Committee Members

THE WORLD BANK/IFC/MIGA
OFFICE MEMORANDUM

DATE: September 11, 1989

TO: Avishay Braverman, Chief, AGRAP

FROM: Phi Anh Plesch, RAD PAP

EXTENSION: 31063

SUBJECT: Extension of RPO 674-34: "Rural Credit Markets, Investment and Agricultural Productivity in China"

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attachment

cc: Messrs. Knudsen, Feder, Ody, de Tray

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

RECEIVED
AUG 2 8 1989
RESEARCH ADMINISTRATION DEPARTMENT

DATE: August 16, 1989

TO: Mr. Dennis De Tray, Research Administrator, RAD

FROM: Odin Knudsen, Acting Division Chief, AGRAP

EXTENSION: 30366/N-8037

SUBJECT: **Extension of RPO-674-34: "Rural Credit Markets, Investment & Agricultural Productivity in China"**

1. The above mentioned research study was originally scheduled for completion in November 1989. Recent political developments in China have, however, caused significant obstacles in the timely conduct of the study. The Chinese collaborating institution (Research Center for Rural Development), and the two senior Chinese researchers (Justin Lin and Luo Xiaopeng) have been negatively affected by the turmoil. Mr. Lin has not been able to travel to the U.S. this summer in order to collaborate with our U.S. based consultant in Stanford University (Professor L. Lau). Mr. Xiaopeng has not returned to China since May 1989, thus being unable to prepare an agreed-upon background report. Both researchers have been preoccupied with the changes taking place and have not had much time to devote to the study.

2. In view of these unexpected and unusual obstacles, we would like to ask for an extension of the completion date by six months (until May 1990). We consider that by reshuffling writing responsibilities and collaborative arrangements during the coming months, it will still be possible to accomplish the substantive objectives of the study. Professor Lau is visiting Beijing these days and will take up these issues with Justin Lin. No additional funds will be necessary to complete the project.

9/5/89
Approved

Cleared by: Messrs. Cadario (AS3CO)
Eisa (AS3AG)

cc. Messrs. Braverman (o/r) (AGRAP); Ody (AS3CO); Feder (AGRAP)

GFeder:ces

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Phi Anh Plesch

Subject / Title
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THE WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

DATE: September 30, 1988

TO: Messrs. A. Braverman, Chief, AGRAP and P. M. Cadario, Acting Chief, AS3CO

FROM: Dennis de Tray, Deputy Chairman, Research Committee

EXTENSION: 33480

SUBJECT: Research Project 674-34 : Rural Financial Markets, Investment and Productivity in China - Phase II -

Thank you for submitting to the Research Committee the materials related to work accomplished during Phase I of project 674-34. I have reviewed these materials and agree with you that project sponsors have met the requirements spelled out in my decision memorandum of Septenber 29, 1987. I am therefore pleased to release the remaining funds previously authorized for Phase II as you requested ($71,600). The budget of project 674-34 is now revised as follows:

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cc: Messrs./Mmes. M. Petit, G. Feder, B. McLaughlin, AGR
R. Deshpande, A. Ody, J. Goldberg, AS3
E. Rodriguez, M. Tonson, PBD
J. Fernandez, K. Hannemann, CTR
V. Mataac, RAD
Research Committee Members

THE WORLD BANK/INTERNATIONAL FINA E CORPORATION

OFFICE MEMORANDUM

DATE: September 16, 1988

TO: Mr. Dennis de Tray, Research Administrator, PPRRA

FROM: Avishay Braverman, Chief, AGRAP, and Paul M. Cadario, Act. Chief, AS3CO

EXTENSION: 37546 and 72059

SUBJECT: **Second Phase of Study of Rural Financial Markets, Investment and Productivity in China (RPO 674-34)**

1. In accordance with the procedure outlined in your memorandum of September 29, 1987 to Messrs. Schuh and Burki, the above mentioned collaborative study in China was designed as a two-phased effort. The first phase was to consist of field visits and data collection followed by a preliminary descriptive analysis to test the validity of the data and the model as proposed originally. Field work was undertaken in three separate counties (one was surveyed in November 1987 and two in March 1988) and was followed by data processing and preliminary analysis. While one more county is to be surveyed in December 1988, the data available at this point and the preliminary analysis which was already completed were adequate for a reassessment of the research approach.

2. The findings of Phase I, and the implications for the analytical framework and the econometric modeling are contained in a report entitled "Agricultural Production and Finance: Case Studies of Three Counties in China", a copy of which is enclosed. A summary of the major findings and implications for Phase II of the research is outlined in the annex to this memorandum. The report reflects comments and suggestions made by participants in a workshop held in Washington at the end of Phase I (August 16, 1988), prior to which a draft version of the report was circulated. Participants in the workshop included the chief Chinese collaborators, from the Research Center for Rural Development (RCRD), Bank staff from several departments, and three outside guests: Professors Faqir Bagi (Tennessee State University), Clive Bell (Vanderbilt University) and Luis Guasch (University of California at San Diego). Some of the comments made suggested that the applicability of results from the proposed analysis should be interpreted with due recognition of the major changes being undertaken or potentially forthcoming in China (e.g., price reform and interest rate reform). The need to differentiate credit impact for different activities of agricultural households was another suggestion, which can be accommodated within the proposed analytical framework. By and large, there was no major disagreement with the main thrust of the planned analytical effort. While a combination of disequilibrium econometrics and numerical simulation will be the main analytical tool, as originally proposed, the econometric modeling has been modified on the basis of information gained in Phase I (details in the annex).

3. Many of the suggestions and concerns raised by the four reviewers of the original proposal were taken up in the design of the data collection effort: for example, the research used a direct approach to identify credit-constrained households within the sample, documented the incidence of credit in-kind or through advance payment, obtained information on individuals' connection to leaders and officials (source of preferential access to credit and inputs), enumerated different types of liquid assets available to farmers, and obtained a record of credit transactions and investments over the five years preceding the interview. Data quality is good, and the processing and validation stage were completed in a very short time (about one month after each survey).

4. We consider that we have now met the requirements spelled out in para. 4(i), 4(ii) of your memorandum of September 29, 1987, though we will of course be happy to respond to any further clarifications you may request at this stage. By this memorandum, we are requesting release of the remaining budget ($71,600) for phase II. If this is agreed, our timeplan is to produce a draft of the final report in September 1989, and a final report in November 1989.

cc and cleared with: Messrs. Goldberg (AS3AG), Tidrick (AS3DR)
cc. Messrs. Burki (AS3DR); Petit, Vyas (AGRDR); Ody, Yusuf (AS3CO); Burcroff, Deshpande (AS3AG); Feder (AGRAP)

Attachments

9/26/88
Approved

ANNEX

RURAL FINANCIAL MARKETS, INVESTMENT AND FARM PRODUCTIVITY IN CHINA (RPO 674-34): SUMMARY OF INTERIM RESULTS AND IMPLICATIONS FOR FURTHER RESEARCH

1. Stylized Facts

Several major stylized facts emerge from our preliminary analysis of the initial three survey counties of Gongzhuling, Jurong and Tai. First, it is found that, for these three countries, the formal and informal credit markets are quite segmented and cannot in general be considered effective alternatives for each other from the point of view of the potential borrower. In the first place, the formal loans are effectively restricted as to purpose -- primary for the financing of production and not available for other personal or consumption uses. In the second place, the formal loans generally have a very short maturity -- approximately equal to the length of the production cycle. In the third place, the informal loans are almost always tied to largely exogenous, lumpy and highly visible special consumption purposes such as funerals and weddings or investment purposes such as construction of new housing. As such they cannot be easily diverted for other uses without detection by the informal lenders who are typically relatives and friends of the borrowers. Moreover, the fact that no interest is generally charged on these informal loans is further indicative of the non-profit nature of these informal loans which confers upon the informal lenders the moral authority to assure that they are used for their intended purposes. As a result, the informal loans are almost always used directly as intended and consequently do not normally increase the net liquidity available to the farm household for production purposes.

Given the lack of anonymity in the informal credit market (and indeed, in even the formal credit market) and the general geographical immobility of the potential borrowers, informal loans are really not good substitutes for formal loans and vice versa. Households that are constrained in the formal credit market, that is, whose demands for production credit cannot be met there, cannot expect to have their unmet demands satisfied in the informal credit market. Likewise, households that are constrained in the informal credit market cannot expect to have their unmet consumption credit demands satisfied in the formal credit market. Thus, in the analysis of production behavior of the agricultural households in the three study counties in China, it is justifiable to assume that the formal and informal credit markets are not interrelated and that the volume of informal credit for a farm household, to the extent that it has an effect on far production, say, through some risk preference on the aggregate volume of outstanding debt of the household, may be regarded as exogenously determined. This finding has important implications for the analytical work because it allows us to use the much simpler single market disequilibrium model rather than the dual market disequilibria model in our analysis of the data from Gongzhuling county. This finding is quite different from our expectations, as we had originally formulated a dual market disequilibria model similar to the one employed by Bell, Srinivasan and Udry (1988).

Second, a significant proportion of farm households in Gongzhuling county, almost 80 percent, were actual borrowers from the formal credit market. By contrast, the corresponding proportion are 12.5 percent for Jurong county and 24 percent for Tai county. However, approximately 35 percent of farm households in Gongzhuling reported being constrained by

credit, compared to 11.5 percent for Jurong county and 25 percent for Tai county. The relatively low proportion of households in Jurong county reporting being constrained by credit has led to a decision to pool the sample of households from both Jurong and Tai counties. This procedure is considered viable in view of the similarity in conditions between the two counties.

Third, there is little or not variation in the rates of interest paid by the borrowers on their formal loans, regardless of amount and credit standing of the borrower.

Fourth, for various country-specific reasons, we find that there is at present very little use of hired labor (although significant exchange labor in Jurong and Tai counties) and very little land subleasing, either in or out. Land under operation may therefore be also considered to be predetermined to the farm household in our analysis.

Fifth, a significant proportion of farm households in Jurong county, and to a lesser extent in Tai county, are constrained by the supply of chemical fertilizers, and by other purchased inputs such as diesel fuel, herbicide and pesticide. This observation also has important implications for the analytical work because it requires us to consider the possible simultaneous disequilibria of both the formal credit and the input markets. For example, a farm household might have reported that it was not credit-constrained precisely <u>because</u> it was constrained by the supply of one of the inputs. In this situation, additional credit would do the farm household no good. However, this does not necessarily mean that if the supply of the input were increased, output would have been increased, because then the farm household might find itself to be credit-constrained. Since chemical fertilizer was by far the most important purchased input in

terms of expenditure, we shall focus only on chemical fertilizer in our analysis of the input-supply constraint for Jurong and Tai counties.

Sixth, non-farm activities can be an important source of liquidity as well as an important end-use for credit. They were especially important in Jurong and Tai counties, accounting for almost 50 percent of the incomes. The dominant portion of the income came from non-farm employment, which was more likely to provide additional liquidity than to use additional credit. However, a significant portion of the income also came from non-farm business activities, which might increase the net demand for credit. In any case, income from non-farm activities cannot be considered exogenous because it affects not only the formal credit demand and possibly supply but also the utilization of labor and other inputs in farm production. It should be considered as an endogenous variable to be determined simultaneously with the other endogenous variables.

Definition of Credit-Constrained

A farm household is said to be credit-constrained in the formal credit market if its demand for formal credit is positive and greater than the supply of credit to it by formal financial institutions, in this case, by the agricultural bank and/or the agricultural credit cooperative. As unmet demand cannot be directly observed (since observed actual formal credit is the minimum of formal credit demand and formal credit supply), one can in general only infer whether a farm household is credit-constrained by comparing the credit demand and supply projected for that household from the econometrically estimated formal credit demand and supply functions. This approach, however, is not exact, and is subject to possibly large stochastic errors. Fortunately, unlike most other studies

on credit, we have additional information on whether a farm household is credit-constrained obtained through direct questions addressed to the head of the farm household as to whether he had any problems in obtaining all the formal credit that he needed. This direct response information can be combined with the information on actual formal credit in the econometric estimation of the formal credit demand and supply functions to obtain more efficient estimates.[1] (This case is sometimes referred to in the literature as the "known sample separation case"). Alternatively, this information can be used to provide a test as to the degree of correspondence between the survey responses by and the econometric predictions for the farm households.[2] If it is determined that this type of direct questions provide informationally meaningful responses, it would imply that they could be more widely used, not only in surveys involving other credit markets, but in other markets in general.

The Important Policy Questions

The most important policy question that we hope to answer through further analysis of this set of data is, primarily: What would be the effect, if any, of an increase in formal credit availability in rural China on agricultural production? For example, if the total supply of credit to Chinese agricultural households is increased by ten percent, what is the effect on the supply of agricultural output and the demand for agricultural inputs? And secondly: How are these effects enhanced or attenuated

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1/ This, to the best of our knowledge, has not been attempted before.

2/ This, to the best of our knowledge, has also not been done before.

depending on the supply conditions of the other inputs, or on the opportunities for non-farm employment and business activities?

Of course, these are interesting questions only insofar as there are farm households in China which are at least potentially credit-constrained. If there had been no evidence that Chinese farm households are credit-constrained at all, there would have been no point in pursuing this analysis further. However, we do find a significant proportion of households in our three study counties reporting that they were credit-constrained, and the proportion might well have been larger had some farm households not been input supply-constrained. It is therefore meaningful to ask what will happen if appropriate policy measures are undertaken so that the credit constraints can be alleviated for these households.

The answers to these questions are critically important to the formulation of an effective agricultural credit policy (and program) in China. Whether it is worthwhile for the Chinese government to attempt to alleviate the credit constraint problem in the rural areas depends on the benefits that the removal of such credit constraints will bring. Our analysis provides the tools and parameters with which these benefits and costs can be estimated and evaluated. In addition, it also throws light on how the evaluation may change depending on the underlying conditions in the other input markets that may differ from county to county and from household to household. It will thus be directly useful at the operational level as well.

Identification and Estimation of Credit Demand and Supply Functions-Credit Market Disequilibrium Only

In order to estimate and evaluate the effect of the removal of the formal credit constraint, it is necessary to identify separately and estimate the formal credit demand and supply functions. Formal credit demand may be assumed to be a function of the characteristics of the head of the household, including age, education and sex, the level of liquidity (as perceived and known to the household), the level of total indebtedness, the quantity of land under operation (quality adjusted if possible), the quantity of productive capital, the quantity of potential labor, and the township or village dummy variables. Formal credit supply may be assumed to be a function of the characteristics of the head of the household, the levels of total and different types of ascertainable financial assets, the level of total indebtedness, the quantity of capital and land, the level of past total income, previous loan experience, and whether anyone in the household had an official position either in the government administration or in the party. (Recall that the rate of interest is constant in nominal terms).

Identification of the formal credit demand and supply functions depends on the existence of variables which affect demand and not supply and also variables which affect supply but not demand. In addition, there must be at least a significant proportion of households with positive actual formal loans. If actual formal loans had all been zero, then it would have been impossible to identify separately the credit demand and the credit supply functions. Finally, there must be at least a significant proportion of households with positive actual formal loans that reported being credit constrained as well as those that reported not being credit

constrained. Otherwise, once can only estimate one of the two functions but not the other. For example, if no one household had reported being credit-constrained, then credit supply must have been greater than credit demand for every household with a positive credit demand. This would have meant that all the observed actual formal loan amounts lay on the credit demand function; in which case, the credit demand function could have been estimated but the credit supply function could not have been identified.

The Problem of Cell Size

We have to treat Jurong and Tai counties differently from Gongzhuling county. In Gongzhuling, there were enough borrowers who reported being credit-constrained, approximately 60 out of 160, so that the formal credit supply as well as the demand functions can be identified. In Jurong, however, the number of borrowers who reported being credit-constrained was only 13 out of 45, hardly enough to allow the estimation of all the parameters of the formal credit supply function. In Tai, the comparable number was 13 out of 65, again hardly enough to allow the estimation of all the parameters of the formal credit supply function. Since the two counties are geographically proximate to each other and have other similar characteristics, it was decided that the data from the two counties will be pooled in the analysis, but allowing county-specific dummy variables where ever appropriate.

The Method of Estimation

The method of estimation is by maximum likelihood. Under the assumption of a bivariate normal distribution of the stochastic disturbance terms of the formal credit demand and supply functions, a likelihood

function for the sample (consisting of either Gongzhuling county or Jurong and Tai counties) is maximized, using a variant of the Davidson-Fletcher-Powell method. There are still, however, technical problems with implementing this method of estimation, and various alternatives are being pursued.

The addition of output Supply and Input Demand Functions

It is possible to improve the efficiency of our estimators by making use of the fact that, depending on whether the household is credit-constrained, the farm household will behave differently in terms of both output supply and input demand. For example, the response of the output of farm household to an increase in the number of adults (labor power) in the household may well depend on whether the credit constraint is binding. This may be modeled by specifying the joint distribution of the stochastic disturbance terms of not only the formal credit demand and supply functions but also the reduced form output supply and input demand functions as multivariate normal, conditional on whether the household is credit-constrained. This approach, which enhances the separation of the sample, appears to be new.

In addition, it is possible to use a structural form approach, that is, to make explicit assumptions about the form of the production function of the household and to derive a set of interrelated output supply and input demand functions, conditional on whether the farm household is credit-constrained or not. The principal advantages of the structural form approach are that it reduces the number of unknown parameters to be estimated and enables a more straightforward interpretation of the results. The principal weakness of the structural form approach is that it depends

on the specific functional forms that we assume and in particular on the degree of risk-aversion of the farm households. If farm households are not risk neutral, as they most likely are not, then the derived structural form is no longer simple, even though it may still be feasible to implement a linearized or logarithmic linearized approximation.

Simultaneous Identification and Estimation of Credit and Fertilizer Demand and Supply Functions-Credit and Fertilizer Market Disequilibria

An additional complication arises from the fact that while the farm households in Gongzhuling are generally not input-supply constrained, many farm households in Jurong and Tai counties reported themselves to be input-supply constrained in addition to or instead of being credit-constrained (See Table 5.6). This complication requires the formulation of a statistical model with two interrelated disequilibrium markets. Our current thinking is to rely heavily on the structural form and to make use of those restrictions in the estimation process. Simplifying assumptions based on the sequentiality of credit and input decision will be explored. As mentioned earlier, only constraints in chemical fertilizer supply will be considered.

Simulating the Effects of the Removal of the Credit Constraint

At the conclusion of our estimation, we shall estimate the effect of alleviating the credit constraint. We shall perform this exercise by hypothetically raising the formal credit supply function by, say, 10 percent across the board. We shall then calculate the effect on output supply and on input demand for each household and adding them together for the whole sample. There are of course other ways of simulating an increase in overall credit availability; for example, one may assume that the

government attempts to allocate the additional credit to those households with the highest use for credit. In order to do the latter, however, the government needs to possess a degree of information and practice a degree of discrimination that do not seem likely. Of course, an increase in formal credit availability may be simulated in many different ways.

Long-Term Credit

We have discussed only credit over the production cycle, or credit for working capital. We have not discussed the availability of long-term credit, which is necessary to finance fixed investment. Our survey of the three counties indicate that long-term credit is generally not available from the formal financial institutions. We also suspect that short-term credit cannot be easily rolled over indefinitely so that it becomes de facto long-term credit, although this remains to be more thoroughly investigated. In order to analyze the long-term investment behavior of the households, it will be necessary to look at the time-series information on the approximately half of our sample households that are included in the Chinese national probability sample.

AGRICULTURAL PRODUCTION AND FINANCE:

Case Studies of Three Counties in China

by

Gershon Feder
World Bank
Washington, D.C.

Lawrence J. Lau
Stanford University
Stanford, California

Justin Lin/Luo Xiaopeng
Research Center for Rural Development, Beijing

August 1988

This report was prepared within the context of a World Bank sponsored study on "Rural Credit Markets, Investment and Farm Productivity in China" (RPO 674-34). The views presented here are those of the authors.

AGRICULTURAL PRODUCTION AND FINANCE:
Case Studies of Three Counties in China

Table of Contents

I. INTRODUCTION

This paper presents interim results from a Bank-sponsored study conducted in collaboration with the Research Center for Rural Development (Beijing). The study, entitled "Rural Credit Markets, Investment, and Farm Productivity in China" (RPO 674-34) was initiated in October 1987, and aims at gaining knowledge regarding the role of rural credit markets in China's agricultural sector. The research approach envisages utilization of detailed household-level data in the analysis of farming households' performance. In the context of this study, samples of 200 households each from three counties in China were selected and interviewed: Gongzhuling county in Jilin province and Jurong and Tai counties in Jiangsu province.

Because credit transactions (or absence of such transactions) by agricultural households are directly and indirectly related to assets, input utilization, labor allocation and production, the data collected cover many aspects of the household's economic activities as well as perception. In part, the survey was designed to provide the research team with an understanding of the institutional arrangements in input and output markets, as these were not fully known, yet their understanding is necessary when quantitative analysis and interpretation of the data are undertaken. Thus, the extent of various quantitative constraints on the supply of inputs, the incidence and format of land transactions, the nature of informal credit transactions and the pattern of labor allocations are among the data recorded.

The present report is intended as a preliminary step before rigorous quantitative analysis is undertaken. Our intention is to describe the economic environment and the institutional setting within which the households providing the data operate. The paper also describes various household activities and transactions in different factor markets, and indicators of performance. Some tentative conclusions are highlighted, but these are intended as hypotheses to guide the next phase of the study. The insights described in this report will be utilized in designing the analytical approach to be adopted in the next phase. This two-staged procedure was dictated by the fact that China's rural economy has undergone enormous changes in the last decade, and not enough time has passed to allow the accumulation of a well-founded body of "stylized facts" at the micro level. In the absence of such a foundation, it is difficult and improper to adopt a specific analytical framework. For instance, if certain input markets are not in equilibrium, this fact needs to be recognized when output supply functions are estimated.

The structure of this report is as follows: The first two sections describe the location and agro-climatic aspects of the study areas, and various characteristics of the sampled households. The following section deals with the various factor markets (land, labor, capital services and material inputs), highlighting their implications for households' liquidity positions. Credit markets are described in the subsequent section, and the extent of credit rationing is assessed. The implications of liquidity shortage for input use and economic performance are discussed in another section, followed by a description of investment in productive and other assets. The last section sketches the analytical issues to be tackled in the next phase of the study.

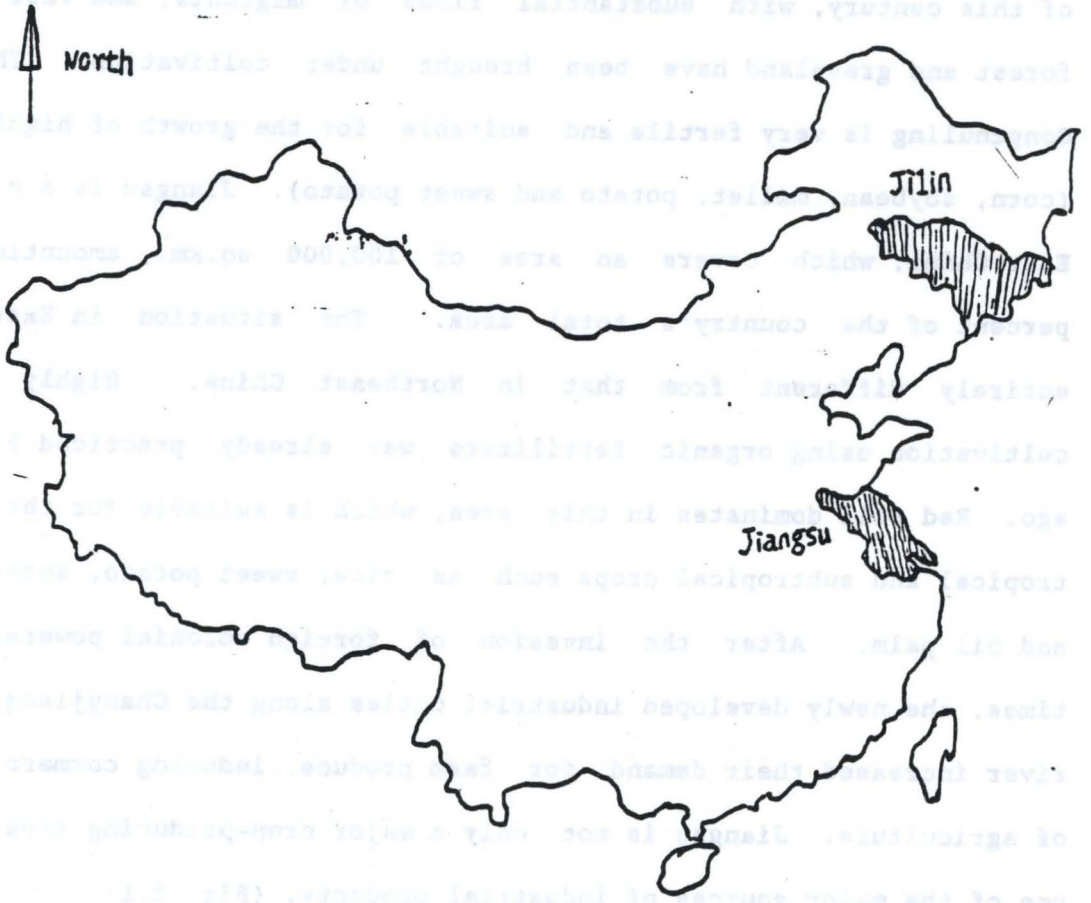
II. A GENERAL DESCRIPTION OF STUDY AREAS

1. Location and Natural Condition

Gongzhuling is in Jilin Province, and Jurong and Tai counties are in Jiangsu Province.[1] Jilin occupies 290,000 sq.km. in Northeast China, which accounts for 3.02% of the total area of the country. Farming began rather late in this area, and people there still led a nomadic life a century ago. Population started increasing significantly in the early part of this century, with substantial flows of migrants, and vast tracts of forest and grassland have been brought under cultivation. The soil in Gongzhuling is very fertile and suitable for the growth of highland crops (corn, soybean, millet, potato and sweet potato). Jiangsu is a province in East China, which covers an area of 100,000 sq.km., amounting to 1.02 percent of the country's total area. The situation in East China is entirely different from that in Northeast China. Highly developed cultivation using organic fertilizers was already practiced 2,000 years ago. Red soil dominates in this area, which is suitable for the growth of tropical and subtropical crops such as rice, sweet potato, sugarcane, tea and oil palm. After the invasion of foreign colonial powers in modern times, the newly developed industrial cities along the Changjiang (Yangtse) river increased their demand for farm produce, inducing commercialization of agriculture. Jiangsu is not only a major crop-producing area, but also one of the major sources of industrial products. (Fig. 2.1)

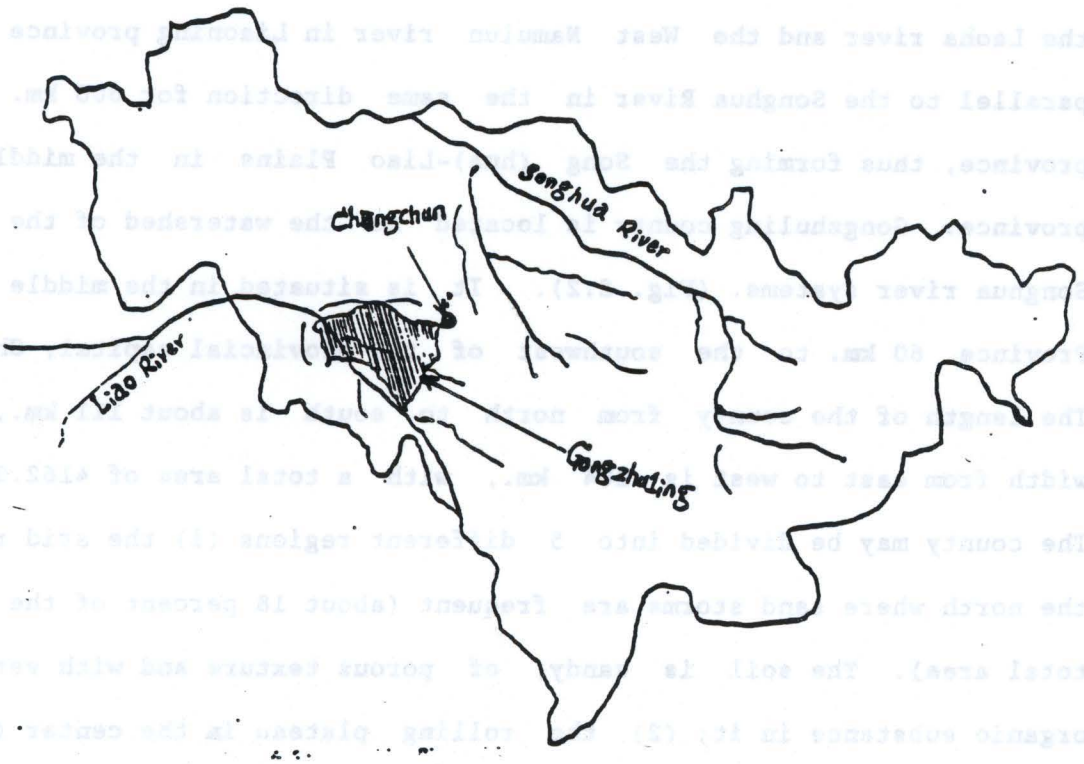
1/ Gongzhuling was originally Huaide County, and became a county-level city in 1985. It will be referred to as Gongzhuling county to simplify the presentation. Taixian county will be referred to as Tai County.

Figure 2.1: The Location of Study Provinces



Jilin is surrounded by the Changbai Mountains (more than 1,000 m. above sea level) and hills (less than 500 m. above sea level) in the east, the great Xinganling Mountains (more than 500 m, above sea level) in the west, and virgin forests in the north. The Song-Liao Plains are in the central part of the Northeast Plains (the corn belt in China). The Songhua river, the most important one in the province, rises in the Changbai Mountains and flows some 900 km. from northwest to southeast within the boundaries of the province. The West and East Liao rivers originate from the Laoha river and the West Namulun river in Liaoning province and flow parallel to the Songhua River in the same direction for 600 km. in Jilin province, thus forming the Song (hua)-Liao Plains in the middle of the province. Gongzhuling county is located at the watershed of the Liao and Songhua river systems. (Fig. 2.2). It is situated in the middle of Jilin Province, 60 km. to the southwest of the provincial capital, Changchun. The length of the county from north to south is about 111 km., and its width from east to west is 104 km., with a total area of 4162.3 sq. km. The county may be divided into 5 different regions (i) the arid region in the north where sand storms are frequent (about 18 percent of the county's total area). The soil is sandy, of porous texture and with very little organic substance in it; (2) the rolling plateau in the center (about 55 percent of the county's total area). It is the most fertile region in the county hence the major crop-producing region; (3) the low-lying land in the east (about 20 percent of total area). Though fertile, it is prone to waterlogging since it is surrounded by highlands; (4) the low hilly region in the south (about 7 percent of the county's total area). It suffers from serious soil erosion; (5) the alluvial soil area long the river (about 6

Figure 2.2: A Map of Jiling Province



percent of the county's total area). The soil there is most fertile, so it is a high yield region (Fig.2.3).

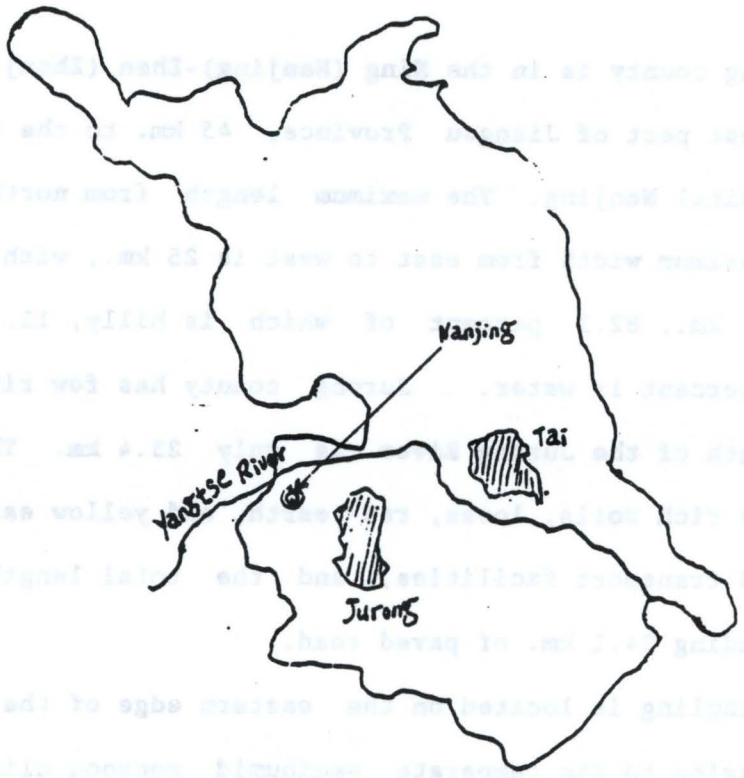
Gongzhuling has well-developed urban transport facilities. The Beijing-Harbin railway line and the Harbin-Dalian and Zhongehang highways cross the county and a highway network connects it with surrounding towns and villages. The highway network amounts to a total of 821 km. of highways, including 443 km. of all-weather road and 461 km. of paved road.

Jiangsu is the lowest and flattest province in the country. About 68 percent of the total area is plains, mainly the Huang-Huai Plains in North Jiangsu and the Changjiang (Yangtse) delta. The southeast part of the Huang-Huai Plains is comparatively low and similarly the rivers are flanked by low-lying land. The Changjiang (Yangtse) Delta is on the whole less than 10 m. above sea level, dotted here and there with hills and covered by a crisscross network of rivers, so it is known as a "region of rivers and lakes". The Ning (Nanjing)-Zhen (Zhenjiang) hilly land lies in the southwest part of the province (200-400 m. above sea level). The three major river systems are the Huai river, Yishu river and the Changjiang (Yangtse) river. The latter flows some 500 km. in the Province. There are more than 200 lakes in the province, including Hongze Lake (3700 sq. km.) and Taihu lake (2200 sq. km.) (Fig. 2.4).

Tai county is situated on the northern bank of the Changjiang (Yangtse) river in the center of Jiangsu province, 140 km. to the northeast of the provincial capital Nanjing. The shape of Tai county is roughly rectangular, 45 km. long from east to west and 38 km. wide from north to

Figure 2:3: A Map of Gongzhuling County

Figure 2.4: A Map of Jiangsu Province



South. The total area is about 1,200 sq. km., of which 1028 sq. km. are land and 177 sq. km. are water. Tai county is located in the alluvial plain of Changjiang (Yangtse) River and Huai River, therefore its soil is mainly moist and suitable for rice cultivation. The Tong (Nantong)-Yang (Yangzhou) canal flows through the center south part of the county from west to east. Tai county has both land and water transport connections in all directions. There is a total of 194 km. paved road and 651 km. of waterways.

Jurong county is in the Ning (Nanjing)-Zhen (Zhenjiang) hilly area in the southwest part of Jiangsu Province, 45 km. to the southeast of the provincial capital Nanjing. The maximum length from north to south is 60 km. and the maximum width from east to west is 25 km., with a total area of about 1379 sq. km., 82.1 percent of which is hilly, 11.7 percent is dry area and 6.6 percent is water. Jurong county has few river courses, and the total length of the Jurong River is only 23.4 km. The soil types in the county are rich soils, loess, red earth, and yellow earth. Jurong has well developed transport facilities, and the total length of highways is 441 km., including 24.1 km. of paved road.

Gongzhuling is located on the eastern edge of the medium-latitude Eurasia, belonging to the temperate semihumid monsoon climatic zone. Its climate is characterized by fast temperature rise and a dry and windy spring. The summer is humid and warm with intensive rainfall. Fast temperature drop and early frost are typical in autumn, and the winter is cold, dry and lengthy. The annual average temperature is around 5.6°C, and the frost-free period is generally between 130 and 140 days. The total sunshine time per year is 2560 hours and the annual rainfall is about 600 mm, meeting on the whole the requirements for one crop a year.

According to statistics (1949-1982), abnormal climate appears every 3.7 years in Gongzhuling, resulting in reduction of crop yield. Natural calamities include heavy rainfall and waterlogging, flood, microtherm, gale, hail and frost. Since the sixties, a large number of water conservation facilities have been built, bringing waterlogging and flood under effective control and making microtherm the major concern at present. In 1976, a 13.3 percent reduction of crops resulted from shortage of rainfall and microtherm. However, in 1986 a serious waterlogging caused only 5.2 percent loss of output. At present, there are effective means to control and prevent most natural calamities (except gale and hail).

Tai and Jurong counties are within the northern subtropical monsoon climatic zone, so there is abundant rainfall, the temperature is moderate and sunshine is sufficient. The annual average temperature in Tai is 14.5°C and that in Jurong is 14.7°C. The average rainfall per year in the former county is 1,000 mm. and that of the latter is 1100 mm. Tai county enjoys 2300 hours of sunshine per year and its frost-free period is 210 days, while Jurong county has 1,900 hours of sunshine a year and its frost-free period is 220 days. Both counties suffer from typhoons and rainstorms, but the losses caused by these two types of natural calamities have been brought under control as a series of farmland and water conservation projects were completed in the sixties (e.g. regularized land now accounts for more than 80 percent of the total area of cultivated land in Tai and weather forecasting techniques were greatly improved). At present only a few crops in limited areas are affected by insect pests and plant diseases. The total output of crops in these two counties is stable at 500 and 300 million kg. respectively, and the per mu yield is 650-700 kg.

2. Economy

Owing to the difference in location and natural conditions, Gongzhuling, Jurong and Tai counties developed economically at a different pace. Differences in their economy still persist.

(a) Population

Before 1644, Gongzhuling was outside of the "great wall" which was built against the invasion of northern nomadic tribes, and it had been the royal hunting grounds since the Qing court entered Shanhaiguan. The county government was set up in 1844. Large scale farming began in the early part of the 20th century. The twenties and thirties of this century witnessed an immigration peak from the interior of Shanhaiguan, and population reached 300,000. The population was 500,000 in 1949, and the density of population was 120 per sq. km., more than double the national average. The cultivated area per person in this county was 2.8 times as much as that of the nation (2.5 mu per person), implying a relatively low population pressure.

An administrative system existed in Tai and Jurong counties as early as the Han Dynasty, 2,000 years ago (221 and 128 B.C.), 2098 and 2005 years earlier than Gongzhuling. Immediately after liberation, the population was 560,000 in Tai and 300,000 in Jurong. The population density of the former was 466 per sq. km. and that of the latter was 217.7 per sq. km., 8.3 and 3.8 times as much as that of the nation. The cultivated areas per person in these two counties were 1.6 mu and 2.5 mu respectively. There was heavy population pressure on the land. In the 40 years after liberation, the population in the three counties has doubled, exerting pressure on land, though at different degrees (Table 2.1).

Table 2.1: Population and Its Composition
In Three Sample Counties (1986)
Unit: 10,000 Households or People

	No. of Households	Total Population	By Sex Male %	By Sex Female %	Urban/Rural Urban %	Urban/Rural Rural %	Population Density Man/KM^2	Agricultural Population 10,000 People	Agricultural Population %
China	24927	105721	51.65	48.35	41.4	58.6	110	85007	84.40
Jilin	558.31	2315	51.24	48.76	63.6	36.4	124	1409	60.86
Jiangsu	1681.3	6270	51.02	48.98	32.8	67.2	611	5278	84.18
Gongzhu	21.96	90.97	51.25	48.75	51.2	48.8	218	71.75	78.89
Tai	29.56	106.33	51.17	48.83	8.5	91.5	886	97.93	91.50
Jurong	14.78	56.56	51.98	48.02	21.0	79.0	406	51.72	91.44

(b) Income Levels

The total output values in Gongzhuling, Jurong and Tai counties have all exceeded one billion yuan (RMB), much higher than that of the national average (0.5 billion yuan). As far as the development of non-agricultural enterprises is concerned, Tai is the most advanced of the three, with the output values of industry and agriculture in a ratio of 3.47 to 1; Jurong county is second with a ratio of industrial output to agricultural output of 2.62 to 1; Gongzhuling has a ratio of 0.64 to 1. Because of the development of non-agricultural enterprise, labor productivity is correspondingly higher in Jiangsu. The value of regional income per person in Tai county is 622.36 yuan, 820.00 yuan in Jurong and 593.57 yuan in Gongzhuling.

The regional income is not identical to personal income. According to personal income statistics for urban areas, Jurong county leads with a per person income of 824.04 yuan; Tai county is second, with a per person income of 808.22 yuan; and Gongzhuling is third, with a per person income of 686.16 yuan. However, the income of rural inhabitants is

entirely different. Gongzhuling takes the lead, with a per person rural income of 634.90 yuan; Jurong is second, with a per person income of 531.45 yuan; and Tai is the last, with a per person income of 448.44 yuan (Table 2.2).

Table 2.2: Agro/Industrial Gross Value, Urban/Rural Income and Their Composition in the Three Sample Counties
Unit: 100 Million Yuan, and Yuan

	Gross Value of Product	Agro/Industrial Gross Value			National Income		Per Capita Value	
		Total	Industrial %	Agr. %	Total	Per Capita	Urban	Rural
China	19961	15207	73.61	26.39	7790	741	909.96	423.76
Jilin	*422.24	380.91	74.16	25.84	*169.62	*730.60	937.68	456.70
Jiangsu	*1526.7	1567.89	78.78	21.22	*578.46	*933.76	1035.96	561.29
Gongzhul	*101417	10647.5	38.93	61.07	533997	593.57	686.16	634.90
Tai	176833	133979	71.16	28.84	66176	622.36	808.22	448.44
Jurong	112507	96932	61.54	38.46	46286	820.00	824.04	531.45

Note: * refers to the statistic figure in 1985.

(c) Infrastructure and Non-Agricultural Employment

The passenger and freight transport capacities of highways in Gongzhuling, Tai and Jurong counties are close to or lower than the average of the country. There are differences in the mileage per person, passenger and freight transport capacities and volume of goods actually transported among the highways in these three counties (Table 2.3). Similar differences between town and country and among various regions can be seen in commerce and finance. But the differences in education facilities are less significant (Tables 2.4 and 2.5).

Table 2.3: Electricity Utilization and Transportation Capacity in the Three-Sample Counties

	Electricity Utilization		Railroad in Service	Inner Rivers	Roads		Road Transportation Capacity		
	Total	Rural Areas	KM	KM	KM 1000 men	KM/MK^2	# of Tracts Per Men	Cargo Tons/ 1000 Men	Passenger Seats/ 1000 Men
China	4117.6	586.7	52487	109404	0.91	0.10	3.40	15.5	9.8
Jilin	139.94	13.9	3482	1114	0.72	0.05	5.20	14.1	18.9
Jiangsu	277.38	71.2	713	23653	0.37	0.21	2.74	7.5	7.0
Gongzhu	N.A	N.A	N.A	N.A	0.90	0.20	2.33	10.4	7.1
Tai	1.4985	0.9017		651.3	0.18	0.16	1.55	2.3	1.4
Jurong	1.1681	0.7494		76.5	0.74		2.03		

Table 2.4: The Per Capita Commercial Retail Value and Per Capita Deposit and Bank Loans, Unit: Yuan

	Per Capita Retail Value of the Commerce	Per Capita Deposit Balance	Per Capita Balance of Bank Loans
China	468.21		
Jilin	665.10		
Jiangsu	567.46		
Gongzhuling	487.50	181.89	796.87
Tai	427.64	223.30	298.70
Jurong	462.13	495.74	477.19

Table 2.5: The Education and Sanitation Infrastructure in the Three Sample Counties

	Education			Sanitation	
	# Schools/ Men	# Teachers/ Students	Enroll-ments/Men	Hospital Beds/Men	Doctors/ Men
China	1 /956	1 /22.6	1 /4.92	1 /677	1 /237
Jilin	-	-	-	1 /260	1/ 147
Jiangsu	-	-	-	1 /426	1/ 255
Gongzhuling	1 /1000	1 /19.8	1 /5.06	1 /403	1/ 381
Tai	1 / 804	1 /26.6	1 /4.99	1 /568	1/ 464
Jurong	1 / 498	1/ 19.5	1/ 5.45	1/ 515	1/ 434

Tai county has the highest non-farm employment while Gongzhuling has the lowest among the three study areas (Table 2.6).

Table 2.6: The Off-Farm Employment in the Three Sample Counties

County	# of Laborers	Agr. Laborers	Emp. in 20 Rur S-S Ind.	Cons. Workers	Agr. Income 10000 Y	Rural S-S Ind. Income 10000 Y	Cons. Income 10000 Y
Gongzhu	250246	167995	11775	3172	48617	1187.1	696.3
Tai	534411	255776	88375	54302	23724	20164.8	4598.3
Jurong	253871	176313	42369	15376	30669	5351.4	1258.0

Legend:

Emp. = Employees
Ag. = Agricultural
Cons. = Construction
S-S Ind. = Small-Scale Industries
Y = Yuan

(d) Economic Policies and Finances of Local Government

Gongzhuling has been the source of commodity grain for the whole country as well as Jilin province, so it has enjoyed the preferential treatment that the central government gives to sources of commodity grain. Since the introduction of the land contracting system, the preferential treatment takes the form of the construction of basic facilities related to agriculture and the establishment of industrial enterprises with financial support from the government. The chemical fertilizer factory, the sugar refinery and the cultivator factory in Gongzhuling are the results of this preferential treatment. Since the introduction of the contracting system, grain output in Gongzhuling has increased sharply, (from 550 million kg. to 1.5 billion kg in less than 5 years). This growth was accompanied with a significant rise in peasants' income. In 1983 and 1984 Gongzhuling ranked first among the counties in the country for its grain yield, bringing high prestige to local government officials. However, the local government had to bear certain kinds of political pressure: in order to prevent the grain yield from dropping, it had to infuse great quantities of financial resources, manpower and material resources into agriculture, thus giving second priority to village- and town-run enterprises. This obviously affects the growth of local industrial income and non-agricultural employment. At the same time, there is rigorous control over the prices of industrial products from enterprises producing means of agricultural production in particular, and the price control over agricultural raw materials has been loosened, causing heavy losses to those enterprises. Consequently, industrial enterprises are no longer sources of income for the local government and they have to be subsidized. Since the introduction of the contracting system, grain-producing areas such as

Gongzhuling have lagged, relatively, compared to regions that develop village- and town-run enterprises and a diversified economy. In order to avoid the political consequence that "the more grain you produce and the greater contribution you make, the heavier your financial load will become", and to protect the enthusiasm of those grain-producing areas, the central government has to provide substantial financial subsidies every year. In 1986, Gongzhuling county received a financial subsidy of 20,107 million yuan, corresponding to 35.8 percent of its financial income in the same year (Table 2.7).

Jiangsu is the largest grain-producing area in China, and Tai and Jurong are the principal sources of grain for the Ning (Nanjing)-Zhen (Zhenjiang)-Yang (Yangzhou) region. The only difference is that the pressure of population on land has reached the limit in Tai and Jurong and even in the entire Jiangsu Province. In the early eighties, the cultivated area per person was only 1.12 mu in Jiangsu, and that of grain-producing counties in the plains is only a fraction of a mu.[2] As no surplus could be obtained from the land after the introduction of the contracting system, 17 counties have turned to the development of village-and town-run enterprises, taking advantage of the fact that they are located near major industrial centers such as Shanghai and Nanjing. In only a few years, the output value of industry and agriculture of certain counties has exceeded one billion yuan, and in 1987, the output value of industry and agriculture in counties under the Suzhou, Waxi and Changzhou municipalities exceeded 4 billion yuan in average. Tai and Jurong made a late start, and their total output value reached the one billion-yuan level in 1987. The expansion of

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2/ One hectare equals 15 mu.

the economy and the sharp increase of financial resources in South Jiangsu is a strong stimulus to the government in Tai and Jurong counties to put more efforts on non-agricultural enterprises, and to accelerate the development of village- and town-run enterprises in particular (Table 2.8).

(e) The Introduction of the Land Contracting System

As in most areas of China, the land contracting procedure in Gongzhuling, Tai and Jurong counties followed a pattern where the land was contracted out first, and then communal assets were contracted or sold to the peasants. Generally speaking, small farm tools and implements were sold at fair prices, and draft animals and tractors were contracted out or sold to individuals or to several households. The only difference is that the output quotas had not been fixed on a household basis in Gongzhuling until 1983 on account of the highly developed mechanization of farm work in the county. In Tai and Jurong, the contracting system was introduced in 1983 in all-round way because of their flourishing collective economy.

Table 2.7A: The Budget, Revenue and Expenditure in Gongzhuling (Unit: 10,000 Yuan)

	Yeas	1982	1983	1984	1985	1986
R E V E N U E S	Enterprise Incomes	13112	33.7	-489	-532	1316
	Business and commercial taxes	696	647.2	715.3	2833	3146
	Agricultural taxes	600	619.5	630	545	615
	Other incomes	9.9	29.4	7	4.5	42
	Govt't subsidies	1405	1595	1743	2933	2010
	Balance from last year	-7	-75	177	181	40
	This year's total	2579.1	3090	3474.2	6350	7172
E X P E N D I T U R E S	Basic construction	11.2	-	-	678	59.6
	Agricultural	476.5	574	513.1	1232	351.4
	Cultural and Education	1314.2	144.7	1604.8	2190	2477
	Income subsidy and direct transfers	145.2	116.5	128.1	286	507
	Administrative expenses	328.9	372.6	438.4	602	698
	Price subsidy	-	-		394	1490
	Total	2579.1	3090	3474.2	6350	7172

Note: The items listed above are not complete. Sum of the entry items is therefore not equal to the "total" value.

Table 2.8B: The Budget, Revenue and Expenditure in Tai and Jurong (Unit: 10,000 Yuan)

	County	Tai			Jurong		
	Year	1984	1985	1986	1984	1985	1986
REVENUES	Enterprise incomes	24	7.4	162	22.3	75	142.7
	Business and commercial taxes	3501	4140.3	4498	1185.5	2163	2392
	Agricultural taxes	393	472	488	185.2	242	253
	Other incomes	3.6	2.6	27.3	-	4	19
	Govt't subsidy	265.3	327	423	-	-	-
	Balance from last year	199.6	34.4	342	266	69.5	447
	Off budget incomes	8125	3637	5692	-	-	-
	Total	12542	8694	11746	2080	2508	2833
EXPENDITURES	Basic construction	37.2	119.4	126.8	16.5	85	189
	Agricultural	224	95.1	364	181	178	235
	Cultural and Education	1412	1587	1760	959	1015	1133
	Income subsidy and direct transfers	224	243	307	130	122	136
	Administrative expenses	533	505	579	300	275	380
	Price subsidies	-	91	407	-	44	258
	Off-budget expenses	6149	1830	2699	-	-	-
	Total	10566	6887	8753	2160	2122	3004

III. AGRICULTURAL ECONOMIC CHARACTERISTICS OF THE STUDY AREAS

3.1 Sampling Procedure

The 600 households in the present study (200 households each county) were sampled for investigation as follows:

(a) The sampling result of the former State Investigation Team was adopted. The State Investigation Team utilized a multi-stage sampling method of random starting point and on the principle of symmetry and equal distance. The number of counties sampled for investigation by the State Team accounts for 35 percent of the total number of counties in the whole country, i.e., 846 counties. The selected counties number 34 in Jiangsu, and 20 in Jilin. Counties are sampled on the basis of the per mu yield of grain ranked from low to high, within a three-year period (1982-84). Starting points are decided at random and samples are chosen at equal distance. Gongzhuling, Tai and Jurong are included among the counties in the national sample. They were selected for the present study because they are typical agricultural districts in China and agriculture occupies an important share in their annual income. Another reason for the selection of these counties is the difference in their main crop (corn in Gongzhuling, one crop a year; wheat and rice in Tai and Jurong, two crops a year), and the difference in their level of development (the output value of non-agricultural enterprises accounts for 28 percent in Gongzhuling, 72 percent in Tai and 62 percent in Jurong).

According to standard regulations, eight xiang (township) and 16 villages have been sampled in Gongzhuling, six xiang and 12 villages in Tai, and four xiang and eight villages in Jurong. Eighty households have been randomly selected by the State Investigation Team in these three

counties.[3] Since 200 households per county were required for the present study the sample was augmented as follows: using the list of households that paid the agricultural tax in 1987 as a starting point, those that exist in name only were eliminated and new ones were added, forming the sampling frame. Finally, a total of 120 households were selected at random from the villages and townships included in the national sample of the pre-selected counties, and these were added to the 80 households already selected. The sample households can be found in every part of the counties in Gongzhuling: the townships of Shiwu, Nianjiazi and Chaoyangpo are in districts prone to waterlogging along the Liao River Sidaogang, Huaide and Heilingzi townships are in the rolling plateau; Yangchengzi is in the sandy district, and Xiangshui in the alluvial plains (Figure 3.1).

As for Tai county, the sample households are selected from six townships in three locations. Wanshi, Zhandian, and Shihang are located in the county's southern part. The per capita land holding is small and the soil type there is sandy. Yedian and Qingtong townships are in the northern region. The per capita land holding there is relatively large, and the soil type is clay. In the latter two areas, sideline business is fairly prosperous. Suehen is in the central area of Tai county whose situation is similar to that in Yedian and Qingtong.

In Jurong, Dongchang township is in the hilly region in the southeast, Guozhuang and Tianwang are in the plain, while Maoxi township is in the hilly area of the west (Figure 3.2).

3/ The actual number of sample households is 79 in Gongzhuling, 83 in Tai and 80 in Jurong due to changes in the last three years.

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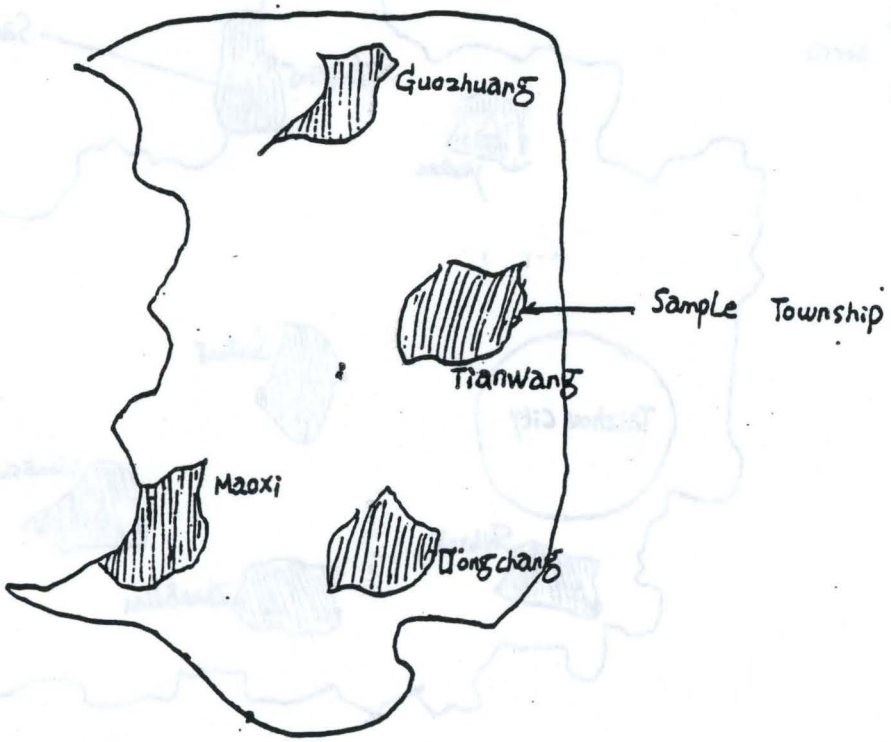
Figure 3.1: A Map on Tai County

Figure 3.2: A Map on Jurong County



Households in Gongzhuling county were surveyed in December 1987, while Jiangsu sample households were interviewed in March 1988.

3.2 Economic Activities by the Sample Households

The cultivated land per household in the sample and the number of fragments of holdings vary significantly across the three study areas. The cultivated land per household in the sample is 20.31 mu, 4.63 mu, and 6.86 mu, in Gongzhuling, Tai, and Jurong, respectively. Table 3.1 presents the distribution of households over the different sizes of the cultivated land. All the sample households in Tai cultivate less than 15 mu, and only two households in Jurong have more than 15 mu, while 65.5 percent of the sample households in Gongzhuling operate more than 15 mus (Table 3.1).

Table 3.1: The Areas of Cultivated Land for the Sample Households (Sample Size = 200 Households/County

The Area of Cultivated Land (Mu)	County		
	Gongzhuling	Tai	Jurong
1 - 5	4.0	74.0	35.5
6 - 10	9.5	25.0	55.0
11 - 15	21.0	1.0	9.5
15 +	65.5	-	1.0
Mean holding size (mu)	20.75	4.63	6.90

Given the small size of farms in Jurong and Tai counties, it is expected that peasants in these counties will attempt to complement their income by expanding specialized agricultural activities (e.g. poultry, pig

raising) and by seeking complementary sources of income off the farm. In Gongzhuling, where farm sizes are much larger, farmers will tend to focus their efforts on cropping activities. Such tendencies are evident from Table 3.2, which describes the composition of incomes in the three samples. In Gongzhuling, most of farmers' incomes is derived from cropping activities (71 percent), and farming income is the main source of livelihood (81 percent). In both Tai and Jurong, farming income is only 53 percent of total income, and a substantial part of the farming income is derived from non-cropping activities (fruits, minor vegetables and livestock). Non-farming income contributes thus close to a half of total income in the Jiangsu counties.

Table 3.2: Composition of Income in Winter/Spring Season

County	---Gongzhuling---		------Tai------		-----Jurong----	
Source	Share in Income	% of HH Report-ing	Share in Income	% of HH Report-ing	Share in Income	% HH Report-ing
Farmers Income:	.82	-	.53	-	.53	-
Crop	.71	99.5	.26	100.0	.34	98.5
Minor fruits & Veg.	.01	11.5	.01	14.0	.02	20.0
Livestock and Other	.10	57.0	.26	90.5	.17	60.0
Non-Farming Income	.18	-	.47	-	.47	-
Off-Farm employment	.04	33.5	.23	49.0	.33	53.0
Non-Farm activities	.18	15.0	.24	59.0	.14	31.5
Total	100.0	-	100.0	-	100.0	-

The composition of cropping reflects the different agro-climatic situation of Jiling and Jiangsu provinces. As mentioned earlier, the main crop in Gongzhuling is corn, taking up about 80 percent of the sample's land area. Soybeans rank next, with a mere 12.3 percent. In both Tai and Jurong counties, rice is the main summer crop, occupying 65.3 percent and 74.9 percent, respectively, of the land area (Table 3.3).

Table 3.3: Cropping Patterns in the Study Areas in the Summer/Fall Season (Percent)

Crop \ County	Gongzhuling	Tai	Jurong
Rice	1.3	65.3	74.9
Corn	79.5	3.5	.1
Wheat	.2	0 a/	0 a/
Millet	1.4	0	.2
Sorghum	3.2	0	.2
Sweet Potato	.3	5.9	6.2
Cotton	0	8.9	5.0
Soy Bean	12.3	8.7	3.0
Other Vegetables	1.1	7.5	4.6
Fruits	.4	0	1.7
Other	.3	.2	4.1

a/ Wheat is a winter crop in Jiangsu province, therefore in the fall/summer season its share is nil.

3.3 Participation in Infrastructure Construction and Maintenance and the Status of the Facilities

In recent years, the majority of the sample household took part in activities to maintain roads and irrigation facilities (Table 3.4). Most of the farmers in the sample reported that local rural road and irrigation facilities have improved rather than deteriorated (Table 3.5). Note that the natural rainfall in Gongzhuling is sufficient for crop production.

This is a reason of why a larger number of farmers in this county reported no change in local irrigation facilities.

3.4 The Income Level and Possession of Financial Assets by Sample Households

In 1987, the per capita net income of the sample households was 951.76 Yuan, 736.5 yuan, and 831.74 yuan in Gongzhuling, Tai and Jurong, respectively. These figures are far above the national average, which is 545.47 yuan.

Table 3.4: The Participation in Maintaining the Infrastructure (Percent) (Sample Size = 200 Households/County)

The Study Areas	Roads	Irrigation
Gongzuling	94.0	63.5
Tai	86.0	95.5
Jurong	87.5	95.5

Table 3.5: The Status of the Infrastructure as Reported by sample households (Sample Size = 200 Households/County)

The Study Areas	Roads			Irrigation		
	No Change	Improved	Deteriorated	No Change	Improved	Deteriorated
	%	%	%	%	%	%
Gongzuling	21.0	78.0	1.0	71.5	26.5	2.0
Tai	16.5	82.0	1.5	48.0	42.0	10.0
Jurong	11.0	84.0	5.0	19.5	68.0	12.5

The financial assets owned by sample households prior to the 1987 planting season are reported in Table 3.6. Gongzhuling households own the highest level of financial assets among the three sampled counties. The most significant difference is in the level of the average cash holdings and storage of farm products which is much higher in Gongzhuling compared to the levels observed in Tai and Jurong. This can be explained by the cropping pattern: since Gongzhuling households have only one crop season in a year, the cycle of farm income generation is longer than that in Tai and Jurong, and it is necessary for the Gongzhuling households to hold more cash and farm products in reserve. An additional observation from Table 3.6 is that the sample households in Gongzhuling tend to have a lower amount of financial assets in savings accounts than households in the other study areas. This may be related to a perception that savings accounts are not as liquid as other forms of assets.

Table 3.6: Financial Assets of Sample Households

County / Asset	Gongzhuling (N=200)		Tai (N=200)		Jurong (N=200)	
	Average (Y)	% with positive entry	Average (Y)	% with positive entry	Average (Y)	% with positive entry
Deposits in Ag. Bank	31.4	4.5	189.5	17.0	79.9	11.0
Deposit in RCC	131.0	11.0	329.5	30.5	113.9	19.0
Loans to Others	197.3	18.5	120.4	21.0	171.6	31.5
Value of Jewelry	47.5	1.5	148.0	27.0	11.3	3.5
Value of product stored	674.1	97.5	161.9	78.0	214.4	93.5
Cash	623.0	96.5	244.5	100.0	176.7	88.0
Other	38.0	1.0	.2	1.0	30.2	2.5
Total	1742.3	100.0	1194.0	100.0	798.0	100.0

3.4 Consumer Durables and Production Capital of the Sample Households

There are some variations in the ownership of consumer durables among the sample households in the different counties, but most of the differences are not substantial. Electric fans are not common in Gongzhuling as the weather there is much cooler than in Jiangsu. Housing quality is generally higher in Jiangsu (Table 3.7).

Table 3.7: Ownership of Consumer Durables by sample Households (Percent) a/
(Sample Size = 200 Households/County)

The Study Areas	TV Sets	Audio Radio Cassettes	Bicycle	Sewing Machine	Watch	Electric Fans	Housing		
							High Quality Roof	High Quality Walls	High Quality Floor
Gongzhuling	41.5	14.0	98.0	57.0	123.0	.5	52.5	45.0	22.0
Tai	25.5	12.5	105.0	38.0	170.0	24.5	85.0	85.5	44.0
Jurong	38.0	17.0	107.5	37.0	186.5	32.5	98.5	95.0	26.5

a/ Figures above 100.0 imply more than one item owned by the household.

Table 3.8: Ownership of Productive Capital

Item \ County	Gongzhuling %	Tai %	Jurong %
Tractor	9.5	0	8.0 a/
Truck/boat	.5	25.5	0
Pump/diesel engine	2.0	1.5	11.5 a/
Motorcycle	.5	0	1.0
Thresher	2.5	1.5	12.0
Small tools	98.0	84.5	99.0
Draught animals	30.5	3.0	77.0
Pigs	66.0	66.5	84.5
Poultry	94.0	97.5	95.0
Mean value (Yuan)	1477	578	913

a/ Shared ownership with other households.

The volume of capital owned (on average) in the different counties is positively related to the typical farm size, and thus the figure for Gongzhuling (1477 yuan) is higher than that of Jurong county (913 yuan) or Tai county (578 yuan). Compatible with the larger farm sizes in Gongzhuling, the ownership of tractors there is more common. Tractor and pump ownership figures in Jurong county are somewhat misleading as they actually reflect shared ownership among several households.

IV. FACTOR MARKETS

1. The Land market

(a) The Distribution of Land after the Household Responsibility System

Land operated by each household in the three study counties can be classified, based on the use right arrangements, into three different categories, namely private plot, food ration plot, and responsibility plot (Table 4.1). All these plots are essentially leased from the production teams. However, the obligations of the contracting households are different for different types of plots. For responsibility plots, a household has to pay the agricultural tax, public accumulation fund, public welfare fund, and other duties to its team. Most importantly, holders of responsibility land have to sell a certain amount of grain output to the

Table 4.1: Type of Household Plots

Plot Type	Gongzhuling County %	Tai County %	Jurong County %
Private	12.3	20.6	19.4
Food-ration	28.9	56.4	8.8
Responsibility	56.5	20.2	69.2
Other or missing	2.0	2.6	2.8

Note: Some plots counted in the table consist of several smaller plots. The actual number of plots in Jurong county is 1410 and in Tai county is 993.

state procurement agency at a fixed price to meet the quota obligation, which is inherited from the production team system.[4] For food ration plots, the grain quota obligation, and in some teams the contributions to the public fund as well, are waived. Private plots, in general, do not carry any obligation, including the state agricultural tax. Most of the plots have been assigned to sample households by the production team or brigades (687 out of 716 in Gongzhuling, 992 out of 993 in Tai and 1164 of 1173 in Jurong).

As in most of China, farmers' holdings in the study counties are fragmented. The extent of fragmentation in Jurong county (the average holding is 7.05 plots) is more severe than in Tai county (average holding 4.9 plots) and Gongzhuling county (average holding 3.7 plots). Since a farmer usually was assigned a plot from each quality type of land when the household responsibility system was adopted, the differences in the degree of fragmentation may be a result of the differences in topology and land quality of these three counties. Jurong county is located in a hilly area while Tai county and Gongzhuling county are located in a plain area. Land quality in both Tai county and Gongzhuling county are more homogeneous than in Jurong county. The fragmentation in all three counties, however, is below the national average of nine plots for each household. This is

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4/ The quota obligations on the responsibility plot vary from village to village and from county to county. In Gongzhuling county, the quota per mu of responsibility plot in the surveyed villages ranges from 30 kg per year to 350 kg per year and the mean is about 200 kg per year. In Jurong county the quota ranges from 240 kg to 600 kg with a mean of 270 kg. In Tai county, it ranges from 155 kg to 270 kg with a mean of 215 kg.

perhaps partly because the household responsibility system was not adopted in these three counties until 1982-83, when over-fragmentation had already become a much discussed issue. Plot size in both Jurong county and Tai county is very small. Only 7.5 percent of the plots in Tai county and 11 percent of the plots in Jurong county are bigger than two mu (one-third of an acre). However, in Gongzhuling county, only 24.5 percent of plots are smaller than two mu.[5]

About 12.3 percent of the plots in Gongzhuling county, 19.4 percent in Jurong county and 20.6 percent in Tai county are private plots. Many of these private plots have been assigned to the households since 1962. From the very beginning of the collectivatization in the early 1950s, certain farm activities (e.g., hog raising and vegetable production for home consumption) were largely accomplished on private plots assigned to the household, with work done during spare time. The "Great Leap Forward", starting from 1958, imposed the commune system on individual households and eliminated private plots. When the failures of the "Great Leap Forward" were acknowledged, the production team system was introduced to take the place of the commune system as the basic unit of production and accounting. At the same time, five to seven percent of land were redistributed to each household in the team as private plots. During the Cultural Revolution, there were renewed criticisms of private plots, but in the surveyed villages private plots had been maintained. After the household responsibility reform was first introduced in 1978, individual incentives were given more attention. As a result, the size of private

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5/ However, the weather in Gongzhuling county allows only single cropping, while in Jurong and Tai counties double cropping is possible.

plots in most surveyed villages was enlarged as in many other parts of China. Private plots were allocated according to each household's size. The entitlement to private plots is most secure. In most cases, farmers perceive this arrangement as permanent.

The majority of plots in Gongzhuling county and Jurong county was contracted as responsibility plots, while in Tai county the majority is food ration plots. This is due to the fact that both Gongzhuling and Jurong are commercial grain producing counties. They have to sell a great portion of their grain output to the government to meet the procurement quota. The grain produced in Tai county is mostly for self-consumption. The allotment of food ration plots was done in most cases according to the size of the household. That is, a child was treated equally with an adult in the allotment of food ration plots. For the allocation of responsibility plots, as shown in Table 4.2, rules differ among villages. In Gongzhuling county, half of the 16 surveyed villages distributed the responsibility plots according to the labor force in each household while the other villages based their allocation on a weighted average of labor force and household size. In Jurong county, among the eight surveyed villages, two based their allocation purely on labor force, one purely on household size, and five on the weighted average of labor force and household size. In Tai county, half of the 12 surveyed villages did not assign land for responsibility plots. Among the six villages that had responsibility plots, two villages distributed them according to labor force, three were based purely on the household size and one on the weighted average of labor force and household size. Food ration plots and

Table 4.2: Distribution Rules of Responsibility Plots

Rule	Gongzhuling County	Tai County	Jurong County
Labor	8	2	2
Household Size	-	3	1
Labor:Household size	8	1	5
Other	-	6	-
Number of Villages	16	12	8

Note: Six villages of the twelve surveyed in Tai county did not assign responsibility land.

responsibility plots were assigned to each household when the household responsibility system was adopted.[6] The distribution rules of private plots, food-ration plots and responsibility plots indicate a strong egalitarian tendency.

Currently in Jurong county, 63 percent of the plots have a 15-year contract and 20 percent are private plots. In Tai county, 73 percent of the plots, and in Gongzhuling county 86.6 percent of the plots were initially assigned to the households with a 15-year contract when the

6/ When the collectively-owned land in the village was distributed to individual households, most villages kept a part of the land in reserve in order to accommodate the possibility of changes in the size of households. This reserve land may be temporarily leased to households in the village.

household responsibility system was adopted. One quarter of the plots in Jurong county, eight percent of the plots in Tai county, and 2.1 percent of the plots in Gongzhuling county had initially a shorter duration contract, and were changed only in the past two or three years to a 15-year contract. The change in contract was induced by the central government's policy. In the Document No. 1 of the Central Committee of CPC issued in 1984, a 15-year contract was encouraged. However, practically all the farmers interviewed (94 percent in Gongzhuling county, 85 percent in Jurong county and 88.5 percent in Tai county) favored an expansion of land contract duration to a period longer than 15 years. The most important benefit of contract extension as perceived by farmers is the better incentive for long-term investment and for improving farm management decisions (88 percent of the respondents in Jurong county and 67 percent in both Tai county and Gongzhuling county cited this merit). The majority of respondents (85 percent in Gongzhuling county, 75 percent in Tai county, and 68 percent in Jurong county) see little likelihood that the same plots they operate at the present will be assigned to them after the present contract expires. This may indicate a serious source of disincentive for certain long-term investments in land improvement.

The frequencies of land disputes were proportional to the degree of land fragmentation in these three counties. While only 2.5 percent of the households in Gongzhuling county had ever experienced disputes over land boundaries, it was five percent in Tai county and over a quarter of the households (25.5 percent) in Jurong county.[7] The rate of land

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7/ The average number of land tracts is 3.7 in Gongzhuling county, 4.9 in Tai county, and 7.05 in Jurong county.

disputes is thus positively correlated with the extent of fragmentation. This suggests that land fragmentation not only increases the costs of farming due to the increase in travelling time between plots and by reducing the profitability of mechanization, but also increases social tension in a community.

Close to 90 percent of the farmers in Gongzhuling county, and about 70 percent in both Jurong and Tai counties favored land consolidation. However, more than one-third of the respondents in these three counties thought that government intervention would be necessary to make consolidation effective. In addition, about one-fifth of the farmers thought that consolidation by exchange among farmers was not a practical option due to the large differences in plot quality. Only about one-fifth of the farmers in Jurong and Tai counties and about a third in Gongzhuling county thought that consolidation could be accomplished by agreements and transactions between farmers.

(b) <u>The Land Market after the Household Responsibility System</u>

The above discussions suggest that the distribution of land which took place recently had a strong egalitarian bias. The allotment of private plots and food ration plots is strictly proportional to the size of a household. Even in the allotment of responsibility plots, household size was also taken into account in over two-thirds of the villages in our sample (see Table 4.2). However, households are at different stages in their life cycle. They thus have different endowments of family labor. In addition, households differ in abilities, education, and other productive endowments. Therefore, the egalitarian distribution of land will result in disparities in the marginal products of land, labor and other inputs across households. These differences in marginal production represent an

allocative inefficiency. Output can be increased if resources are reallocated Across households. Although land is still collectively owned, the right to use the land for 15 years, if it is tradable, could facilitate land market transactions. The government has also encouraged households specialized in cropping to consolidate their landholding. An interesting question, therefore, is whether farmers respond to this opportunity and engage in land transactions.

Our data indicate that the extent of "land market" activities is very limited in the three study counties. One household in Tai county leased in a vegetable plot from the collective under the arrangement of share-cropping. In Jurong county, five households leased in plots and eight households leased out their plots.[8] In Gongzhuling county, 13 household leased in plots and three households leased out their plots. Among these three lease-out households, two are cadres and the other one is a hog-raising specialized household. As Tai county has practically no land markets[9] and the number of lease-out transactions is too small in Gongzhuling county, the following discussion will focus on the land market transactions in Jurong county and the lease-in transactions in Gongzhuling county.

8/ In addition, three households increased their operational holdings by claiming new marginal land.

9/ In a visit to Tai county, a farmer was asked how much he would charge for one of his plots if he could lease it to someone, his response was "I would give it to anyone free if you could find someone to take it in."

Table 4.3 summarizes the comparisons of several aspects of the households engaging in land market transactions with those households not engaging in these transactions. For the five lease-in households in Jurong county, although their average operational landholding per person is smaller than the average of the non-leasing households, their income from agricultural activities is significantly higher than that of the other group of households. This implies that these five households are specializing in agricultural production. The labor endowment in these five households is slightly higher than the average of the other group, but their capital endowments is lower than the average of the other group. The differences in land, labor and capital endowments between these two groups are all not significant in a statistical sense. Perhaps what distinguishes these five households from the other group is the educational level of the household heads. The heads of these five households have an average of 6.6 years of education compared to 4.2 in the other group. The difference is quite substantial (significant at 16 percent level of confidence). Since the original land-labor and land-person ratio was unfavorable to these five households, the disadvantage will be strengthened if the quality of labor is taken into account. Therefore, the marginal product of labor and the marginal product of land in these five households should be higher than their other group. Land leased to these five households increases their operational holding, thus reducing the gap of marginal productivities and improving efficiency.

For the eight lease-out households in Jurong county, it can be observed from the income structure that they are households specializing in non-farming activities, such as crafts, services, transportation, and commerce. As the households which lease-in land, they have slightly

Table 4:3: Land Market Transactions and Household Characteristics

County	(1) Number of Households	(2) HH Size	(3) Adult	(4) Age (yrs)	(5) Education (yrs)	(6) Average Holding Before (mu/person)	(7) Average Holding After (mu/person)	(8) Tractor (yuan)	(9) Buffalo (yuan)	(10) Ag. Income (yuan)	(11) Off-farm Emp. (yuan)	(12) Non-farm Income (yuan)
Jurong												
Lease-in												
No	195	4.3	3.3	42.9	4.2	1.75	1.74	448	147	336	294	151
Yes	5	5.0	4.0	49.4	6.6	1.54	1.68	0.0	145	*761	395	286
Lease-out												
No	192	4.2	3.3	43.2	4.3	1.75	1.76	436	149	352	296	129
Yes	8	4.3	4.0	39.3	5.3	1.49	1.17	437	96	310	243	*775
Gongzhuling												
Lease-in												
No	187	4.3	3.1	39.7	5.8	4.87	4.86	327	138	1617	284	130
Yes	13	4.5	2.7	36.8	3.5	4.40	*7.43	675	*473	1943	243	92

Note: (1) Number of households
(2) Household size
(3) Number of adults between age 14 and 65 in the household
(4) Average landholding per household
(5) Years of education of the household head
(6) Average landholding per person before land market transactions
(7) Average landholding per person after land market transactions
(8) Average value of tractor in a household
(9) Average value of buffalo in a household
(10) Average household income from agricultural sources including cropping, fruits, vegetables, animal husbandry, in last season
(11) Average household income from off-farm employment, such as rural enterprises.
(12) Average household income from non-farm activities, such as transportation, service, retailing

* Indicates that the difference is significant at the one percent level.

favorable endowments in labor force and education, and slightly unfavorable endowments in land and capital. The explanation for leasing out their plots may be as follows: the majority of family labor in these households was shifted to non-farm activities. The labor force which remained in farming was reduced to an unfavorable level in comparison to the other group. If this explanation is correct, it implies that the adjusted land-labor ratio in these eight households is higher than the average of the non-leasing out households. The marginal product of land would be lower in these eight households than in the other group. As such, leasing-out some plots to other households reduces the gap in marginal products and improves resource allocation.

In Gongzhuling county, 13 households leased-in plots from other farmers or from the collectively-owned reserve land. From Table 4.3 it is observed that these do not differ from the other group of households in the endowments of land, labor, and education, and in the structure of income. However, this group of households has a larger capital endowment. The average value of draft animal owned by these 13 households is more than triple that of the non-leasing in households. The difference in draft animals among these two groups is highly significant statistically. The average value of tractors owned by these 13 households is also more than double that in the non-leasing in households. If the inputs are divided into two categories, namely, power and land, the power-land ratio in the leasing-in households is higher than that in the non-leasing households. Again this disparity implies the existence of a gap in the marginal products of land among these two groups. Land market transactions, therefore, reduce the gap in the marginal productivity of land, and improve the resource allocation.

The above discussions suggest that some farmers in Jurong county and Gongzhuling county engage in land market transactions to improve resource allocation. Those households that tend to lease in plots are households that either have higher human capital endowments or physical capital endowments. Households that tend to lease out land are households that specialize in non-farm activities. However, overall, the extent of land market transactions is very limited. For households that hope to specialize in non-farming activities, long- and medium-term credit could be one of the constraints in their undertaking. One hypothesis is that if credit is more widely available, more households will be able to move to non-farm business, and as a result, more households will be ready to lease out their plots. Also, if credit is more widely available, more households will invest in draft animals and tractors, they will thus tend to lease-in land to increase their operational holdings. Another explanation for the limited extent of land transactions is the relative novelty of the responsibility system in the study areas. Farmers may be uncertain as to whether they could lose their land entitlement if they lease-out their land to others, as this could be taken as an indication that the household does not need the land. It is not clear whether leasing transactions imply payment in advance (i.e., before harvest). But since the occurrence of these transactions in our sample is quite minimal, it is not a factor of much significance in analyzing the demand for liquidity.

2. The Labor Market

The household structures in the three sample counties are very similar. About three-fourths of the households in each county have three to five members and two to four adults (see Tables 4.4 and 4.5). The average household size is 4.28 in Gongzhuling county, 4.46 in Tai county,

and 4.18 in Jurong county. The average number of adults is 3.05, 3.62 and 3.32, respectively. The dependent population (defined as age younger than 14 or older than 65) is 1.23 in Gongzhuling county, and .84 and .86, in Tai county and Jurong county, respectively. The dependent-adult ratios are, thus, respectively 0.40, 0.23 and 0.26. Among these three counties, Tai county has the largest household size, but the lowest dependency ratio. The reason is the different age structure of the household heads. About three-fifths of household heads in Gongzhuling county and about half of the household heads in Jurong county are younger than forty years old, while about 70 percent of household heads in Tai county are older than forty (see Table 4.6). Since most households are nuclear households, the old age of household head implies that his children have become adults and his parents have passed away. Hence, the dependency ratio in the households with older household heads is low.

Table 4.4: Household Size

No. of Members	Gongzhuling County %	Tai County %	Jurong County %
1	0	1.5	1.5
2	7.5	5.0	6.5
3	19.5	18.5	24.0
4	36.5	31.0	32.0
5	22.5	23.0	21.0
6	15.0	21.0	15.0
Average	4.28	4.46	4.18

Table 4.5: Number of Adults in a Household

Adult	Gongzhuling County %	Tai County %	Jurong County %
1	1.5	2.5	1.5
2	48.5	23.0	34.0
3	16.0	21.0	24.5
4	17.0	30.0	18.5
5	4.5	9.0	21.5
Average	4.05	3.62	3.32

Table 4.6: Age Structure of Household Head

Age	Gongzhuling County	Tai County	Jurong County
-30	25.0	4.5	14.0
31-40	36.0	25.0	37.0
41-50	16.0	37.5	20.5
51-60	13.0	22.0	19.5
60+	10.0	11.0	9.0

The educational level and experience of household heads also differ quite substantially. Only 18 percent of household heads in Gongzhuling county have less than four years of education (see Table 4.7). The figure is more than 40 percent in both Tai and Jurong Counties. About

one-third of household heads in Gongzhuling county (32 percent) and Jurong county (28 percent) have the experience of being a production team or brigade leader. Only a quarter of household heads in Tai county had such experience.

Table 4.7: Education of Household Head

Education	Gongzhuling County	Tai County	Jurong County
0	11.0	19.0	25.5
1-3	7.0	22.5	21.5
4-6	44.0	40.0	25.5
7-8	15.0	10.5	10.5
9	20.0	3.0	9.0
10	3.0	5.0	8.0

The discussions above confirm the assertion in the preceding section that households are at different stages of life cycle and have different human capital endowment, which includes educational level and experiences. Therefore, the egalitarian bias in the distribution of land when the household responsibility system was adopted implies that the marginal products of land and labor will be different across households. Labor market transactions are another way to reduce the marginal product gaps and to improve resource allocation. The need for labor market transactions may also arise from other reasons. Because of the seasonality in most agricultural production, the demand for labor is highly

concentrated in certain periods of time in the year. During the peak periods, most households experience shortage of labor. The interesting question, therefore, is whether the sampled households engage in labor market transactions to improve resource allocation.

Table 4.8 shows that only 12 households in Gongzhuling county and 22 households in Jurong county employed hired workers in various stages of production. No labor-hiring for agricultural production was found in Tai county. Table 4.9 shows the average wage rate for different types of work in Gongzhuling county and Jurong county. The average rate ranges from about 1.5 yuan per day to about 6.3 yuan per day. However, the actual daily rate ranges from one yuan to ten yuan. In addition to the wage, meals for workers, in general, are also required.

Table 4.8: Labor Market Transactions

Type of Activity	No. of Household Hiring Labor (%)			Households Exchanging Labor (%)		
	Gongzhuling	Tai	Jurong	Gongzhuling	Tai	Jurong
Preparation	0	0	1.5	1.0	12.0	5.5
Planting	3.0	0	7.0	5.0	61.5	48.5
Cultivation	4.0	0	2.5	4.0	4.0	1.0
Harvest	2.5	0	8.0	12.0	38.0	67.0
Total % of Households	6.0	0	11.0	15.0	65.5	74.5

Table 4.9: Wage Rates

Activity	Gongzhuling	Jurong
Preparation	.	1.5
Planting	3.8	4.2
Cultivation	6.3	3.9
Harvest	3.6	5.4

Note: Wage rates reported here are cash wages. In general, employers also need to provide meals, which are not calculated in the wage here.

Table 4.10 lists the comparison of some aspects of the households engaged in wage labor employment with those households which did not employ any worker. From this table, it is noted that the characteristics of labor-hiring households in Gongzhuling county differ from those in Jurong county. Compared to the non-labor-hiring households in Gongzhuling county, the labor-hiring households in this county are smaller in size and with less labor endowment. However, they also have smaller operational land area, both in absolute size and relative size (operational land per worker and operational land per person). While none of these labor-hiring households own tractors, the value of the draft animals they own is about twice as much as that of the non-hiring households. From these comparisons, there are no obvious reasons that these households need to hire labor and the other households do not. Perhaps, the main explanation lies with the off-farm jobs and activities. On average, about a quarter of income for the labor-hiring households in the last season came from off-farm employment

Table 4:10: Labor Hiring and Household Characteristics

County	(1) Number of Households	(2) HH Size	(3) Adult	(4) Operational Holding (mu)	(5) Land-Labor Ratio (mu/worker)	(6) Land-Person Ratio (mu/person)	(7) Tractor (yuan)	(8) Buffalo (yuan)	(9) Non-Farm Income (%)
Gongzhuling									
No	188	4.3	3.0	21.1	7.4	5.0	372	150	16.7
Yes	12	3.7 *	2.5	15.4	6.7	4.9	0	316	24.8
Jurong									
No	178	4.2	3.3	6.7	2.2	1.6	487	150	45.5
Yes	22	3.7 *	3.3	8.2	2.7 *	2.4 *	27	123	45.4

Note:
(1) Number of households
(2) Household size
(3) Number of adults between age 14 and 65 in the household
(4) Average landholding per household
(5) Average landholding per adult member
(6) Average landholding per person
(7) Average value of tractor in a household
(8) Average value of buffalo in a household
(9) The percentage of household income from non-farm employment and non-farm activities in the total household income.

* Indicates that the difference reaches the significant level of 10 percent.

and activities, while the non-hiring households had only 16.7 percent of income derived from these sources.[10] This may imply that after adjusting for off-farm employment, the actual labor-land ratios in the hiring households are much smaller than the average in the sample. Therefore, hiring labor in these households improved this ratio and reduced the marginal productivity gaps. One point deserving attention is related to the educational level of the household heads in the labor-hiring households. On average, education is higher for hiring households than for non-hiring households (7.9 years compared to 5.7 years, the difference is significant at .01 confidence level). This difference may explain why this group of households has higher ratio of off-farm income. Off-farm employment, such as industry, and activities such as crafts, services and commerce, in general, require abilities that are different from farming. Education increases a person's ability in handling the uncertainty and obtaining new required skills that arise from a new job. Therefore, a high level of education facilitates the shifting of labor from farming to non-farming activities.

The 22 labor-hiring households in Jurong county have characteristics that are different from those of Gongzhuling county. The portion of income derived from non-farm sources did not differ from that of non-hiring households (45.4 percent compared to 45.5 percent). However, both the land-labor ratio and land-person ratio are much more favorable in the hiring households than in the non-hiring households (2.7 mu/labor compared to 2.2 mu/labor, 2.4 mu/person compared to 1.6 mu/person). The differences in land-labor ratio and land-person ratio are both significant

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10/ The difference is not significant at the conventional level.

statistically. These contrasts indicate that labor-hiring in Jurong county is mainly a result of the difference in the land-labor ratio across households.

Although the reasons for hiring labor are different in Jurong county and Gongzhuling county, the underlying economic forces are the same. In Jurong county, the land-labor ratio in the hiring households is higher than the non-hiring households. This difference indicates that, if labor-hiring did not occur, the marginal product of labor in these 22 households would be higher and the marginal product of land would be lower than the other 178 households. The employment of workers increases the availability of labor and thus reduces the gaps of marginal products between the hiring and non-hiring households. As such, the resource allocation is improved. In Gongzhuling county, the original land-labor ratio is lower in the 12 hiring households than in the non-hiring households. However, the hiring households have higher portions of labor force shifting out of agriculture. After making this adjustment the land-labor ratio should be higher in the hiring households than in the non-hiring households. The employment of workers thus reduces the gap in the marginal products between these groups of households.

Table 4.8 also indicates that most sample households in Tai county (65.1 percent) and Jurong county (74.5 percent), and a significant group of households in Gongzhuling county (15 percent) engaged in exchange labor. Most incidence of labor exchanging occurred during the periods of planting and harvesting, which are the peak periods in using labor. There are two explanations why most households use labor-exchanging instead of labor-hiring to alleviate seasonal labor shortages. The first reason is that hired labor is subject to incentive problems. The direct exchange of

labor between relatives and friends mitigates the shirking problem and thus reduces the cost of supervision. An additional explanation is that hiring labor requires cash. Thus, engaging in labor-exchanging to alleviate seasonal labor shortages reduces the need to draw on cash resources or to borrow. The latter explanation is partly supported by the distinct characteristics of labor-hiring households in Gongzhuling county and Jurong county. The higher portion of income from non-farm source in the labor-hiring households in Gongzhuling county implies that these households have more cash income. The favorable land-labor ratio in Jurong county's labor-hiring households indicates that these households have larger agricultural surplus and, as a result, larger cash reserves.

3. Capital Services Market

After the household responsibility system was adopted, irrigation, in general, has still remained as a collective function that is performed by the village. Plowing and harvesting are also coordinated by the village. However, whether these two functions are performed by the village depends on whether draft animals and tractors are still collectively owned. None of our sample villages collectively owns draft animals and tractors. Sampled farmers either used their own or rented draft animals or tractors from specialized households to do plowing and harvesting.

Draft animals, tractors and other farm machinery were the most difficult assets to be divided when the household responsibility system was adopted. Several different measures were taken to deal with such assets. In all of the 16 surveyed villages in Gongzhuling county, tractors and draft animals were sold to individual households at prices that were negotiated and agreed upon by the villagers, and funds were paid to the villages in a three to five year installments. The prices for a big

tractor (25 HP) were about 4,000 to 6,000 yuan, and for a small tractor (12 HP) was about 2,000 to 4,000 yuan. The price for a draft animal ranged from 100 to 800 yuan (mostly between 500 to 800 yuan). Since a village had about one hundred to three hundred draft animals when the land was allocated, about half of the households in a village had opportunity to buy a draft animal. In Tai county, most villages contracted the tractors to specialized households. Each year these households gave about 150 to 200 yuan to the village as rent. Draft animals were also contracted to specialized households. Since arable land is very limited in Tai county, feeding draft animals was a big burden on these households. Therefore, in one village the draft animals were given free to a household. The only obligation is that this household has to plow the other households' plots without charge for two years. In another case, the village gave 2.5 mu of land as feed plot to the specialized household. In two other villages, the specialized households were subsidized at 150 yuan a year for feeding a draft animal. Tractors and draft animals in Jurong county, in general, were also sold to individual households at prices negotiated among households in a village, as in Gongzhuling county. The prices for tractor and draft animals were also similar to those in Gongzhuling county. However, the average operational size in Jurong county is not big enough to maintain a tractor or even a draft animal, therefore, tractors and draft animals are often jointly owned by several households.

The different arrangements of ownership of tractors and draft animals imply different intensities of capital services market. In Gongzhuling county, 40.5 percent of the sampled households used only hired animals or tractors in farming. In Jurong county, most households (58 percent) used both family-owned and hired tractors or animals, and

relatively a few households (12.5 percent) used only hired equipment or animals. On the contrary, almost all households (96.5 percent) used only hired tractors and animals in Tai county (see Table 4.11). Draft animal and tractor services, in most cases, are provided by households in the same village.

Table 4.11: Capital Services Market

	Gongzhuling County	Tai County	Jurong County
% Using only family-owned draft animal or tractor	36.5	0.0	29.0
% Using only hired draft animal or tractor	40.5	96.5	12.5
% Using both family-owned and hired draft animal or tractor	22.0	1.0	58.0
% Not using any draft animal and tractor	1.0	2.5	0.5

Capital services, in general, were charged at a piece rate. The cost of plowing a mu is between 12 yuan and 20 yuan. The way that rental fees are paid is different in different areas. In most cases in Gongzhuling county, fees for hired animals or tractors were collected in cash after harvest. In Tai county and Jurong county, fees, in general, are collected when work is done. However, it is also possible to delay the payments until harvest. For hiring tractors, in addition to paying fees, a household needs also to provide fuel. This is because subsidized fuel is allocated to each household by the government according to each household's

operational acreage. Hired capital services are thus not a drain on cash resources before the harvest in Gongzhuling, but they are cash-requiring in Jiangsu for most households. The operational area, however, is quite small, and thus the amount of cash required is small as well.

4. Other Input Markets

Unlike land, labor and capital services markets, the material input (fertilizer, pesticides, etc.) markets have existed even before the recent reform. However, the adoption of the household responsibility system in rural areas increased the frequency of transactions in material input markets and brought dramatic changes in the forms of current markets.

A. Fertilizer. Fertilizer is the most important material input in agricultural production. Nitrogen is the main ingredient in the contents of fertilizer applied. As in other parts of China, farmers in these three counties used only a little potassium and phosphate.

Fertilizer is distributed to farmers through several channels. Tables 4.12a, 4.12b and 4.12c show the weights of different sources of fertilizer in each village. There are four main sources: "quota-linked fertilizer", "price-negotiated fertilizer", "planned fertilizer", and "free-market fertilizer".

Table 4.12A: Sources of Fertilizer: Gongzhuling County

Village Number	Quota-Linked Fertilizer (%)	Price-Negotiated Fertilizer (%)	Free-Market Fertilizer (%)
1	15	65	20
2	4	79	17
3	7	43	50
4	24	0	76
5	12	80	8
6	5	40	55
7	20	60	20
8	40	40	20
9	12	88	0
10	50	40	10
11	11	35	54
12	10	67	23
13	11	65	24
14	20	30	50
15	35	45	20
16	15	70	15

Table 412B: Sources of Fertilizer: Tai County

Village Number	Fertilizer (%)			
	Quota-Linked	Price-Negotiated	Free-Market	Planned
1	29	43	28	0
2	2	66	32	0
3	15	45	5	35
4	0	60	0	40
5	3	70	0	27
6	0	40	20	20
7	0	29	0	71
8	0	29	0	71
9	0	50	10	40
10	11	15	44	30
11	22	24	25	29
12	15	45	5	35

Table 4.12C: Sources of Fertilizer: Jurong County

Village Number	Quota-Linked Fertilizer (%)	Price-Negotiated Fertilizer (%)	Free-Market Fertilizer (%)
1	35	52	13
2	20	0	80
3	20	50	30
4	20	20	60
5	46	30	24
6	8	40	52
7	32	54	14
8	20	20	60

The "quota-linked fertilizer" is supplied by the central government, provincial government or county government to the township government according to the quota of grain that each township sells to the government. The township then allocates this fertilizer to the villages, and the villages ration it to the households according to each farmer's grain quota. Part of this fertilizer is produced in the giant state fertilizer plants, some is produced in the county government-owned small plants, and part of it is imported. This fertilizer is sold to farmers at the government-set price, which recently was about 50 percent of the free-market price.

The "price-negotiated fertilizer", in general, is purchased by various levels of governments from the fertilizer plants in other counties, provinces or some fertilizer importing agencies to supplement the quota-linked fertilizer. It is then distributed to the village and from the village to households at a price higher than the government-set price but lower than the free-market price. Two different methods are used in the distribution of the price-negotiated fertilizer. One is according to each

household's grain quota. The other method is based on each household's operational farm size.

The "planned" fertilizer allocation is observed only in Tai county. Tai county is self-sufficient in grain and it does not provide commercial grain to the state. The Tai county government procures some quota grain from farmers only to support the urban residents in the county. Since no grain is sold to the state, therefore, the state does not allocate quota-linked fertilizer to Tai county. Nevertheless, the county has two county-owned fertilizer plants. Part of the output of these two plants is distributed as quota-linked fertilizer to the households with grain quota obligations and part of it is distributed as "planned" fertilizer to the households without grain quota obligation. The distribution of planned fertilizer is mainly based on the operational farm size. The prices are similar to quota-linked fertilizer.

The fertilizer obtained through the above three sources is not sufficient for most household needs. The free-market is another source of fertilizer supply. However, the prices in the free market are much higher than the government prices. For example, the government set price for ammonia is 0.56 yuan per kg, while it is about 1.2 yuan in the free market. The percentage of fertilizer bought through the free market varies from village to village. It ranges between about 10 percent to about 80 percent of the total fertilizer consumption. The two-tier price structure encourages the diversion of fertilizer earmarked for quota-linked or negotiated fertilizer schemes to the free market. Farmers frequently complain that the government does not fulfill its promise of fertilizer delivery.

B. Diesel. The distribution of diesel is similar to the distribution of fertilizer. However, there are only three categories, that is , quota-linked diesel, planned diesel, and free-market diesel. In Tai county, the planned diesel was allocated according to the operational size of a farm. However, the diesel ration, in most cases, is distributed to the tractor operator who provides capital service and not to the farmers. In Jurong county, the quota-linked diesel was distributed to the individual households according to either the grain quota obligation of each household or the size of responsibility plots in each household. Gongzhuling county adopted the same methods as Jurong county to distribute quota-linked diesel. If a household does not have a tractor or other farm machinery, it can sell the diesel ration to a diesel station.

C. Herbicide and Pesticide. The supply channels of herbicides and pesticides are much simpler compared to those of fertilizer and diesel. Herbicides and pesticides are supplied by the township or village supply and marketing cooperatives. In general, farmers obtain them directly from the cooperatives. However, in some villages, the staff in the village scientific station buy the herbicides and pesticides from the county or township supply and marketing cooperatives and then sell them to the farmers in the village. A two-tier price system exists also in herbicides and pesticides. The government-set prices are about half of the market prices. Farmers frequently complain that it is very difficult to obtain herbicide and pesticide at the government set prices.

D. Market Constraints. Even though free markets for fertilizer, diesel, pesticides and herbicides exist, these markets are still very limited. Table 4.13 shows the fraction of farmers in each county that were willing to pay prices at the market rates or even higher but were

Table 4.13: Input Supply Constraints

	Gongzhuling %	Tai %	Jurong %
Fertilizer	10	14	54
Diesel	10	29	33
Pesticide	1	23	32
Herbicide	1	26	28

Note: The numbers show the percentages of respondents who stated that they were not able to obtain the needed inputs even though they were willing to pay higher than market prices.

unable to obtain the goods. In Jurong county about half of the respondents were unable to obtain enough supplies of fertilizer, diesel, pesticides and herbicides. The quantity constraints are less severe in Gongzhuling county. Only about 10 percent of the farmers there had difficulty in obtaining enough fertilizer and diesel, and only one percent could not obtain pesticides and herbicides. Perhaps this is because Gongzhuling county is the champion commercial grain producer in China. Therefore, the local government at various levels makes great efforts to deliver adequate supplies of each kind of material inputs into this county in order to maintain the high grain output and the distinguished leadership position of the county.

The phenomenon that some farmers are unable to obtain fertilizer, diesel, pesticides, and herbicides even though they are willing to pay higher than the market prices, implies that the free market is in a disequilibrium. For a full-fledged free market, the price of a good will

be equilibrated according to the demand and supply. The reason for the market disequilibrium may be due to the fact that a great portion of the supply in the free market is not from ordinary sources, and availability is localized and unpredictable. The market is thus highly segmented. In many cases, supplies which enter the free market are diverted from the quantities that are earmarked as quota-linked or planned, without sanction of authorities. Thus many retailers cannot guarantee a continuous supply of these products, and availability is unpredictable.

Diesel, pesticides, and herbicides, in general, are sold for cash payment. For fertilizer, the arrangement is more complicated. In many villages in Gongzhuling county, the quota-linked and price-negotiated fertilizer was distributed directly to farmers as a fertilizer loan. In the Jiangsu counties, rationed fertilizer is usually paid in cash. Free-market fertilizer, even in Gongzhuling county, is sold on a cash basis.

V. CREDIT MARKETS

There is a marked difference in the incidence of credit activities between Gongzhuling county and the two Jiangsu counties in the sample: Whereas only 21 percent of the former sample have not borrowed from any source, the share of non-borrowers in Jurong county was 78.5 percent, and 67 percent in Tai county. This difference is somewhat artificial, as the supply of subsidized fertilizer in Gongzhuling county is linked to credit in a procedure that forces farmers to become borrowers regardless of whether they really need credit.[11] In all counties the extent of informal credit transactions is very limited. Furthermore, most of the informal transactions reflect interest-free loans among relatives and friends (Table 5.1). Below we review in detail credit operations in the formal and informal sectors.

In Gongzhuling county, the overwhelming majority of the sampled farmers (74.5 percent) utilized formal credit during the season reviewed. Most of the loans were in kind in the context of fertilizer distribution. In Jurong county, only 12.5 percent of the sample obtained formal credit. The percent of formal sector borrowers is somewhat higher in Tai county (24 percent). Most of the formal credit transactions in Tai county reflect an advance cash payment made to cotton growers by the cotton marketing agency

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11/ The distribution of subsidized fertilizer is performed as a loan in kind, and no cash is collected from the farmer. The delivery of the fertilizer is registered in the credit cooperative as a loan, to be repaid after the corn harvest. Since most farmers wish to obtain fertilizers at the subsidized price, they become borrowers even if they would prefer to pay in cash.

as an inducement to grow cotton. The amount of liquidity entailed in these cash advances is rather small (less than a third of a typical credit cooperative loan). While half of the recipients of cash advances in Tai county did not perceive the advances as credit (because there is no explicit interest or payback), the procedure clearly adds to the liquidity of the household during the cultivation period, and may therefore diminish the need for credit or liquidity from other sources.

Table 5.1: Credit Activities (Percent)

County / Item	Gongzhuling (N=200)	Tai (N=200)	Jurong (N=200)
Non-borrowers	21.5	67.0	78.5
Borrowers from formal market only	56.0	20.0	8.5
Borrowers from informal market only	4.0	9.0	9.0
Borrowers from both formal and informal markets	18.5	4.0	4.0
Percent of informal transactions which are interest-free	68.0	75.0	100.0

The frequency of informal credit transactions is smaller than formal transactions in both Gongzhuling an Tai county, and is about equal in Jurong county. Only 22.5 percent of the Gongzhuling sample, and 13 percent of the Jiangsu counties sample had informal loans. In these latter counties the incidence of borrowing in both markets is less than the trend observed in recent years (Table 5.2). In Gongzhuling the incidence of borrowing in the informal market is slightly up while the incidence of borrowing in the formal market is within the range observed in recent years.

Table 5.2: Occurrence of Borrowing Over Time (Percent)

County	Gongzhuling		Tai		Jurong	
	Formal Market (N=200)	Informal Market	Formal Market (N=200)	Informal Market	Formal Market a/ (N=200)	Informal Market
1983	63.0	11.0	13.5	9.5	20.0	10.5
1984	70.5	11.0	10.5	10.5	27.5	14.0
1985	72.5	15.5	14.0	13.5	24.5	18.5
1986	78.5	19.5	15.5	20.0	23.5	18.0
1987	74.5	22.5	6.0	13.0	12.5	13.0

a/ Figures for formal market borrowing in Tai County exclude cash advances to cotton growers to allow comparability between 1987 figures and earlier years.

The basic structure of the institutional (formal) credit system is quite uniform in most areas of China: The Rural Credit Cooperatives (RCCs) are the main lending institution to farming households while the Agricultural Bank of China interacts very little with households in lending operations (it is more active in attracting deposits). Other agencies may provide credit in the context of input supply or marketing operations, and their role may be quite variable. This structure is evident in Table 5.3, which presents the composition of loans in the sample by source. In both Gongzhuling and Jurong counties, the RCCs are the most frequent institutional lender, with the ABC playing a very minor role. In Tai county, where cotton promotion efforts entail a cash advance to growers, the cotton marketing agency is the most frequent institutional provider of liquidity. However, if the volume of credit is considered, the RCCs would be the most significant institutional lender even in this county, as the

amount of cash advanced by the cotton agency is small. In the informal sector relatives provide most of the loans, and friends are the second major source. As indicated earlier, the overwhelming majority of these informal transactions is not profit-motivated and no interest rate is charged. The share of institutional credit in the total volume of credit is 66.5 percent in Gongzhuling, 33 percent in Jurong and 25 percent in Tai county. Thus in the two Jiangsu counties loans from relatives and friends account for the bulk of borrowed liquidity, by volume.

Table 5.3: Sources of Loans a/

County	Gongzhuling	Tai	Jurong
Source	(N=259)	(N=60)	(N=82)
I. Institutional	81.9	69.3	48.3
ABC	8.9	3.6	6.6
RCC	71.4	10.9	35.0
Other	1.5	54.8 b/	6.7
II. Non Institutional	18.1	30.7	51.7
Relatives	11.2	20.7	40.0
Friends	1.9	8.5	10.0
Other Farmers	5.0	1.5	1.7

a/ Unit of observation is loan transaction (not household).
b/ Cash advances to cotton growers.

Practically all of the loans from institutional sources are granted for a short-term maturity (Table 5.4). There are few medium-term loans, and no long-term institutional loans in the sample. Non-institutional loans in Gongzhuling and Tai county are also mostly short-term, while in Jurong country there is a significant share of informal loans with an indefinite maturity. Such loans may apparently be rolled over depending on the borrowers' ability to pay, as the transaction is among relatives. The maturity structure of loans in the sample thus

indicates that most of the medium term credit for agricultural households in our study areas (to the extent that such credit is utilized) is provided by non-institutional sources. This situation is different from that typically prevailing in less-developed countries, where most of the medium and long term credit is provided by institutional lenders. The reason for this apparent anomaly can be inferred from an inspection of the declared purpose of loans from the different sources (Table 5.5). A small part only of institutional credit is acquired for construction and social purposes such as weddings or funerals. Construction and special social events require large cash outlays which typically can not be covered from the farmers short run cash flow. It is an apparent policy of institutional lenders not to lend for such purposes.

Table 5.4: Duration of Loans (Percent)

County	Gongzhuling		Tai		Jurong	
Term	Institu-tional	Non-Instit.	Institu-tional	Non-Instit.	Institu-tional	Non-Instit.
Short term (12 months or less)	99.0	79.0	100.0	88.0	89.5	32.3
Medium term (13-48 months)	1.0	21.0	0	0	3.4	3.2
Indefinite or Unknown	0	0	0	12.0	7.1	64.5
Sample Size	212	47	57	25	29	31

The farmers face difficulty in diverting other institutional credit to such purposes, as diversion is easily noticeable in the case of construction or significant social events. For the same reason, informal loans contracted for these purposes cannot be diverted for consumption.

Farmers thus tend to fund large expenses on non-productive items (which require medium term credit) from the informal sector. The low incidence of formal credit for machinery acquisition reflects apparently low demand, as farm sizes are rather small and do not justify investment in machinery by individual households. According to farmers' statements, most of the formal credit is acquired for production purposes, and this is indeed the declared policy of institutional lenders. Of the total volume of credit which is not earmarked for easily verifiable purposes (i.e., credit which is fungible for production and consumption), the formal sector provides 87 percent in Gongzhuling county, 67 percent in Tai county and 57 percent in Jurong county. The bulk of the fungible credit in the study areas thus comes from the formal sector.

Table 5.5: Distribution of Loan Purposes by Type of Lender (Percent)

Purpose / County and Source	Sample Size	Production	Farm Machinery	Construction	Consumption	Social (Marriage Funeral etc.	Other
Gongzhuling							
Institutional	212	93.0	4.0	2.0	0	1.0	0
Non-Institutional	47	11.0	4.0	23.0	15.0	26.0	21.0
Tai							
Institutional	57	89.0	2.0	4.0	0	0	3.0
Non-Instututional	25	20.0	0	32.0	0	20.0	18.0
Jurong							
Institutional	29	48.0	10.0	10.0	3.0	10.0	19.0
Non-Institutional	31	6.0	19 0	29.0	13.0	23.0	10.0

Interest rates on institutional loans in all three counties are in the range 7-12 percent per annum, which is within the range of government-prescribed interest rates for different categories of loans. Most of the

informal loans do not carry an interest charge, and in the few where interest is charged, the rate is usually similar to that of institutional lenders. There are only a few loans in the sample with high interest rates commonly observed in less developed countries. Given the non-profit character of much of at he informal credit in the sample, it is not surprising that these loans by and large are provided without a security. A few instances of third-party guaranty are observed. In the institutional sector, the grain quota is pledged as security in most of the loans of Gongzhuling county. In Jurong county, most of the institutional loans do not carry an explicit security, while in Tai county both third party guaranty and the expected cotton harvest are utilized as security.

The very small incidence of commercially oriented informal credit market transactions in the study areas (relative to other less developed countries) is probably a consequence of factors on both the supply and demand side. The status of private lenders is not clarified legally, and they may not get any official backing in the case of disputes. Lending for profit may still be viewed negatively by some. Collateral assets are not available for most farmers, as until recently land leases were not officially transferable. In other countries, conditional pledges of land-use rights serve as a common security for informal credit. However, in China it is not clear that such transfers can be put into effect, as they do not have official sanction. In the absence of effective enforcement mechanisms, it is not surprising that most of the informal transactions observed are conducted between relatives and friends, where the motivation to lend is not profit, and the inducement to pay derives from the close links between the parties. The market is thus extremely segmented, with

transactions taking place within small circles of related households which are not open to outsiders.

On the demand side, there are factors which limit households demand for informal credit. In Gongzhuling, authorities are keen on maintaining the high grain output which has characterized the county in recent years, and they arrange for substantial amounts of institutional credit through fertilizer loans. This diminishes the residual demand for informal credit. In the two Jiangsu counties, the overall demand for credit (both formal and informal) is low, as chemical inputs (fertilizers, pesticides) are rationed and there is a relatively thin free market for these inputs. In the absence of opportunities to purchase these cash inputs, the demand for liquidity is reduced (see Table 4.14). Another factor which reduces Jiangsu households' need for borrowed funds (whether formal or informal) is the prevalence of off-farm employment in these study areas: on average, close to half of the income of Jiangsu households in the sample is derived from off-farm employment (in Gongzhuling the proportion is .18). The cash incomes from such activities tend to be less seasonal and more stable as compared to farming activities, thus diminishing the need for borrowed liquidity. Farm sizes are much smaller in jiangsu relative to Gongzhuling (by a factor of 4). The demand for credit for working capital purposes would thus be smaller in Jiangsu.

Given the apparently ample supply of institutional credit in Gongzhuling, and the limited demand for credit in Jiangsu, the natural question is to what extent credit is a binding constraint in the study areas. Put differently, for what proportion of the households in our study areas would an increased allocation of institutional credit induce an increase in productive activities. The data collected in the context of

the present study allow inference on this subject, as borrowing households were asked if at the going interest rates they would have liked more institutional credit than the amount they actually received. Households which did not borrow were asked the reason for not borrowing. Those borrowers which indicated desire to obtain more credit, and the non-borrowers who answered that they could not get credit may be viewed as being credit-constrained. The most common reason for not borrowing was availability of sufficient resources from own savings, but in Tai county there is a significant group of individuals who apparently did not borrow because they already had a large outstanding non-institutional debt. These individuals would possibly have desired to have additional liquidity. It is not clear whether these should be treated as credit-constrained. Adopting a more extensive definition, the share of households affected by credit shortage would seem to be the highest in Gongzhuling (35 percent) and the lowest in Jurong (11.5 percent, see Table 5.6). The latter county is indeed the one with the most severe constraints on the availability of chemical inputs, as evident from Table 4.14. An interesting issue (which can be tackled only by a more detailed analysis) is the extent to which credit will become a binding constraint once the input supply problems are resolved (e.g., by allowing a free market in chemical inputs).

Table 5.6: Extent of Credit Constraints

Category	Gongzhuling		Tai		Jurong	
	Sample size	% Con-strained	Sample size	% Con-strained	Sample size	% Con-strained
Borrowers	157	40.8	65	21.5	44	30.9
Non-Borrowers	43	14.0	135	26.6	156	6.5
All	200	35.5	200	25.0	200	11.5

VI. LIQUIDITY, INPUT USE AND PRODUCTIVITY

Theoretically, constrained liquidity adversely affects the utilization of cash inputs and ultimately leads to lower output. The verification of these propositions has proven difficult, as typically researchers do not know which farmers are constrained by liquidity. Some works used the dichotomy between borrowers and non-borrowers, assuming that all non-borrowers are liquidity-constrained. This procedure is clearly not appropriate, as our data indicates that many of the non-borrowers had sufficient liquidity from their own resources and they have not borrowed precisely because they did not need additional liquidity. Below we examine various indicators of liquidity, cash requirements, input use and output employing the distinction between credit constrained and unconstrained households as defined in the preceding section. Ultimately, the analysis should employ more refined econometrics in order to control for various attributes (other than the liquidity situation) which differentiate farmers. Our study has not reached this stage yet, and some of the methodological issues involved are discussed in section VIII of this report.

Table 6.1 presents several liquidity items, standardized per unit of land to overcome differences in holding size among households. It is observed that in all counties the households which are categorized as credit-constrained have substantially lower savings accounts, and cash. Other data show that the share of non-farm income in the overall income of non-constrained households is higher. Since their own liquid resources are smaller than those of non-constrained households one would expect liquidity-constrained households to borrow more. This is indeed verified

by line (5) of Table 6.1, which demonstrates that liquidity-constrained households borrow more (by 40 percent - 80 percent) than other households.[12] Overall, the liquidity position of unconstrained households is substantially higher than that of constrained households. This strengthens our confidence in the criteria used to categorize households as constrained or unconstrained (preceding section), because these criteria were independent of liquidity variables.

Table 6.1: Liquidity Indicators
(Yuan per unit of operated land)

County	Gongzhuling		Tai		Jurong	
Item	Credit Con-strained (N=71)	Not Con-strained (N=129)	Credit Con-strained (N=50)	Not Con-strained (N=150)	Credit Con-strained (N=23)	Not Con-strained (N=177)
1. Savings accounts	1.9	21.8	42.5	132.7	11.5	43.4
2. Cash	31.5	49.1	35.4	78.8	15.0	37.6
3. Fungible formal credit	18.3	17.0	5.0	5.2	.5	5.1
4. Fungible informal credit a/	6.9	1.2	5.6	3.1	11.9	1.8
5. Total fungible borrowing	25.2	18.2	11.6	8.3	12.4	6.9
6. Total liquid resources	58.6	89.1	88.5	219.8	38.9	87.9

a/ Excludes loans for purposes which could be easily verified, such as construction, machinery, funerals, weddings etc. In Tai county, formal credit includes cash advances to cotton growers.

12/ The definition of borrowing utilized for this discussion excludes credit which is earmarked for non-production purposes and the utilization of which for the purpose contracted can be verified.

Table 6.2 presents expenditures on various inputs. The comparison between counties is hampered by the fact that not all items are cash-inputs uniformly in all counties. Thus, fertilizers are mostly obtained as loan in-kind in Gongzhuling, but not in the two Jiangsu counties. Similarly, payments for capital services in Gongzhuling county are typically settled after the harvest, while in Jiangsu these services are more commonly settled at the time of services. Another complication is the fact that even if some of the inputs are obtained as a loan-in-kind there is another portion which is acquired on a cash basis in the free market. For the case of Gongzhuling, an estimate of the cash expenses on inputs is obtained by assuming that all fungible formal credit (Table 6.1, line [3]) was utilized for fertilizers. Deducting this item from the expenditure on fertilizers yields an estimate of the cash expenditure on this input. Adding other cash costs (seeds, pesticides, other materials and hired labor), indicates a cash expenditure of 12.4 Yuan per unit of land among credit constrained households as compared to 16.6 Yuan among unconstrained households (a difference of 33 percent). In Tai and Jurong counties (assuming all reported expenditures are in cash) the differences are smaller, 7 percent and 12 percent, respectively. The actual utilization of nitrogen (the most important fertilizer) as measured in nutrient-equivalent units is consistently higher among unconstrained households (by 8.4 percent - 16.4 percent). The data are thus compatible with the proposition that credit-constrained households will spend less on cash inputs as compared to unconstrained households.

The comparison of output levels among the sub-groups of farmers (lines (9)-(10) of Table 6.2) indicates that only in Gongzhuling county the data for <u>agricultural</u> output are compatible with the proposition that

Table 6.2: Expenditures on Inputs and Output Indicators
(Yuan per unit of operated land)

County	Gongzhuling		Tai		Jurong	
Item	Credit Con-strained (N=71)	Not Con-strained (N=129)	Credit Con-strained (N=50)	Not Con-strained (N=150)	Credit Con-strained (N=23)	Not Con-strained (N=177)
1. Seed	6.8	7.2	8.5	8.2	7.2	6.2
2. Fertilizer	22.9	25.5	23.8	28.8	19.1	20.1
3. Pesticides	.5	.4	4.8	6.1	5.8	5.7
4. Other material input	.4	.3	9.5	6.9	4.0	5.7
5. Hired labor	.1	.2	2.6	2.5	4.8	5.3
6. Hired capital services	7.1	5.2	4.0	4.6	3.7	6.0
7. Total input cost	37.8	38.9	53.3	57.0	44.5	49.7
8. Quantity of nitorgen used a/ (kg)	16.6	18.0	11.6	13.5	13.6	14.9
9. Value of agric. output b/	138.5	166.4	255.8	249.7	268.7	268.6
10. Value of agric. output plus non farm business income b/	143.1	174.9	306.1	335.6	301.8	297.5

a/ Measured in pure nutrients.

b/ Value of crops calculated at free market prices plus value of fruits and vegetables plus income from livestock and other specialized agricultural activities.

c/ Calculated as line (9) plus the income from non-farm business activities.

credit-constrained households have a lower output (by about 20 percent), while in the other counties agricultural output is practically identical for the two subgroups. However, if all the household's economic activities (whether agricultural or non-agricultural) are viewed as an aggregate performance criterion (a justifiable approach, as production credit is fungible across activities) the data show (line (10) of Table 6.2) that in both Gongzhuling and Tai counties, total output is higher among unconstrained households (by 22 percent in Gongzhuling, and 10 percent in Tai). The implication of these results could be that while in Gongzhuling the infusion of additional formal credit would increase the agricultural output of credit-constrained households, in Tai county additional credit, even if intended for agriculture, will increase non-agricultural output, as long as the present system of material inputs markets is not changed. Such tentative conclusions need, of course, to be confirmed through a more rigorous econometric analysis.

VII. INVESTMENT IN PRODUCTIVE AND NON-PRODUCTIVE ASSETS

The household responsibility system has brought a dramatic increase in income to rural areas in China. While in 1980 the average net income for a peasant was 191 yuan nationally, it increased to 424 yuan in 1986. The same dramatic change occurred in the sample areas. The average income for a farmer in 1986 was 635 yuan in Gongzhuling county, 448 yuan in Tai county, and 531 yuan in Jurong county. In all of the three sample counties, the per capita income is above the national average.

The direct impact of the sharp increase in per capita income is the improvement in living standards. Table 7.1 summarizes the comparison of percentages of sample households owning television, radio/recorder and other appliances between 1983 and 1987. The numbers of households owning TV sets, radio/recorder, and electric fan more than tripled in all three counties. The numbers of households owning sewing machine and watches have also increased about 50 percent. On the average, each household owned about half a bicycle in 1983. Ownership increased to about one bicycle in 1987.[13]

The most significant investment in consumer durables since the adoption of the household responsibility system is in the improvement of housing (see Table 7.2). About 60 percent of the households in Gongzhuling county, 68 percent in Tai county, and 56 percent in Jurong county have

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13/ Watch, sewing machine, and bicycle are the traditional "three big pieces." Television, radio/tape, and electric fan are the new "three big pieces" in rural areas.

either built new houses or improved their old houses. Now almost all houses in Tai county and Jurong county have tile roof and non-earth wall.

Table 7.1: The Changes in Living Standard

	Gongzhuling		Tai		Jurong	
	1983 (N=200)	1987	1983 (N=200)	1987	1983 (N=200)	1987
Percent own T.V.	6	42	2	26	11	38
Percent own radio/tape	3	14	2	12	3	17
Percent own sewing machine	46	57	11	31	27	37
Percent own watch	64	83	53	81	69	94
Percent own electric fan	0	1	1	25	9	32
Average no. of bicycle	.62	.96	.39	1.05	.41	1.08

Table 7.2: Improvement in Housing

	Gongzhuling		Tai		Jurong	
	1983 (N=200)	1987	1983 (N=200)	1987	1983 (N=200)	1987
Percent with tile roof	22	51	50	83	93	96
percent with non-earth floor	11	23	15	44	12	26
Percent with non-earth wall	22	48	51	85	84	95
Percent Who invested in house improvement	60		68		56	

About a quarter of the houses in Jurong county and two-fifth of the houses in Tai county have non-earth floor. Although the housing conditions have

also improved greatly in Gongzhuling county, they only reached the levels which prevailed in Tai county and Jurong county in 1983. About half of the houses in Gongzhuling county have tile roof and non-earth wall, and about a quarter of the houses have non-earth floor. The housing conditions in Gongzhuling county are obviously lower than those in Tai county and Jurong county.

The household responsibility system has also brought dramatic changes in production practices. In the old collective system, all production activities were managed and equipment was provided by the production team or brigades. As described in Section 4.3, when the household responsibility system was adopted, not only land was divided among individual households, but also some productive assets, such as tractors and draft animals, which were sold to individual households. Production management as well as productive investment have become the responsibility of individual households. Table 7.3 summarizes the percentages of households owning productive assets in 1983 and 1987. In 1983, the average value of productive assets (tractors, trucks, cars, pumps, engines, motorcycles, treshers, small tools, draft animals, pigs, poultry and other animals) owned by households in Gongzhuling county was only 570 yuan (47 percent of this was in pigs and poultry), in Tai county 250 yuan (84 percent of it in pigs and poultry), and in Jurong county 403 yuan (50 percent in pigs and poultry). The average value of productive assets by households owned has more than doubled by 1987. The values were respectively 1,477 yuan in Gongzhuling county, 578 yuan in Tai county, and 913 yuan in Jurong country.

In a relative sense, the increase in value of productive assets is very substantial in all three counties. However, in absolute levels, the

investment in productive assets is only a fraction of the amount invested in the improvement of housing. Table 7.4 compares the average investment per household in housing and productive assets. The value of productive assets was broken into three categories, namely equipment, draft animals, and other animals. The difference is largest in Tai county, where on average, each household spent 3,559 yuan on house improvement, but only 327 on acquiring new productive assets between 1983 and 1987. The difference is also quite substantial in both Gongzhuling county and Jurong county.

Table 7.3: Change in Productive Assets

	Gongzhuling		Tai		Jurong	
	1983	1987	1983	1987	1983	1987
	(N=200)		(N=200)		(N=200)	
Percent own tractor	1	9.5	0	0	3.5	8.0
Percent own truck/car	0	0.5	4.5	26.0	0	0
Percent own pump engine	1	2	0	1.5	6	11.5
Percent own thresher	0	3	0	0.5	2.5	12
Percent own buffalo/oxen	5	19	0	3.0	53	77
Percent own pigs	81	66	86.5	66.5	85	84.5
Percent own other draft animal	15	30	.5	0.0	1.5	0
Average value per household (Yuan)*	570	1477	250	578	403	913

Note: The values for 1987 reported in the table are undeflated. The price index for the agriculture productive equipments increased by 15 percent between 1983 and 1987. Therefore, in constant prices of 1983, the average value of agricultural productive assets that each household in the sample owned were 1,284 yuan in Gongzhuling county, 502 yuan in Tai county, and 990 yuan in Jurong county.

Table 7.4: Productive and Housing Investment (Yuan)

	Gongzhuling (N=200)	Tai (N=200)	Jurong (N=200)
Equipment	603	165	220
Draft animal	200	12	76
Other animal	104	50	214
Total productive investment	907	327	510
Housing	2461	3559	1820

Note: The numbers represent the average total investment per household between 1983 and 1987.

In these two counties, the expenditures on house improvement were 2.5 times as high as the productive investments. Moreover, it is noted that 48 households in Gongzhuling county, 35 in Tai county and 21 in Jurong county had disinvestment in productive assets. The average levels of disinvestment in these households were 574 yuan, 149 yuan, and 505 yuan respectively in Gongzhuling county, Tai county, and Jurong county.

The low incentive for acquiring productive assets and the high incentives for housing investment may be related to the perception of different degree of security in ownership rights. Houses have always been privately owned in rural areas. As a result, private ownership rights in houses are respected and well defined. Hence, once funds are available, the investment in housing becomes the first priority for most households. Secondly, the high investment in housing may be related to the age structure. A new house has become a precondition in rural areas for a young male adult to get married. The babies born during the baby boom in

early 60s have reached marriage age. The recent house construction boom in rural areas is thus a by-product of the baby boom in early 60s. The latter hypothesis is partly supported by the age structure of household heads in Tai county, where the investment in houses is the highest among these three samples. About 60 percent of the household heads in Tai county's sample are aged between 41 to 60, compared to 29 percent in Gongzhuling county and 40 percent in Jurong county (see Table 4.6). Their children are about 20 to 30 years old. Therefore, there were more marriage age young adults in Tai county's sample households.

The investment in housing was lowest in Jurong county. This fact seems to be inconsistent with the above mentioned hypothesis because there were more household heads aged between 41 to 60 in Jurong county than in Gongzhuling county. However, Jurong county had the best housing condition in 1983. In two indicators, tile roof and non-earth wall, Jurong county living conditions in 1983 were even better than Gongzhuling's condition in 1987 (see Table 7.2). They were also better or about the same as the conditions in Tai county in 1987.

The relatively low investment in productive assets (compared to housing) may also be related to the small size of farms after the household responsibility system: The average size of farm in Tai county's samples was only 4.63 mu, compared to 6.86 mu in Jurong county and 20.31 mu in Gongzhuling county. Tai county has the smallest land endowment. Its average productive investment per household was 327 yuan, which was about two-thirds of that in Jurong county and about one-third of Gongzhuling's investment. Although the average farm size in Jurong county is about 1.5 times as large as in Tai county, it is already too small for a household to independently own a draft animal or tractor. Therefore, the ownership

arrangements in Jurong county differ from those in Gongzhuling county. In general, tractors or draft animals are separately owned by independent households in Gongzhuling county. In Jurong county, on the contrary, they are jointly owned by several households. Joint ownership overcomes the issue of small farm size. Nevertheless, it creates other problems. Farmers may not have the appropriate incentives to take good care of the jointly owned buffaloes or tractors. This incentive issue will be more serious in Tai county than in Jurong county because the farm size is smaller in Tai county. This may explain why no households in Tai county invested in tractors and only 6 households owned buffaloes.

VIII. IMPLICATIONS FOR FUTURE ANALYTICAL WORK

1. Stylized Facts

Several major stylized facts emerge from our preliminary analysis of the three survey counties of Gongzhuling, Jurong and Tai. First, it is found that for these three countries, the formal and informal credit markets are quite segmented and cannot in general be considered effective alternatives for each other from the point of view of the potential borrower. In the first place, the formal loans are restricted as to purpose -- primary for the financing of production and not available for other personal or consumption uses. In the second place, the formal loans generally have a very short maturity -- approximately equal to the length of the production cycle. In the third place, the informal loans are almost always tied to largely exogenous, lumpy and highly visible special consumption purposes such as funerals and weddings or investment purposes such as construction of new housing. As such they cannot be easily diverted for other uses without detection by the informal lenders who are typically relatives and friends of the borrowers. Moreover, the fact that no interest is generally charged on these informal loans is further indicative of the non-profit nature of these informal loans which confers upon the informal lenders the moral authority to assure that they are used for their intended purposes. As a result, the informal loans are almost always used directly as intended and consequently do not normally increase the net liquidity available to the farm household for production purposes.

Given the lack of anonymity in the informal credit market (and indeed, in even the formal credit market) and the general geographical immobility of the potential borrowers, informal loans are really not good

substitutes for formal loans and vice versa. Households that are constrained in the formal credit market, that is, whose demands for production credit cannot be met there, cannot expect to have their unmet demands satisfied in the informal credit market. Likewise, households that are constrained in the informal credit market cannot expect to have their unmet consumption credit demands satisfied in the formal credit market. Thus, in the analysis of production behavior of the agricultural households in the three study counties in China, it is justifiable to assume that the formal and informal credit markets are not interrelated and that the volume of informal credit for a farm household, to the extent that it has an effect on farm production, say, through some risk preference on the aggregate volume of outstanding debt of the household, may be regarded as exogenously determined. This finding has important implications on the analytical work because it allows us to use the much simpler single market disequilibrium model rather than the dual market disequilibria model in our analysis of the data from Gongzhuling county. It is quite different from our expectations as we have originally formulated a dual market disequilibria model similar to the one employed by Bell, Srinivasan and Udry (1988).

Second, a significant proportion of farm households in Gongzhuling county, almost 80 percent, were <u>actual</u> borrowers from the formal credit market. By contrast, the corresponding proportion are 12.5 percent for Jurong county and 24 percent for Tai county. However, approximately 35 percent of farm households in Gongzhuling reported being constrained by credit, compared to 11.5 percent for Jurong county and 25 percent for Tai county. The relatively low proportion of households in Jurong county reporting being constrained by credit makes it necessary for use to pool the sample of households from both Jurong and Tai counties.

Third, there is little or no variation in the rates of interest paid by the borrowers on their formal loans, regardless of amount and credit standing of the borrower.

Fourth, for various reasons as discussed in previous sections, there is very little hired labor (although significant exchange labor in Jurong and Tai counties) and very little land subleasing, either in or out. Land under operation may therefore be also considered to be predetermined to the farm household in our analysis.

Fifth, a significant proportion of farm households in Jurong county, and to a lesser extent in Tai county, are constrained by the supply of chemical fertilizers, and by other purchased inputs such as diesel fuel, herbicide and pesticide. This observation also has important implications for the analytical work because it requires us to consider the possible simultaneous disequilibria of both the formal credit and the input markets. For example, a farm household might have reported that it was not credit-constrained precisely <u>because</u> it was constrained by the supply of one of the inputs. Thus, additional credit does the farm household no good. However, this does not necessarily mean that if the supply of the input were increased, output would have been increased, because then the farm household might find itself to be credit-constrained. Since chemical fertilizer was by far the most important purchased input in terms of expenditure, we shall focus on only chemical fertilizer in our analysis of the input-supply constraint for the Jurong and Tai countries.

Sixth, non-farm activities can be an important source of liquidity as well as an important end use for credit. They were especially important in Jurong and Tai countries, accounting for almost 50 percent of the incomes. The dominant portion of the income came from non-farm employment,

which was more likely to provide additional liquidity than to use additional credit. However, a significant portion of the income also came from non-farm business activities, which might increase the net demand for credit. In any case, income from non-farm activities cannot be considered exogenous because it affects not only the formal credit demand and possibly supply but also the utilization of labor and other inputs in farm production. It should be considered as an endogenous variable to be determined simultaneously with the other endogenous variables.

Definition of Credit-Constrained

A farm household is said to be credit-constrained in the formal credit market if its demand for formal credit is positive and greater than the supply of credit to it by formal financial institutions, in this case, by the agricultural bank and/or the agricultural credit cooperative. As unmet demand cannot be directly observed (recall that observed actual formal credit is the minimum of formal credit demand and formal credit supply), one can in general only infer whether a farm household is credit-constrained by comparing the credit demand and supply projected for that household from the econometrically estimated formal credit demand and supply functions. This approach, however, is not exact, and is subject to possibly large stochastic errors. Fortunately, unlike most other studies on credit, we have additional information on whether a farm household is credit-constrained obtained through direct questions addressed to the head of the farm household as to whether he had any problems in obtaining all the formal credit that he needed. This direct response information can be combined with the information on actual formal credit in the econometric

estimation of the formal credit demand and supply functions to obtain more efficient estimates.[13] (This case is sometimes referred to in the literature as the "known sample separation case). Alternatively, this information can be used to provide a test as to the degree of correspondence between the survey responses by and the econometric predictions for the farm households.[14] If it is determined that this type of direct questions provide informationally meaningful responses, perhaps they can be more widely used, not only in surveys involving other credit markets, but in other markets in general.

The Important Policy Questions

The most important policy question that we hope to answer through an analysis of this set of data is, primarily: What is the effect, if any, of an increase in formal credit availability in rural China on agricultural production? For example, if the total supply of credit to Chinese agricultural households is increased by ten percent, what is the effect on the supply of agricultural output and the demands for agricultural inputs? And secondly: How are these effects enhanced or attenuated depending on the supply conditions of the other inputs, or on the opportunities for non-farm employment and business activities?

Of course, these are interesting questions only insofar as there are farm households in China which are at least potentially credit-

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13/ This, to the best of our knowledge, has not been attempted before.

14/ This, to the best of our knowledge, has also not been done before.

constrained. If there is no evidence that Chinese farm households are credit-constrained at all, there is no point in pursuing this analysis further. However, we do find a significant proportion of households in our three study counties reporting that they were credit-constrained, and the proportion might well have been larger had some farm households not been input supply-constrained. It is therefore meaningful to ask what will happen if appropriate policy measures are undertaken so that the credit constraints can be alleviated for these households.

The answers to these questions are critically important to the formulation of an effective agricultural credit policy (and program) in China. Whether it is worthwhile for the Chinese government to attempt to alleviate the credit constraint problem in the rural areas depends on the benefits that the removal of such credit constraints will bring. Our analysis provides the tools and parameters with which these benefits and costs can be estimated and evaluated. In addition, it also throws light on how the evaluation may change depending on the underlying conditions in the other input markets that may differ from county to county and from household to household. It will thus be directly useful at the operational level as well.

Identification and Estimation of Credit Demand and Supply Functions - Credit Market Disequilibrium Only

In order to estimate and evaluate the effect of the removal of the formal credit constraint, it is necessary to separately identify and estimate the formal credit demand and supply functions. Formal credit demand may be assumed to be a function of the characteristics of the head

of the household, including age, education and sex, the level of liquidity (as perceived and known to the household), the level of total indebtedness, the quantity of land under operation (quality adjusted if possible), the quantity of productive capital, the quantity of potential labor, and the township or village dummy variables. Formal credit supply may be assumed to be a function of the characteristics of the head of the household, the levels of total and different types of ascertainable financial assets, the level of total indebtedness, the quantity of capital and land, the level of past total income, previous loan experience, and whether anyone in the household had an official position either in the government administration or in the party. (Recall that the rate of interest is constant in nominal terms).

Identification of the formal credit demand and supply functions depends on the existence of variables which affect demand and not supply and also variables which affect supply but not demand. In addition, there must be at least a significant proportion of households with positive actual formal loans. If actual formal loans are all zero, then it is impossible to identify separately the credit demand and the credit supply functions. Finally, there must be at least a significant proportion of households with positive actual formal loans that reported being credit constrained as well as those that reported not being credit constrained. Otherwise, one can only estimate one of the two functions but not the other. For example, if no one household reported being credit-constrained, then credit supply must have been greater than credit demand for every household with a positive credit demand. This means that all the observed actual formal loan amounts lie on the credit demand function. Thus the credit demand function can be estimated but the credit supply function cannot be identified.,

The Problem of Cell Size

We have to treat Jurong and Tai counties differently from Gongzhuling county. In Gongzhuling, there were enough borrowers who reported being credit-constrained, approximately 60 out of 160, so that the formal credit supply as well as the demand functions can be identified. In Jurong, however, the number of borrowers who reported being credit-constrained was only approximately 13 out of 45, hardly enough to allow the estimation of all the parameters of the formal credit supply function. In Tai, the comparable number was 13 out of 65, again hardly enough to allow the estimation of all the parameters of the formal credit supply function. Since the two counties are geographically proximate to each other and have other similar characteristics, it was decided that the data from the two counties will be pooled in the analysis, but allowing county-specific dummy variables whereever appropriate.

The Method of Estimation

The method of estimation is by maximum likelihood. Under the assumption of a bivariate normal distribution of the stochastic disturbance terms of the formal credit demand and supply functions, a likelihood function for the sample (consisting of either Gongzhuling county or Jurong and Tai counties) is maximized, using a variant of the Davidson-Fletcher-Powell method. There are still, however, technical problems with implementing this method of estimation, and various alternatives are being pursued.

The addition of output Supply and Input Demand Functions

It is possible to improve the efficiency of our estimators by making use of the fact that depending on whether the household is credit-constrained, the farm household will behave differently in terms of both output supply and input demand. For example, the response of the output of farm household to an increase in the number of adults (labor power) in the household may well depend on whether the credit constraint is binding. This may be modeled by specifying the joint distribution of the stochastic disturbance terms of not only the formal credit demand and supply functions but also the reduced form output supply and input demand functions as multivariate normal, conditional on whether the household is credit-constrained. This approach, which enhances the separation of the sample, appears to be new.

In addition, it is possible to use a structural form approach, that is, to make explicit assumptions about the form of the production function of the household and to derive a set of interrelated output supply and input demand functions, conditional on whether the farm household is credit-constrained or not. The principal advantages of the structural form approach are that it reduces the number of unknown parameters to be estimated and enables a more straightforward interpretation of the results. The principal weakness of the structural form approach is that it depends on the specific functional forms that we assume and in particular on the degree of risk-aversion of the farm households. If farm households are not risk neutral, as they most likely are not, then the derived structural form is no longer simple, even though it may still be feasible to implement a linearized or logarithmic linearized approximation.

Simultaneous Identification and Estimation of Credit and Fertilizer Demand and Supply Functions - Credit and Fertilizer Market Disequilibria

An additional complication arises from the fact that while the farm households in Gongzhuling are generally not input-supply constrained, many farm households in Jurong and Tai counties reported themselves to be input-supply constrained in addition to or instead of being credit-constrained (See Table 4.14). This complication requires the formulation of a statistical model with two interrelated disequilibrium markets. Our current thinking is to rely heavily on the structural form and to make use of those restrictions in the estimation process. Simplifying assumptions based on the sequentiality of credit and input decision will be explored. As mentioned earlier, only constraints in chemical fertilizer supply will be considered.

Simulating the Effects of the Removal of the Credit Constraint

At the conclusion of our estimation, we shall estimate the effect of alleviating the credit constraint. We shall perform this exercise by hypothetically raising the formal credit supply function by, say, 10 percent across the board. We shall then calculate the effect on output supply and on input demand for each household and adding them together for the whole sample. There are of course other ways of simulating an increase in overall credit availability; for example, one may assume that the government attempts to allocate the additional credit to those households with the highest use for credit. In order to do the latter, however, the government needs to possess a degree of information and practice a degree of discrimination that do not seem likely. Of course, an increase in formal credit availability may be simulated in many different ways.

Long-Term Credit

We have discussed only credit over the production cycle, or credit for working capital. We have not discussed the availability of long-term credit, which is necessary to finance fixed investment. Our survey of the three counties indicate that long-term credit is generally not available from the formal financial institutions. We also suspect that short-term credit cannot be easily rolled over indefinitely so that it becomes de facto long-term credit, although this remains to be more thoroughly investigated. In order to analyze the long-term investment behavior of the households, it will be necessary to look at the time-series information on the approximately half of our sample households that are included in the Chinese national probability sample.

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THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

RPO 674-34

DATE: August 26, 1988

TO: Distribution

FROM: Gershon Feder, AGRAP

EXTENSION: 38404

SUBJECT: Revised Paper on Agricultural Production and Credit in China

Enclosed herewith is a revised version of a draft paper circulated earlier as background for a workshop on Rural Credit Markets in China. Additional copies can be obtained from Maggie Wu, Ext. 37570.

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AGRICULTURAL PRODUCTION AND FINANCE:

Case Studies of Three Counties in China

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This report was prepared within the context of a World Bank sponsored study on "Rural Credit Markets, Investment and Farm Productivity in China" (RPO 674-34). The views presented here are those of the authors.

AGRICULTURAL PRODUCTION AND FINANCE:
Case Studies of Three Counties in China

Table of Contents

I. INTRODUCTION

This paper presents interim results from a Bank-sponsored study conducted in collaboration with the Research Center for Rural Development (Beijing). The study, entitled "Rural Credit Markets, Investment, and Farm Productivity in China" (RPO 674-34) was initiated in October 1987, and aims at gaining knowledge regarding the role of rural credit markets in China's agricultural sector. The research approach envisages utilization of detailed household-level data in the analysis of farming households' performance. In the context of this study, samples of 200 households each from three counties in China were selected and interviewed: Gongzhuling county in Jilin province and Jurong and Tai counties in Jiangsu province.

Because credit transactions (or absence of such transactions) by agricultural households are directly and indirectly related to assets, input utilization, labor allocation and production, the data collected cover many aspects of the household's economic activities as well as perception. In part, the survey was designed to provide the research team with an understanding of the institutional arrangements in input and output markets, as these were not fully known, yet their understanding is necessary when quantitative analysis and interpretation of the data are undertaken. Thus, the extent of various quantitative constraints on the supply of inputs, the incidence and format of land transactions, the nature of informal credit transactions and the pattern of labor allocations are among the data recorded.

The present report is intended as a preliminary step before rigorous quantitative analysis is undertaken. Our intention is to describe the economic environment and the institutional setting within which the households providing the data operate. The paper also describes various household activities and transactions in different factor markets, and indicators of performance. Some tentative conclusions are highlighted, but these are intended as hypotheses to guide the next phase of the study. The insights described in this report will be utilized in designing the analytical approach to be adopted in the next phase. This two-staged procedure was dictated by the fact that China's rural economy has undergone enormous changes in the last decade, and not enough time has passed to allow the accumulation of a well-founded body of "stylized facts" at the micro level. In the absence of such a foundation, it is difficult and improper to adopt a specific analytical framework. For instance, if certain input markets are not in equilibrium, this fact needs to be recognized when output supply functions are estimated.

The structure of this report is as follows: The first two sections describe the location and agro-climatic aspects of the study areas, and various characteristics of the sampled households. The following section deals with the various factor markets (land, labor, capital services and material inputs), highlighting their implications for households' liquidity positions. Credit markets are described in the subsequent section, and the extent of credit rationing is assessed. The implications of liquidity shortage for input use and economic performance are discussed in another section, followed by a description of investment in productive and other assets. The last section sketches the analytical issues to be tackled in the next phase of the study.

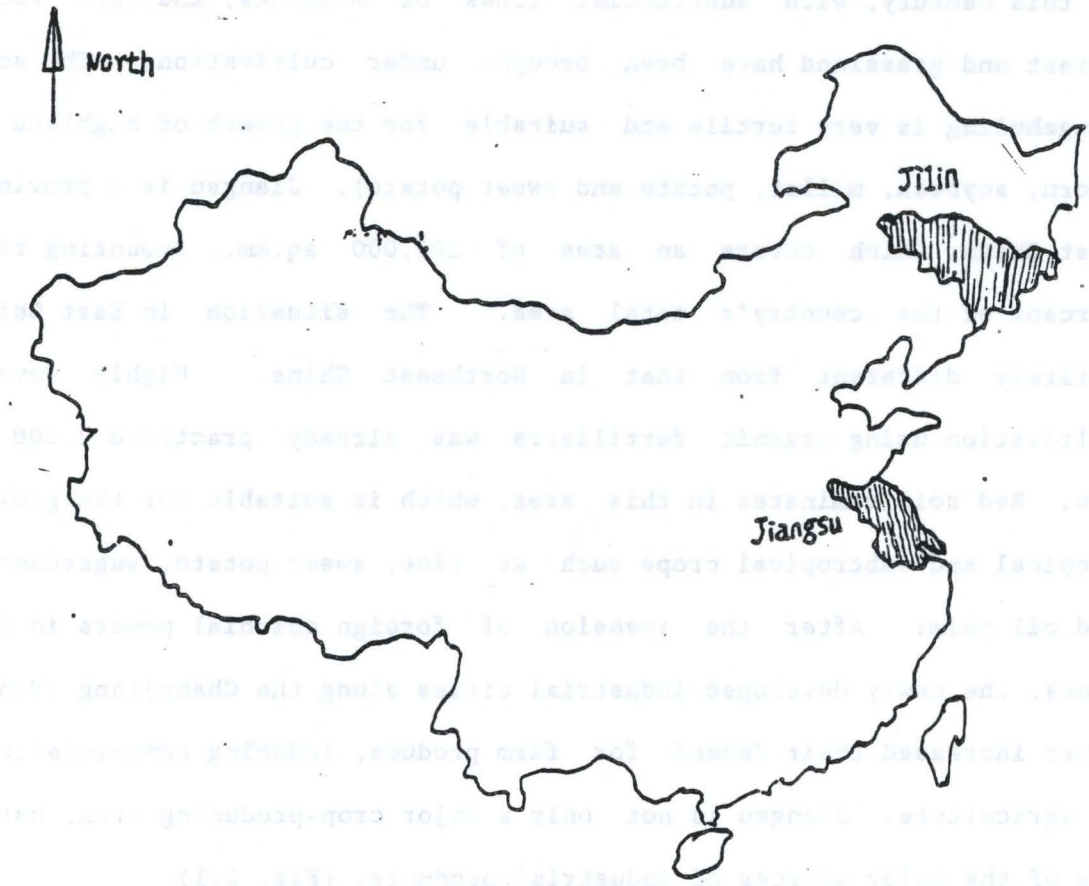
II. A GENERAL DESCRIPTION OF STUDY AREAS

1. Location and Natural Condition

Gongzhuling is in Jilin Province, and Jurong and Tai counties are in Jiangsu Province.[1] Jilin occupies 290,000 sq.km. in Northeast China, which accounts for 3.02% of the total area of the country. Farming began rather late in this area, and people there still led a nomadic life a century ago. Population started increasing significantly in the early part of this century, with substantial flows of migrants, and vast tracts of forest and grassland have been brought under cultivation. The soil in Gongzhuling is very fertile and suitable for the growth of highland crops (corn, soybean, millet, potato and sweet potato). Jiangsu is a province in East China, which covers an area of 100,000 sq.km., amounting to 1.02 percent of the country's total area. The situation in East China is entirely different from that in Northeast China. Highly developed cultivation using organic fertilizers was already practiced 2,000 years ago. Red soil dominates in this area, which is suitable for the growth of tropical and subtropical crops such as rice, sweet potato, sugarcane, tea and oil palm. After the invasion of foreign colonial powers in modern times, the newly developed industrial cities along the Changjiang (Yangtse) river increased their demand for farm produce, inducing commercialization of agriculture. Jiangsu is not only a major crop-producing area, but also one of the major sources of industrial products. (Fig. 2.1)

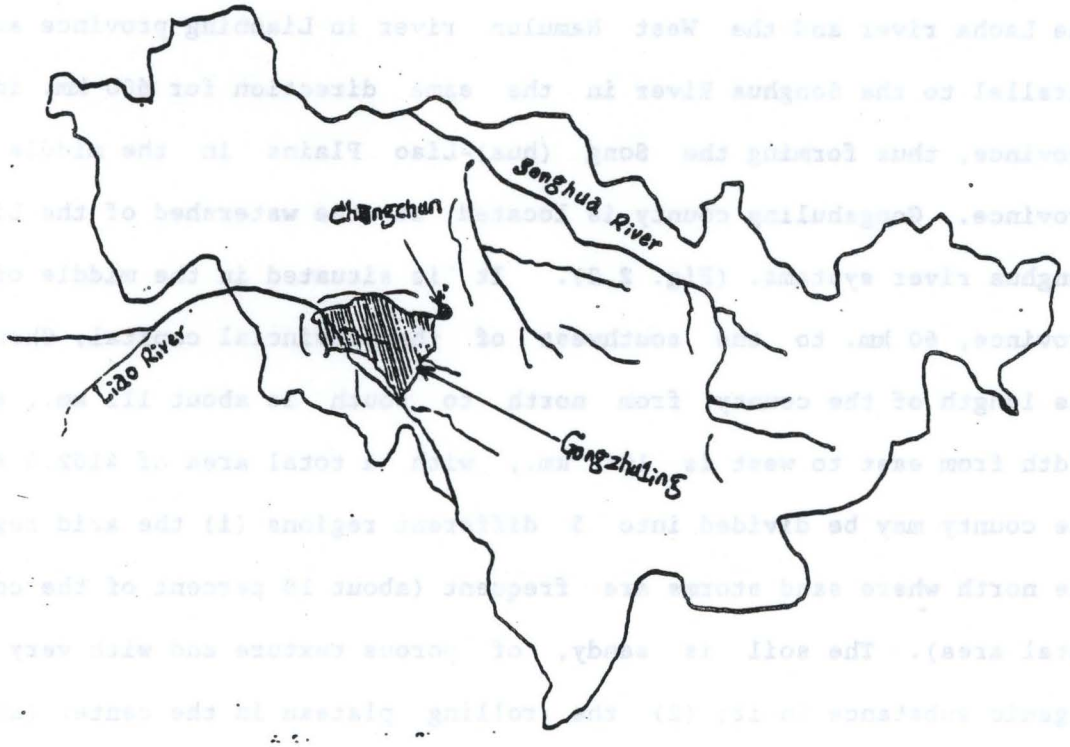
1/ Gongzhuling was originally Huaide County, and became a county-level city in 1985. It will be referred to as Gongzhuling county to simplify the presentation. Taixian county will be referred to as Tai County.

Figure 2.1: The Location of Study Provinces



Jilin is surrounded by the Changbai Mountains (more than 1,000 m. above sea level) and hills (less than 500 m. above sea level) in the east, the great Xinganling Mountains (more than 500 m, above sea level) in the west, and virgin forests in the north. The Song-Liao Plains are in the central part of the Northeast Plains (the corn belt in China). The Songhua river, the most important one in the province, rises in the Changbai Mountains and flows some 900 km. from northwest to southeast within the boundaries of the province. The West and East Liao rivers originate from the Laoha river and the West Namulun river in Liaoning province and flow parallel to the Songhua River in the same direction for 600 km. in Jilin province, thus forming the Song (hua)-Liao Plains in the middle of the province. Gongzhuling county is located at the watershed of the Liao and Songhua river systems. (Fig. 2.2). It is situated in the middle of Jilin Province, 60 km. to the southwest of the provincial capital, Changchun. The length of the county from north to south is about 111 km., and its width from east to west is 104 km., with a total area of 4162.3 sq. km. The county may be divided into 5 different regions (i) the arid region in the north where sand storms are frequent (about 18 percent of the county's total area). The soil is sandy, of porous texture and with very little organic substance in it; (2) the rolling plateau in the center (about 55 percent of the county's total area). It is the most fertile region in the county hence the major crop-producing region; (3) the low-lying land in the east (about 20 percent of total area). Though fertile, it is prone to waterlogging since it is surrounded by highlands; (4) the low hilly region in the south (about 7 percent of the county's total area). It suffers from serious soil erosion; (5) the alluvial soil area long the river (about 6

Figure 2.2: A Map of Jiling Province



percent of the county's total area). The soil there is most fertile, so it is a high yield region (Fig.2.3).

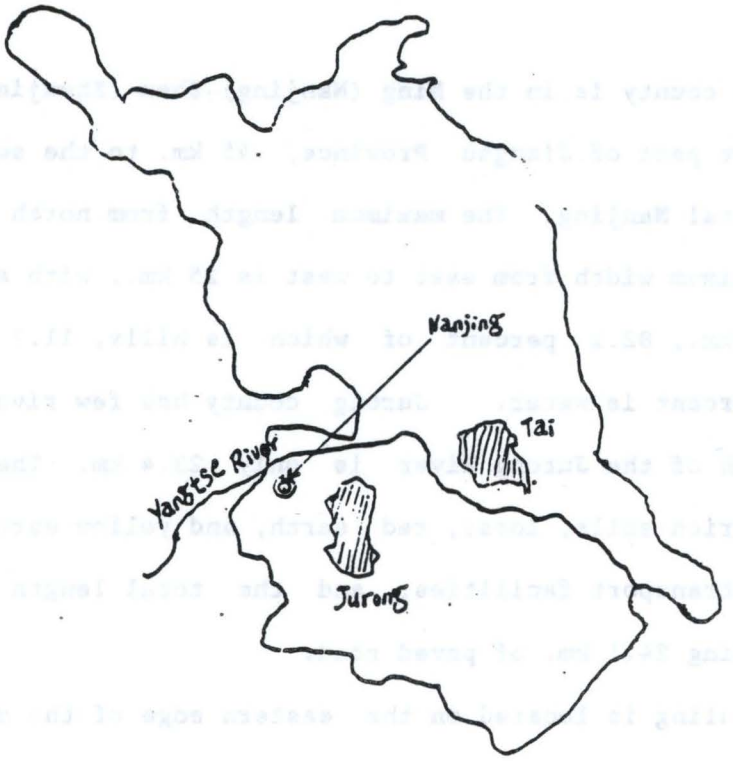
Gongzhuling has well-developed urban transport facilities. The Beijing-Harbin railway line and the Harbin-Dalian and Zhongehang highways cross the county and a highway network connects it with surrounding towns and villages. The highway network amounts to a total of 821 km. of highways, including 443 km. of all-weather road and 461 km. of paved road.

Jiangsu is the lowest and flattest province in the country. About 68 percent of the total area is plains, mainly the Huang-Huai Plains in North Jiangsu and the Changjiang (Yangtse) delta. The southeast part of the Huang-Huai Plains is comparatively low and similarly the rivers are flanked by low-lying land. The Changjiang (Yangtse) Delta is on the whole less than 10 m. above sea level, dotted here and there with hills and covered by a crisscross network of rivers, so it is known as a "region of rivers and lakes". The Ning (Nanjing)-Zhen (Zhenjiang) hilly land lies in the southwest part of the province (200-400 m. above sea level). The three major river systems are the Huai river, Yishu river and the Changjiang (Yangtse) river. The latter flows some 500 km. in the Province. There are more than 200 lakes in the province, including Hongze Lake (3700 sq. km.) and Taihu lake (2200 sq. km.) (Fig. 2.4).

Tai county is situated on the northern bank of the Changjiang (Yangtse) river in the center of Jiangsu province, 140 km. to the northeast of the provincial capital Nanjing. The shape of Tai county is roughly rectangular, 45 km. long from east to west and 38 km. wide from north to

Figure 2:3: A Map of Gongzhuling County

Figure 2.4: A Map of Jiangsu Province



South. The total area is about 1,200 sq. km., of which 1028 sq. km. are land and 177 sq. km. are water. Tai county is located in the alluvial plain of Changjiang (Yangtse) River and Huai River, therefore its soil is mainly moist and suitable for rice cultivation. The Tong (Nantong)-Yang (Yangzhou) canal flows through the center south part of the county from west to east. Tai county has both land and water transport connections in all directions. There is a total of 194 km. paved road and 651 km. of waterways.

Jurong county is in the Ning (Nanjing)-Zhen (Zhenjiang) hilly area in the southwest part of Jiangsu Province, 45 km. to the southeast of the provincial capital Nanjing. The maximum length from north to south is 60 km. and the maximum width from east to west is 25 km., with a total area of about 1379 sq. km., 82.1 percent of which is hilly, 11.7 percent is dry area and 6.6 percent is water. Jurong county has few river courses, and the total length of the Jurong River is only 23.4 km. The soil types in the county are rich soils, loess, red earth, and yellow earth. Jurong has well developed transport facilities, and the total length of highways is 441 km., including 24.1 km. of paved road.

Gongzhuling is located on the eastern edge of the medium-latitude Eurasia, belonging to the temperate semihumid monsoon climatic zone. Its climate is characterized by fast temperature rise and a dry and windy spring. The summer is humid and warm with intensive rainfall. Fast temperature drop and early frost are typical in autumn, and the winter is cold, dry and lengthy. The annual average temperature is around 5.6^{o}C, and the frost-free period is generally between 130 and 140 days. The total sunshine time per year is 2560 hours and the annual rainfall is about 600 mm, meeting on the whole the requirements for one crop a year.

According to statistics (1949-1982), abnormal climate appears every 3.7 years in Gongzhuling, resulting in reduction of crop yield. Natural calamities include heavy rainfall and waterlogging, flood, microtherm, gale, hail and frost. Since the sixties, a large number of water conservation facilities have been built, bringing waterlogging and flood under effective control and making microtherm the major concern at present. In 1976, a 13.3 percent reduction of crops resulted from shortage of rainfall and microtherm. However, in 1986 a serious waterlogging caused only 5.2 percent loss of output. At present, there are effective means to control and prevent most natural calamities (except gale and hail).

Tai and Jurong counties are within the northern subtropical monsoon climatic zone, so there is abundant rainfall, the temperature is moderate and sunshine is sufficient. The annual average temperature in Tai is 14.5°C and that in Jurong is 14.7°C. The average rainfall per year in the former county is 1,000 mm. and that of the latter is 1100 mm. Tai county enjoys 2300 hours of sunshine per year and its frost-free period is 210 days, while Jurong county has 1,900 hours of sunshine a year and its frost-free period is 220 days. Both counties suffer from typhoons and rainstorms, but the losses caused by these two types of natural calamities have been brought under control as a series of farmland and water conservation projects were completed in the sixties (e.g. regularized land now accounts for more than 80 percent of the total area of cultivated land in Tai and weather forecasting techniques were greatly improved). At present only a few crops in limited areas are affected by insect pests and plant diseases. The total output of crops in these two counties is stable at 500 and 300 million kg. respectively, and the per mu yield is 650-700 kg.

2. Economy

Owing to the difference in location and natural conditions, Gongzhuling, Jurong and Tai counties developed economically at a different pace. Differences in their economy still persist.

(a) Population

Before 1644, Gongzhuling was outside of the "great wall" which was built against the invasion of northern nomadic tribes, and it had been the royal hunting grounds since the Qing court entered Shanhaiguan. The county government was set up in 1844. Large scale farming began in the early part of the 20th century. The twenties and thirties of this century witnessed an immigration peak from the interior of Shanhaiguan, and population reached 300,000. The population was 500,000 in 1949, and the density of population was 120 per sq. km., more than double the national average. The cultivated area per person in this county was 2.8 times as much as that of the nation (2.5 mu per person), implying a relatively low population pressure.

An administrative system existed in Tai and Jurong counties as early as the Han Dynasty, 2,000 years ago (221 and 128 B.C.), 2098 and 2005 years earlier than Gongzhuling. Immediately after liberation, the population was 560,000 in Tai and 300,000 in Jurong. The population density of the former was 466 per sq. km. and that of the latter was 217.7 per sq. km., 8.3 and 3.8 times as much as that of the nation. The cultivated areas per person in these two counties were 1.6 mu and 2.5 mu respectively. There was heavy population pressure on the land. In the 40 years after liberation, the population in the three counties has doubled, exerting pressure on land, though at different degrees (Table 2.1).

Table 2.1: Population and Its Composition
In Three Sample Counties (1986)
Unit: 10,000 Households or People

	No. of House-holds	Total Popu-lation	By Sex Male %	By Sex Female %	Urban/Rural Urban %	Urban/Rural Rural %	Population Density Man/KM^2	Agricultural Population 10,000 People	Agricultural Population %
China	24927	105721	51.65	48.35	41.4	58.6	110	85007	84.40
Jilin	558.31	2315	51.24	48.76	63.6	36.4	124	1409	60.86
Jiangsu	1681.3	6270	51.02	48.98	32.8	67.2	611	5278	84.18
Gongzhu	21.96	90.97	51.25	48.75	51.2	48.8	218	71.75	78.89
Tai	29.56	106.33	51.17	48.83	8.5	91.5	886	97.93	91.50
Jurong	14.78	56.56	51.98	48.02	21.0	79.0	406	51.72	91.44

(b) Income Levels

The total output values in Gongzhuling, Jurong and Tai counties have all exceeded one billion yuan (RMB), much higher than that of the national average (0.5 billion yuan). As far as the development of non-agricultural enterprises is concerned, Tai is the most advanced of the three, with the output values of industry and agriculture in a ratio of 3.47 to 1; Jurong county is second with a ratio of industrial output to agricultural output of 2.62 to 1; Gongzhuling has a ratio of 0.64 to 1. Because of the development of non-agricultural enterprise, labor productivity is correspondingly higher in Jiangsu. The value of regional income per person in Tai county is 622.36 yuan, 820.00 yuan in Jurong and 593.57 yuan in Gongzhuling.

The regional income is not identical to personal income. According to personal income statistics for urban areas, Jurong county leads with a per person income of 824.04 yuan; Tai county is second, with a per person income of 808.22 yuan; and Gongzhuling is third, with a per person income of 686.16 yuan. However, the income of rural inhabitants is

entirely different. Gongzhuling takes the lead, with a per person rural income of 634.90 yuan; Jurong is second, with a per person income of 531.45 yuan; and Tai is the last, with a per person income of 448.44 yuan (Table 2.2).

Table 2.2: Agro/Industrial Gross Value, Urban/Rural Income and Their Composition in the Three Sample Counties
Unit: 100 Million Yuan, and Yuan

	Gross Value of Product	Agro/Industrial Gross Value			National Income		Per Capita Value	
		Total	Industrial %	Agr. %	Total	Per Capita	Urban	Rural
China	19961	15207	73.61	26.39	7790	741	909.96	423.76
Jilin	*422.24	380.91	74.16	25.84	*169.62	*730.60	937.68	456.70
Jiangsu	*1526.7	1567.89	78.78	21.22	*578.46	*933.76	1035.96	561.29
Gongzhul	*101417	10647.5	38.93	61.07	533997	593.57	686.16	634.90
Tai	176833	133979	71.16	28.84	66176	622.36	808.22	448.44
Jurong	112507	96932	61.54	38.46	46286	820.00	824.04	531.45

Note: * refers to the statistic figure in 1985.

(c) Infrastructure and Non-Agricultural Employment

The passenger and freight transport capacities of highways in Gongzhuling, Tai and Jurong counties are close to or lower than the average of the country. There are differences in the mileage per person, passenger and freight transport capacities and volume of goods actually transported among the highways in these three counties (Table 2.3). Similar differences between town and country and among various regions can be seen in commerce and finance. But the differences in education facilities are less significant (Tables 2.4 and 2.5).

Table 2.3: Electricity Utilization and Transportation Capacity in the Three-Sample Counties

	Electricity Utilization		Railroad in Service	Inner Rivers	Roads		Road Transportation Capacity		
	Total	Rural Areas	KM	KM	KM 1000 men	KM/MK^2	# of Tracts Per Men	Cargo Tons/ 1000 Men	Passenger Seats/ 1000 Men
China	4117.6	586.7	52487	109404	0.91	0.10	3.40	15.5	9.8
Jilin	139.94	13.9	3482	1114	0.72	0.05	5.20	14.1	18.9
Jiangsu	277.38	71.2	713	23853	0.37	0.21	2.74	7.5	7.0
Gongzhu	N.A	N.A	N.A	N.A	0.90	0.20	2.33	10.4	7.1
Tai	1.4985	0.9017		651.3	0.18	0.16	1.55	2.3	1.4
Jurong	1.1681	0.7494		76.5	0.74		2.03		

Table 2.4: The Per Capita Commercial Retail Value and Per Capita Deposit and Bank Loans, Unit: Yuan

	Per Capita Retail Value of the Commerce	Per Capita Deposit Balance	Per Capita Balance of Bank Loans
China	468.21		
Jilin	665.10		
Jiangsu	567.46		
Gongzhuling	487.50	181.89	796.87
Tai	427.64	223.30	298.70
Jurong	462.13	495.74	477.19

Table 2.5: The Education and Sanitation Infrastructure in the Three Sample Counties

	Education			Sanitation	
	# Schools/ Men	# Teachers/ Students	Enroll-ments/Men	Hospital Beds/Men	Doctors/ Men
China	1 /956	1 /22.6	1 /4.92	1 /677	1 /237
Jilin	-	-	-	1 /260	1/ 147
Jiangsu	-	-	-	1 /426	1/ 255
Gongzhuling	1 /1000	1 /19.8	1 /5.06	1 /403	1/ 381
Tai	1 / 804	1 /26.6	1 /4.99	1 /568	1/ 464
Jurong	1 / 498	1/ 19.5	1/ 5.45	1/ 515	1/ 434

Tai county has the highest non-farm employment while Gongzhuling has the lowest among the three study areas (Table 2.6).

Table 2.6: The Off-Farm Employment in the Three Sample Counties

County	# of Laborers	Agr. Laborers	Emp. in 20 Rur S-S Ind.	Cons. Workers	Agr. Income 10000 Y	Rural S-S Ind. Income 10000 Y	Cons. Income 10000 Y
Gongzhu	250246	167995	11775	3172	48617	1187.1	696.3
Tai	534411	255776	88375	54302	23724	20164.8	4598.3
Jurong	253871	176313	42369	15376	30669	5351.4	1258.0

Legend:

Emp. = Employees
Ag. = Agricultural
Cons. = Construction
S-S Ind. = Small-Scale Industries
Y = Yuan

(d) Economic Policies and Finances of Local Government

Gongzhuling has been the source of commodity grain for the whole country as well as Jilin province, so it has enjoyed the preferential treatment that the central government gives to sources of commodity grain. Since the introduction of the land contracting system, the preferential treatment takes the form of the construction of basic facilities related to agriculture and the establishment of industrial enterprises with financial support from the government. The chemical fertilizer factory, the sugar refinery and the cultivator factory in Gongzhuling are the results of this preferential treatment. Since the introduction of the contracting system, grain output in Gongzhuling has increased sharply, (from 550 million kg. to 1.5 billion kg in less than 5 years). This growth was accompanied with a significant rise in peasants' income. In 1983 and 1984 Gongzhuling ranked first among the counties in the country for its grain yield, bringing high prestige to local government officials. However, the local government had to bear certain kinds of political pressure: in order to prevent the grain yield from dropping, it had to infuse great quantities of financial resources, manpower and material resources into agriculture, thus giving second priority to village- and town-run enterprises. This obviously affects the growth of local industrial income and non-agricultural employment. At the same time, there is rigorous control over the prices of industrial products from enterprises producing means of agricultural production in particular, and the price control over agricultural raw materials has been loosened, causing heavy losses to those enterprises. Consequently, industrial enterprises are no longer sources of income for the local government and they have to be subsidized. Since the introduction of the contracting system, grain-producing areas such as

Gongzhuling have lagged, relatively, compared to regions that develop village- and town-run enterprises and a diversified economy. In order to avoid the political consequence that "the more grain you produce and the greater contribution you make, the heavier your financial load will become", and to protect the enthusiasm of those grain-producing areas, the central government has to provide substantial financial subsidies every year. In 1986, Gongzhuling county received a financial subsidy of 20,107 million yuan, corresponding to 35.8 percent of its financial income in the same year (Table 2.7).

Jiangsu is the largest grain-producing area in China, and Tai and Jurong are the principal sources of grain for the Ning (Nanjing)-Zhen (Zhenjiang)-Yang (Yangzhou) region. The only difference is that the pressure of population on land has reached the limit in Tai and Jurong and even in the entire Jiangsu Province. In the early eighties, the cultivated area per person was only 1.12 mu in Jiangsu, and that of grain-producing counties in the plains is only a fraction of a mu.[2] As no surplus could be obtained from the land after the introduction of the contracting system, 17 counties have turned to the development of village-and town-run enterprises, taking advantage of the fact that they are located near major industrial centers such as Shanghai and Nanjing. In only a few years, the output value of industry and agriculture of certain counties has exceeded one billion yuan, and in 1987, the output value of industry and agriculture in counties under the Suzhou, Waxi and Changzhou municipalities exceeded 4 billion yuan in average. Tai and Jurong made a late start, and their total output value reached the one billion-yuan level in 1987. The expansion of

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2/ One hectare equals 15 mu.

the economy and the sharp increase of financial resources in South Jiangsu is a strong stimulus to the government in Tai and Jurong counties to put more efforts on non-agricultural enterprises, and to accelerate the development of village- and town-run enterprises in particular (Table 2.8).

(e) The Introduction of the Land Contracting System

As in most areas of China, the land contracting procedure in Gongzhuling, Tai and Jurong counties followed a pattern where the land was contracted out first, and then communal assets were contracted or sold to the peasants. Generally speaking, small farm tools and implements were sold at fair prices, and draft animals and tractors were contracted out or sold to individuals or to several households. The only difference is that the output quotas had not been fixed on a household basis in Gongzhuling until 1983 on account of the highly developed mechanization of farm work in the county. In Tai and Jurong, the contracting system was introduced in 1983 in all-round way because of their flourishing collective economy.

Table 2.7A: The Budget, Revenue and Expenditure in Gongzhuling (Unit: 10,000 Yuan)

	Yeas	1982	1983	1984	1985	1986
REVENUES	Enterprise Incomes	13112	33.7	-489	-532	1316
	Business and commercial taxes	696	647.2	715.3	2833	3146
	Agricultural taxes	600	619.5	630	545	615
	Other incomes	9.9	29.4	7	4.5	42
	Govt't subsidies	1405	1595	1743	2933	2010
	Balance from last year	-7	-75	177	181	40
	This year's total	2579.1	3090	3474.2	6350	7172
EXPENDITURES	Basic construction	11.2	-	-	678	59.6
	Agricultural	476.5	574	513.1	1232	351.4
	Cultural and Education	1314.2	144.7	1604.8	2190	2477
	Income subsidy and direct transfers	145.2	116.5	128.1	286	507
	Administrative expenses	328.9	372.6	438.4	602	698
	Price subsidy	-	-		394	1490
	Total	2579.1	3090	3474.2	6350	7172

Note: The items listed above are not complete. Sum of the entry items is therefore not equal to the "total" value.

Table 2.8B: The Budget, Revenue and Expenditure in Tai and Jurong (Unit: 10,000 Yuan)

	County	Tai			Jurong		
	Year	1984	1985	1986	1984	1985	1986
REVENUES	Enterprise incomes	24	7.4	162	22.3	75	142.7
	Business and commercial taxes	3501	4140.3	4498	1185.5	2163	2392
	Agricultural taxes	393	472	488	185.2	242	253
	Other incomes	3.6	2.6	27.3	-	4	19
	Govt't subsidy	265.3	327	423	-	-	-
	Balance from last year	199.6	34.4	342	266	69.5	447
	Off budget incomes	8125	3637	5692	-	-	-
	Total	12542	8694	11746	2080	2508	2833
EXPENDITURES	Basic construction	37.2	119.4	126.8	16.5	85	189
	Agricultural	224	95.1	364	181	178	235
	Cultural and Education	1412	1587	1760	959	1015	1133
	Income subsidy and direct transfers	224	243	307	130	122	136
	Administrative expenses	533	505	579	300	275	380
	Price subsidies	-	91	407	-	44	258
	Off-budget expenses	6149	1830	2699	-	-	-
	Total	10566	6887	8753	2160	2122	3004

III. AGRICULTURAL ECONOMIC CHARACTERISTICS OF THE STUDY AREAS

3.1 Sampling Procedure

The 600 households in the present study (200 households each county) were sampled for investigation as follows:

(a) The sampling result of the former State Investigation Team was adopted. The State Investigation Team utilized a multi-stage sampling method of random starting point and on the principle of symmetry and equal distance. The number of counties sampled for investigation by the State Team accounts for 35 percent of the total number of counties in the whole country, i.e., 846 counties. The selected counties number 34 in Jiangsu, and 20 in Jilin. Counties are sampled on the basis of the per mu yield of grain ranked from low to high, within a three-year period (1982-84). Starting points are decided at random and samples are chosen at equal distance. Gongzhuling, Tai and Jurong are included among the counties in the national sample. They were selected for the present study because they are typical agricultural districts in China and agriculture occupies an important share in their annual income. Another reason for the selection of these counties is the difference in their main crop (corn in Gongzhuling, one crop a year; wheat and rice in Tai and Jurong, two crops a year), and the difference in their level of development (the output value of non-agricultural enterprises accounts for 28 percent in Gongzhuling, 72 percent in Tai and 62 percent in Jurong).

According to standard regulations, eight xiang (township) and 16 villages have been sampled in Gongzhuling, six xiang and 12 villages in Tai, and four xiang and eight villages in Jurong. Eighty households have been randomly selected by the State Investigation Team in these three

counties.[3] Since 200 households per county were required for the present study the sample was augmented as follows: using the list of households that paid the agricultural tax in 1987 as a starting point, those that exist in name only were eliminated and new ones were added, forming the sampling frame. Finally, a total of 120 households were selected at random from the villages and townships included in the national sample of the pre-selected counties, and these were added to the 80 households already selected. The sample households can be found in every part of the counties in Gongzhuling: the townships of Shiwu, Nianjiazi and Chaoyangpo are in districts prone to waterlogging along the Liao River Sidaogang, Huaide and Heilingzi townships are in the rolling plateau; Yangchengzi is in the sandy district, and Xiangshui in the alluvial plains (Figure 3.1).

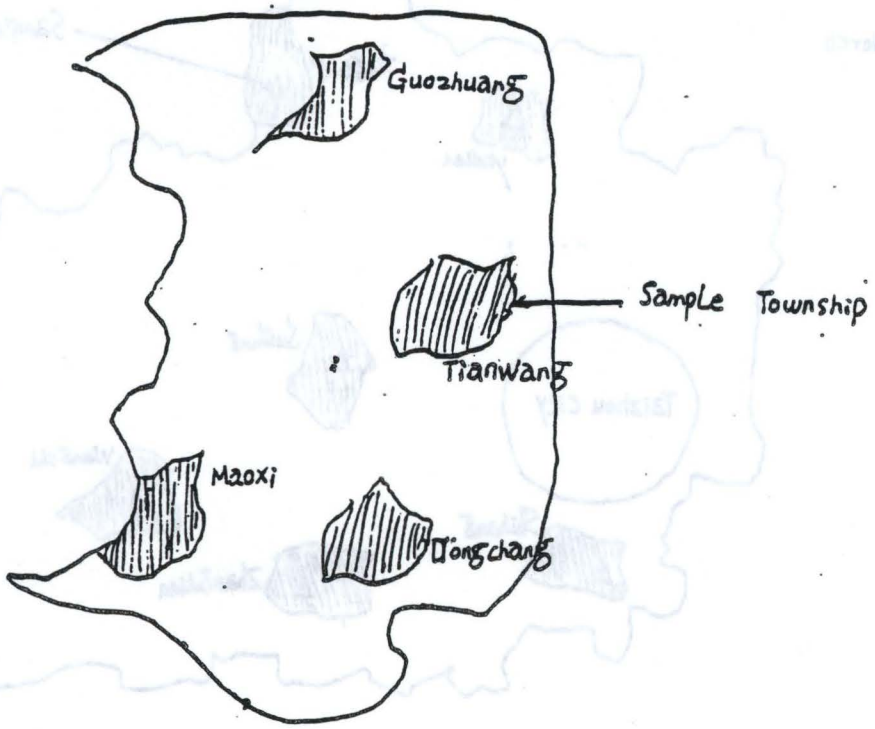
As for Tai county, the sample households are selected from six townships in three locations. Wanshi, Zhandian, and Shihang are located in the county's southern part. The per capita land holding is small and the soil type there is sandy. Yedian and Qingtong townships are in the northern region. The per capita land holding there is relatively large, and the soil type is clay. In the latter two areas, sideline business is fairly prosperous. Suehen is in the central area of Tai county whose situation is similar to that in Yedian and Qingtong.

In Jurong, Dongchang township is in the hilly region in the southeast, Guozhuang and Tianwang are in the plain, while Maoxi township is in the hilly area of the west (Figure 3.2).

3/ The actual number of sample households is 79 in Gongzhuling, 83 in Tai and 80 in Jurong due to changes in the last three years.

Figure 3.1: A Map on Tai County

Figure 3.2: A Map on Jurong County



Households in Gongzhuling county were surveyed in December 1987, while Jiangsu sample households were interviewed in March 1988.

3.2 Economic Activities by the Sample Households

The cultivated land per household in the sample and the number of fragments of holdings vary significantly across the three study areas. The cultivated land per household in the sample is 20.31 mu, 4.63 mu, and 6.86 mu, in Gongzhuling, Tai, and Jurong, respectively. Table 3.1 presents the distribution of households over the different sizes of the cultivated land. All the sample households in Tai cultivate less than 15 mu, and only two households in Jurong have more than 15 mu, while 65.5 percent of the sample households in Gongzhuling operate more than 15 mus (Table 3.1).

Table 3.1: The Areas of Cultivated Land for the Sample Households (Sample Size = 200 Households/County

The Area of Cultivated Land (Mu)	County		
	Gongzhuling	Tai	Jurong
1 - 5	4.0	74.0	35.5
6 - 10	9.5	25.0	55.0
11 - 15	21.0	1.0	9.5
15 +	65.5	-	1.0
Mean holding size (mu)	20.75	4.63	6.90

Given the small size of farms in Jurong and Tai counties, it is expected that peasants in these counties will attempt to complement their income by expanding specialized agricultural activities (e.g. poultry, pig

raising) and by seeking complementary sources of income off the farm. In Gongzhuling, where farm sizes are much larger, farmers will tend to focus their efforts on cropping activities. Such tendencies are evident from Table 3.2, which describes the composition of incomes in the three samples. In Gongzhuling, most of farmers' incomes is derived from cropping activities (71 percent), and farming income is the main source of livelihood (81 percent). In both Tai and Jurong, farming income is only 53 percent of total income, and a substantial part of the farming income is derived from non-cropping activities (fruits, minor vegetables and livestock). Non-farming income contributes thus close to a half of total income in the Jiangsu counties.

Table 3.2: Composition of Income in Winter/Spring Season

County	---Gongzhuling---		------Tai------		-----Jurong----	
Source	Share in Income	% of HH Report-ing	Share in Income	% of HH Report-ing	Share in Income	% HH Report-ing
Farmers Income:	.82	-	.53	-	.53	-
Crop	.71	99.5	.26	100.0	.34	98.5
Minor fruits & Veg.	.01	11.5	.01	14.0	.02	20.0
Livestock and Other	.10	57.0	.26	90.5	.17	60.0
Non-Farming Income	.18	-	.47	-	.47	-
Off-Farm employment	.04	33.5	.23	49.0	.33	53.0
Non-Farm activities	.18	15.0	.24	59.0	.14	31.5
Total	100.0	-	100.0	-	100.0	-

The composition of cropping reflects the different agro-climatic situation of Jiling and Jiangsu provinces. As mentioned earlier, the main crop in Gongzhuling is corn, taking up about 80 percent of the sample's land area. Soybeans rank next, with a mere 12.3 percent. In both Tai and Jurong counties, rice is the main summer crop, occupying 65.3 percent and 74.9 percent, respectively, of the land area (Table 3.3).

Table 3.3: Cropping Patterns in the Study Areas in the Summer/Fall Season (Percent)

Crop \ County	Gongzhuling	Tai	Jurong
Rice	1.3	65.3	74.9
Corn	79.5	3.5	.1
Wheat	.2	0 a/	0 a/
Millet	1.4	0	.2
Sorghum	3.2	0	.2
Sweet Potato	.3	5.9	6.2
Cotton	0	8.9	5.0
Soy Bean	12.3	8.7	3.0
Other Vegetables	1.1	7.5	4.6
Fruits	.4	0	1.7
Other	.3	.2	4.1

a/ Wheat is a winter crop in Jiangsu province, therefore in the fall/summer season its share is nil.

3.3 Participation in Infrastructure Construction and Maintenance and the Status of the Facilities

In recent years, the majority of the sample household took part in activities to maintain roads and irrigation facilities (Table 3.4). Most of the farmers in the sample reported that local rural road and irrigation facilities have improved rather than deteriorated (Table 3.5). Note that the natural rainfall in Gongzhuling is sufficient for crop production.

This is a reason of why a larger number of farmers in this county reported no change in local irrigation facilities.

3.4 The Income Level and Possession of Financial Assets by Sample Households

In 1987, the per capita net income of the sample households was 951.76 Yuan, 736.5 yuan, and 831.74 yuan in Gongzhuling, Tai and Jurong, respectively. These figures are far above the national average, which is 545.47 yuan.

Table 3.4: The Participation in Maintaining the Infrastructure (Percent) (Sample Size = 200 Households/County)

The Study Areas	Roads	Irrigation
Gongzuling	94.0	63.5
Tai	86.0	95.5
Jurong	87.5	95.5

Table 3.5: The Status of the Infrastructure as Reported by sample households (Sample Size = 200 Households/County)

The Study Areas	Roads			Irrigation		
	No Change	Improved	Deteriorated	No Change	Improved	Deteriorated
	%	%	%	%	%	%
Gongzuling	21.0	78.0	1.0	71.5	26.5	2.0
Tai	16.5	82.0	1.5	48.0	42.0	10.0
Jurong	11.0	84.0	5.0	19.5	68.0	12.5

The financial assets owned by sample households prior to the 1987 planting season are reported in Table 3.6. Gongzhuling households own the highest level of financial assets among the three sampled counties. The most significant difference is in the level of the average cash holdings and storage of farm products which is much higher in Gongzhuling compared to the levels observed in Tai and Jurong. This can be explained by the cropping pattern: since Gongzhuling households have only one crop season in a year, the cycle of farm income generation is longer than that in Tai and Jurong, and it is necessary for the Gongzhuling households to hold more cash and farm products in reserve. An additional observation from Table 3.6 is that the sample households in Gongzhuling tend to have a lower amount of financial assets in savings accounts than households in the other study areas. This may be related to a perception that savings accounts are not as liquid as other forms of assets.

Table 3.6: Financial Assets of Sample Households

County / Asset	Gongzhuling (N=200)		Tai (N=200)		Jurong (N=200)	
	Average (Y)	% with positive entry	Average (Y)	% with positive entry	Average (Y)	% with positive entry
Deposits in Ag. Bank	31.4	4.5	189.5	17.0	79.9	11.0
Deposit in RCC	131.0	11.0	329.5	30.5	113.9	19.0
Loans to Others	197.3	18.5	120.4	21.0	171.6	31.5
Value of Jewelry	47.5	1.5	148.0	27.0	11.3	3.5
Value of product stored	674.1	97.5	161.9	78.0	214.4	93.5
Cash	623.0	96.5	244.5	100.0	176.7	88.0
Other	38.0	1.0	.2	1.0	30.2	2.5
Total	1742.3	100.0	1194.0	100.0	798.0	100.0

3.4 Consumer Durables and Production Capital of the Sample Households

There are some variations in the ownership of consumer durables among the sample households in the different counties, but most of the differences are not substantial. Electric fans are not common in Gongzhuling as the weather there is much cooler than in Jiangsu. Housing quality is generally higher in Jiangsu (Table 3.7).

Table 3.7: Ownership of Consumer Durables by sample Households (Percent) a/
(Sample Size = 200 Households/County)

The Study Areas	TV Sets	Audio, Radio Cassettes	Bicycle	Sewing Machine	Watch	Electric Fans	Housing		
							High Quality Roof	High Quality Walls	High Quality Floor
Gongzhuling	41.5	14.0	98.0	57.0	123.0	.5	52.5	45.0	22.0
Tai	25.5	12.5	105.0	38.0	170.0	24.5	85.0	85.5	44.0
Jurong	38.0	17.0	107.5	37.0	186.5	32.5	98.5	95.0	26.5

a/ Figures above 100.0 imply more than one item owned by the household.

Table 3.8: Ownership of Productive Capital

Item \ County	Gongzhuling %	Tai %	Jurong %
Tractor	9.5	0	8.0 a/
Truck/boat	.5	25.5	0
Pump/diesel engine	2.0	1.5	11.5 a/
Motorcycle	.5	0	1.0
Thresher	2.5	1.5	12.0
Small tools	98.0	84.5	99.0
Draught animals	30.5	3.0	77.0
Pigs	66.0	66.5	84.5
Poultry	94.0	97.5	95.0
Mean value (Yuan)	1477	578	913

a/ Shared ownership with other households.

The volume of capital owned (on average) in the different counties is positively related to the typical farm size, and thus the figure for Gongzhuling (1477 yuan) is higher than that of Jurong county (913 yuan) or Tai county (578 yuan). Compatible with the larger farm sizes in Gongzhuling, the ownership of tractors there is more common. Tractor and pump ownership figures in Jurong county are somewhat misleading as they actually reflect shared ownership among several households.

IV. FACTOR MARKETS

1. The Land market

(a) The Distribution of Land after the Household Responsibility System

Land operated by each household in the three study counties can be classified, based on the use right arrangements, into three different categories, namely private plot, food ration plot, and responsibility plot (Table 4.1). All these plots are essentially leased from the production teams. However, the obligations of the contracting households are different for different types of plots. For responsibility plots, a household has to pay the agricultural tax, public accumulation fund, public welfare fund, and other duties to its team. Most importantly, holders of responsibility land have to sell a certain amount of grain output to the

Table 4.1: Type of Household Plots

Plot Type	Gongzhuling County %	Tai County %	Jurong County %
Private	12.3	20.6	19.4
Food-ration	28.9	56.4	8.8
Responsibility	56.5	20.2	69.2
Other or missing	2.0	2.6	2.8

Note: Some plots counted in the table consist of several smaller plots. The actual number of plots in Jurong county is 1410 and in Tai county is 993.

state procurement agency at a fixed price to meet the quota obligation, which is inherited from the production team system.[4] For food ration plots, the grain quota obligation, and in some teams the contributions to the public fund as well, are waived. Private plots, in general, do not carry any obligation, including the state agricultural tax. Most of the plots have been assigned to sample households by the production team or brigades (687 out of 716 in Gongzhuling, 992 out of 993 in Tai and 1164 of 1173 in Jurong).

As in most of China, farmers' holdings in the study counties are fragmented. The extent of fragmentation in Jurong county (the average holding is 7.05 plots) is more severe than in Tai county (average holding 4.9 plots) and Gongzhuling county (average holding 3.7 plots). Since a farmer usually was assigned a plot from each quality type of land when the household responsibility system was adopted, the differences in the degree of fragmentation may be a result of the differences in topology and land quality of these three counties. Jurong county is located in a hilly area while Tai county and Gongzhuling county are located in a plain area. Land quality in both Tai county and Gongzhuling county are more homogeneous than in Jurong county. The fragmentation in all three counties, however, is below the national average of nine plots for each household. This is

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4/ The quota obligations on the responsibility plot vary from village to village and from county to county. In Gongzhuling county, the quota per mu of responsibility plot in the surveyed villages ranges from 30 kg per year to 350 kg per year and the mean is about 200 kg per year. In Jurong county the quota ranges from 240 kg to 600 kg with a mean of 270 kg. In Tai county, it ranges from 155 kg to 270 kg with a mean of 215 kg.

perhaps partly because the household responsibility system was not adopted in these three counties until 1982-83, when over-fragmentation had already become a much discussed issue. Plot size in both Jurong county and Tai county is very small. Only 7.5 percent of the plots in Tai county and 11 percent of the plots in Jurong county are bigger than two mu (one-third of an acre). However, in Gongzhuling county, only 24.5 percent of plots are smaller than two mu.[5]

About 12.3 percent of the plots in Gongzhuling county, 19.4 percent in Jurong county and 20.6 percent in Tai county are private plots. Many of these private plots have been assigned to the households since 1962. From the very beginning of the collectivatization in the early 1950s, certain farm activities (e.g., hog raising and vegetable production for home consumption) were largely accomplished on private plots assigned to the household, with work done during spare time. The "Great Leap Forward", starting from 1958, imposed the commune system on individual households and eliminated private plots. When the failures of the "Great Leap Forward" were acknowledged, the production team system was introduced to take the place of the commune system as the basic unit of production and accounting. At the same time, five to seven percent of land were redistributed to each household in the team as private plots. During the Cultural Revolution, there were renewed criticisms of private plots, but in the surveyed villages private plots had been maintained. After the household responsibility reform was first introduced in 1978, individual incentives were given more attention. As a result, the size of private

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5/ However, the weather in Gongzhuling county allows only single cropping, while in Jurong and Tai counties double cropping is possible.

plots in most surveyed villages was enlarged as in many other parts of China. Private plots were allocated according to each household's size. The entitlement to private plots is most secure. In most cases, farmers perceive this arrangement as permanent.

The majority of plots in Gongzhuling county and Jurong county was contracted as responsibility plots, while in Tai county the majority is food ration plots. This is due to the fact that both Gongzhuling and Jurong are commercial grain producing counties. They have to sell a great portion of their grain output to the government to meet the procurement quota. The grain produced in Tai county is mostly for self-consumption. The allotment of food ration plots was done in most cases according to the size of the household. That is, a child was treated equally with an adult in the allotment of food ration plots. For the allocation of responsibility plots, as shown in Table 4.2, rules differ among villages. In Gongzhuling county, half of the 16 surveyed villages distributed the responsibility plots according to the labor force in each household while the other villages based their allocation on a weighted average of labor force and household size. In Jurong county, among the eight surveyed villages, two based their allocation purely on labor force, one purely on household size, and five on the weighted average of labor force and household size. In Tai county, half of the 12 surveyed villages did not assign land for responsibility plots. Among the six villages that had responsibility plots, two villages distributed them according to labor force, three were based purely on the household size and one on the weighted average of labor force and household size. Food ration plots and

Table 4.2: Distribution Rules of Responsibility Plots

Rule	Gongzhuling County	Tai County	Jurong County
Labor	8	2	2
Household Size	-	3	1
Labor:Household size	8	1	5
Other	-	6	-
Number of Villages	16	12	8

Note: Six villages of the twelve surveyed in Tai county did not assign responsibility land.

responsibility plots were assigned to each household when the household responsibility system was adopted.[6] The distribution rules of private plots, food-ration plots and responsibility plots indicate a strong egalitarian tendency.

Currently in Jurong county, 63 percent of the plots have a 15-year contract and 20 percent are private plots. In Tai county, 73 percent of the plots, and in Gongzhuling county 86.6 percent of the plots were initially assigned to the households with a 15-year contract when the

6/ When the collectively-owned land in the village was distributed to individual households, most villages kept a part of the land in reserve in order to accommodate the possibility of changes in the size of households. This reserve land may be temporarily leased to households in the village.

household responsibility system was adopted. One quarter of the plots in Jurong county, eight percent of the plots in Tai county, and 2.1 percent of the plots in Gongzhuling county had initially a shorter duration contract, and were changed only in the past two or three years to a 15-year contract. The change in contract was induced by the central government's policy. In the Document No. 1 of the Central Committee of CPC issued in 1984, a 15-year contract was encouraged. However, practically all the farmers interviewed (94 percent in Gongzhuling county, 85 percent in Jurong county and 88.5 percent in Tai county) favored an expansion of land contract duration to a period longer than 15 years. The most important benefit of contract extension as perceived by farmers is the better incentive for long-term investment and for improving farm management decisions (88 percent of the respondents in Jurong county and 67 percent in both Tai county and Gongzhuling county cited this merit). The majority of respondents (85 percent in Gongzhuling county, 75 percent in Tai county, and 68 percent in Jurong county) see little likelihood that the same plots they operate at the present will be assigned to them after the present contract expires. This may indicate a serious source of disincentive for certain long-term investments in land improvement.

The frequencies of land disputes were proportional to the degree of land fragmentation in these three counties. While only 2.5 percent of the households in Gongzhuling county had ever experienced disputes over land boundaries, it was five percent in Tai county and over a quarter of the households (25.5 percent) in Jurong county.[7] The rate of land

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7/ The average number of land tracts is 3.7 in Gongzhuling county, 4.9 in Tai county, and 7.05 in Jurong county.

disputes is thus positively correlated with the extent of fragmentation. This suggests that land fragmentation not only increases the costs of farming due to the increase in travelling time between plots and by reducing the profitability of mechanization, but also increases social tension in a community.

Close to 90 percent of the farmers in Gongzhuling county, and about 70 percent in both Jurong and Tai counties favored land consolidation. However, more than one-third of the respondents in these three counties thought that government intervention would be necessary to make consolidation effective. In addition, about one-fifth of the farmers thought that consolidation by exchange among farmers was not a practical option due to the large differences in plot quality. Only about one-fifth of the farmers in Jurong and Tai counties and about a third in Gongzhuling county thought that consolidation could be accomplished by agreements and transactions between farmers.

(b) <u>The Land Market after the Household Responsibility System</u>

The above discussions suggest that the distribution of land which took place recently had a strong egalitarian bias. The allotment of private plots and food ration plots is strictly proportional to the size of a household. Even in the allotment of responsibility plots, household size was also taken into account in over two-thirds of the villages in our sample (see Table 4.2). However, households are at different stages in their life cycle. They thus have different endowments of family labor. In addition, households differ in abilities, education, and other productive endowments. Therefore, the egalitarian distribution of land will result in disparities in the marginal products of land, labor and other inputs across households. These differences in marginal production represent an

Table 4.3 summarizes the comparisons of several aspects of the households engaging in land market transactions with those households not engaging in these transactions. For the five lease-in households in Jurong county, although their average operational landholding per person is smaller than the average of the non-leasing households, their income from agricultural activities is significantly higher than that of the other group of households. This implies that these five households are specializing in agricultural production. The labor endowment in these five households is slightly higher than the average of the other group, but their capital endowments is lower than the average of the other group. The differences in land, labor and capital endowments between these two groups are all not significant in a statistical sense. Perhaps what distinguishes these five households from the other group is the educational level of the household heads. The heads of these five households have an average of 6.6 years of education compared to 4.2 in the other group. The difference is quite substantial (significant at 16 percent level of confidence). Since the original land-labor and land-person ratio was unfavorable to these five households, the disadvantage will be strengthened if the quality of labor is taken into account. Therefore, the marginal product of labor and the marginal product of land in these five households should be higher than their other group. Land leased to these five households increases their operational holding, thus reducing the gap of marginal productivities and improving efficiency.

For the eight lease-out households in Jurong county, it can be observed from the income structure that they are households specializing in non-farming activities, such as crafts, services, transportation, and commerce. As the households which lease-in land, they have slightly

Table 4:3: Land Market Transactions and Household Characteristics

County	(1) Number of Households	(2) HH Size	(3) Adult	(4) Age (yrs)	(5) Education (yrs)	(6) Average Holding Before (mu/person)	(7) Average Holding After (mu/person)	(8) Tractor (yuan)	(9) Buffalo (yuan)	(10) Ag. Income (yuan)	(11) Off-farm Emp. (yuan)	(12) Non-farm Income (yuan)
Jurong												
Lease-in												
No	195	4.3	3.3	42.9	4.2	1.75	1.74	448	147	336	294	151
Yes	5	5.0	4.0	49.4	6.8	1.54	1.68	0.0	145	*761	395	286
Lease-out												
No	192	4.2	3.3	43.2	4.3	1.75	1.76	436	149	352	296	129
Yes	8	4.3	4.0	39.3	5.3	1.49	1.17	437	96	310	243	*775
Gongzhuling												
Lease-in												
No	187	4.3	3.1	39.7	5.8	4.87	4.86	327	138	1617	284	130
Yes	13	4.5	2.7	36.8	3.5	4.40	*7.43	675	*473	1943	243	92

Note: (1) Number of households
(2) Household size
(3) Number of adults between age 14 and 65 in the household
(4) Average landholding per household
(5) Years of education of the household head
(6) Average landholding per person before land market transactions
(7) Average landholding per person after land market transactions
(8) Average value of tractor in a household
(9) Average value of buffalo in a household
(10) Average household income from agricultural sources including cropping, fruits, vegetables, animal husbandry, in last season
(11) Average household income from off-farm employment, such as rural enterprises.
(12) Average household income from non-farm activities, such as transportation, service, retailing

* Indicates that the difference is significant at the one percent level.

favorable endowments in labor force and education, and slightly unfavorable endowments in land and capital. The explanation for leasing out their plots may be as follows: the majority of family labor in these households was shifted to non-farm activities. The labor force which remained in farming was reduced to an unfavorable level in comparison to the other group. If this explanation is correct, it implies that the adjusted land-labor ratio in these eight households is higher than the average of the non-leasing out households. The marginal product of land would be lower in these eight households than in the other group. As such, leasing-out some plots to other households reduces the gap in marginal products and improves resource allocation.

In Gongzhuling county, 13 households leased-in plots from other farmers or from the collectively-owned reserve land. From Table 4.3 it is observed that these do not differ from the other group of households in the endowments of land, labor, and education, and in the structure of income. However, this group of households has a larger capital endowment. The average value of draft animal owned by these 13 households is more than triple that of the non-leasing in households. The difference in draft animals among these two groups is highly significant statistically. The average value of tractors owned by these 13 households is also more than double that in the non-leasing in households. If the inputs are divided into two categories, namely, power and land, the power-land ratio in the leasing-in households is higher than that in the non-leasing households. Again this disparity implies the existence of a gap in the marginal products of land among these two groups. Land market transactions, therefore, reduce the gap in the marginal productivity of land, and improve the resource allocation.

The above discussions suggest that some farmers in Jurong county and Gongzhuling county engage in land market transactions to improve resource allocation. Those households that tend to lease in plots are households that either have higher human capital endowments or physical capital endowments. Households that tend to lease out land are households that specialize in non-farm activities. However, overall, the extent of land market transactions is very limited. For households that hope to specialize in non-farming activities, long- and medium-term credit could be one of the constraints in their undertaking. One hypothesis is that if credit is more widely available, more households will be able to move to non-farm business, and as a result, more households will be ready to lease out their plots. Also, if credit is more widely available, more households will invest in draft animals and tractors, they will thus tend to lease-in land to increase their operational holdings. Another explanation for the limited extent of land transactions is the relative novelty of the responsibility system in the study areas. Farmers may be uncertain as to whether they could lose their land entitlement if they lease-out their land to others, as this could be taken as an indication that the household does not need the land. It is not clear whether leasing transactions imply payment in advance (i.e., before harvest). But since the occurrence of these transactions in our sample is quite minimal, it is not a factor of much significance in analyzing the demand for liquidity.

2.- The Labor Market

The household structures in the three sample counties are very similar. About three-fourths of the households in each county have three to five members and two to four adults (see Tables 4.4 and 4.5). The average household size is 4.28 in Gongzhuling county, 4.46 in Tai county,

and 4.18 in Jurong county. The average number of adults is 3.05, 3.62 and 3.32, respectively. The dependent population (defined as age younger than 14 or older than 65) is 1.23 in Gongzhuling county, and .84 and .86, in Tai county and Jurong county, respectively. The dependent-adult ratios are, thus, respectively 0.40, 0.23 and 0.26. Among these three counties, Tai county has the largest household size, but the lowest dependency ratio. The reason is the different age structure of the household heads. About three-fifths of household heads in Gongzhuling county and about half of the household heads in Jurong county are younger than forty years old, while about 70 percent of household heads in Tai county are older than forty (see Table 4.6). Since most households are nuclear households, the old age of household head implies that his children have become adults and his parents have passed away. Hence, the dependency ratio in the households with older household heads is low.

Table 4.4: Household Size

No. of Members	Gongzhuling County %	Tai County %	Jurong County %
1	0	1.5	1.5
2	7.5	5.0	6.5
3	19.5	18.5	24.0
4	36.5	31.0	32.0
5	22.5	23.0	21.0
6	15.0	21.0	15.0
Average	4.28	4.46	4.18

Table 4.5: Number of Adults in a Household

Adult	Gongzhuling County %	Tai County %	Jurong County %
1	1.5	2.5	1.5
2	48.5	23.0	34.0
3	16.0	21.0	24.5
4	17.0	30.0	18.5
5	4.5	9.0	21.5
Average	4.05	3.62	3.32

Table 4.6: Age Structure of Household Head

Age	Gongzhuling County	Tai County	Jurong County
-30	25.0	4.5	14.0
31-40	36.0	25.0	37.0
41-50	16.0	37.5	20.5
51-60	13.0	22.0	19.5
60+	10.0	11.0	9.0

The educational level and experience of household heads also differ quite substantially. Only 18 percent of household heads in Gongzhuling county have less than four years of education (see Table 4.7). The figure is more than 40 percent in both Tai and Jurong Counties. About

one-third of household heads in Gongzhuling county (32 percent) and Jurong county (28 percent) have the experience of being a production team or brigade leader. Only a quarter of household heads in Tai county had such experience.

Table 4.7: Education of Household Head

Education	Gongzhuling County	Tai County	Jurong County
0	11.0	19.0	25.5
1-3	7.0	22.5	21.5
4-6	44.0	40.0	25.5
7-8	15.0	10.5	10.5
9	20.0	3.0	9.0
10	3.0	5.0	8.0

The discussions above confirm the assertion in the preceding section that households are at different stages of life cycle and have different human capital endowment, which includes educational level and experiences. Therefore, the egalitarian bias in the distribution of land when the household responsibility system was adopted implies that the marginal products of land and labor will be different across households. Labor market transactions are another way to reduce the marginal product gaps and to improve resource allocation. The need for labor market transactions may also arise from other reasons. Because of the seasonality in most agricultural production, the demand for labor is highly

concentrated in certain periods of time in the year. During the peak periods, most households experience shortage of labor. The interesting question, therefore, is whether the sampled households engage in labor market transactions to improve resource allocation.

Table 4.8 shows that only 12 households in Gongzhuling county and 22 households in Jurong county employed hired workers in various stages of production. No labor-hiring for agricultural production was found in Tai county. Table 4.9 shows the average wage rate for different types of work in Gongzhuling county and Jurong county. The average rate ranges from about 1.5 yuan per day to about 6.3 yuan per day. However, the actual daily rate ranges from one yuan to ten yuan. In addition to the wage, meals for workers, in general, are also required.

Table 4.8: Labor Market Transactions

Type of Activity	No. of Household Hiring Labor (%)			Households Exchanging Labor (%)		
	Gongzhuling	Tai	Jurong	Gongzhuling	Tai	Jurong
Preparation	0	0	1.5	1.0	12.0	5.5
Planting	3.0	0	7.0	5.0	61.5	48.5
Cultivation	4.0	0	2.5	4.0	4.0	1.0
Harvest	2.5	0	8.0	12.0	38.0	67.0
Total % of Households	6.0	0	11.0	15.0	65.5	74.5

Table 4.9: Wage Rates

Activity	Gongzhuling	Jurong
Preparation	.	1.5
Planting	3.8	4.2
Cultivation	6.3	3.9
Harvest	3.6	5.4

Note: Wage rates reported here are cash wages. In general, employers also need to provide meals, which are not calculated in the wage here.

Table 4.10 lists the comparison of some aspects of the households engaged in wage labor employment with those households which did not employ any worker. From this table, it is noted that the characteristics of labor-hiring households in Gongzhuling county differ from those in Jurong county. Compared to the non-labor-hiring households in Gongzhuling county, the labor-hiring households in this county are smaller in size and with less labor endowment. However, they also have smaller operational land area, both in absolute size and relative size (operational land per worker and operational land per person). While none of these labor-hiring households own tractors, the value of the draft animals they own is about twice as much as that of the non-hiring households. From these comparisons, there are no obvious reasons that these households need to hire labor and the other households do not. Perhaps, the main explanation lies with the off-farm jobs and activities. On average, about a quarter of income for the labor-hiring households in the last season came from off-farm employment

Table 4:10: Labor Hiring and Household Characteristics

County	(1) Number of Households	(2) HH Size	(3) Adult	(4) Operational Holding (mu)	(5) Land-Labor Ratio (mu/worker)	(6) Land-Person Ratio (mu/person)	(7) Tractor (yuan)	(8) Buffalo (yuan)	(9) Non-Farm Income (%)
Gongzhuling									
No	188	4.3	3.0	21.1	7.4	5.0	372	150	16.7
Yes	12	3.7 *	2.5	15.4	6.7	4.9	0	316	24.8
Jurong									
No	178	4.2	3.3	6.7	2.2	1.6	487	150	45.5
Yes	22	3.7 *	3.3	8.2	2.7 *	2.4 *	27	123	45.4

Note: (1) Number of households
(2) Household size
(3) Number of adults between age 14 and 65 in the household
(4) Average landholding per household
(5) Average landholding per adult member
(6) Average landholding per person
(7) Average value of tractor in a household
(8) Average value of buffalo in a household
(9) The percentage of household income from non-farm employment and non-farm activities in the total household income.

* Indicates that the difference reaches the significant level of 10 percent.

and activities, while the non-hiring households had only 16.7 percent of income derived from these sources.[10] This may imply that after adjusting for off-farm employment, the actual labor-land ratios in the hiring households are much smaller than the average in the sample. Therefore, hiring labor in these households improved this ratio and reduced the marginal productivity gaps. One point deserving attention is related to the educational level of the household heads in the labor-hiring households. On average, education is higher for hiring households than for non-hiring households (7.9 years compared to 5.7 years, the difference is significant at .01 confidence level). This difference may explain why this group of households has higher ratio of off-farm income. Off-farm employment, such as industry, and activities such as crafts, services and commerce, in general, require abilities that are different from farming. Education increases a person's ability in handling the uncertainty and obtaining new required skills that arise from a new job. Therefore, a high level of education facilitates the shifting of labor from farming to non-farming activities.

The 22 labor-hiring households in Jurong county have characteristics that are different from those of Gongzhuling county. The portion of income derived from non-farm sources did not differ from that of non-hiring households (45.4 percent compared to 45.5 percent). However, both the land-labor ratio and land-person ratio are much more favorable in the hiring households than in the non-hiring households (2.7 mu/labor compared to 2.2 mu/labor, 2.4 mu/person compared to 1.6 mu/person). The differences in land-labor ratio and land-person ratio are both significant

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10/ The difference is not significant at the conventional level.

statistically. These contrasts indicate that labor-hiring in Jurong county is mainly a result of the difference in the land-labor ratio across households.

Although the reasons for hiring labor are different in Jurong county and Gongzhuling county, the underlying economic forces are the same. In Jurong county, the land-labor ratio in the hiring households is higher than the non-hiring households. This difference indicates that, if labor-hiring did not occur, the marginal product of labor in these 22 households would be higher and the marginal product of land would be lower than the other 178 households. The employment of workers increases the availability of labor and thus reduces the gaps of marginal products between the hiring and non-hiring households. As such, the resource allocation is improved. In Gongzhuling county, the original land-labor ratio is lower in the 12 hiring households than in the non-hiring households. However, the hiring households have higher portions of labor force shifting out of agriculture. After making this adjustment the land-labor ratio should be higher in the hiring households than in the non-hiring households. The employment of workers thus reduces the gap in the marginal products between these groups of households.

Table 4.8 also indicates that most sample households in Tai county (65.1 percent) and Jurong county (74.5 percent), and a significant group of households in Gongzhuling county (15 percent) engaged in exchange labor. Most incidence of labor exchanging occurred during the periods of planting and harvesting, which are the peak periods in using labor. There are two explanations why most households use labor-exchanging instead of labor-hiring to alleviate seasonal labor shortages. The first reason is that hired labor is subject to incentive problems. The direct exchange of

labor between relatives and friends mitigates the shirking problem and thus reduces the cost of supervision. An additional explanation is that hiring labor requires cash. Thus, engaging in labor-exchanging to alleviate seasonal labor shortages reduces the need to draw on cash resources or to borrow. The latter explanation is partly supported by the distinct characteristics of labor-hiring households in Gongzhuling county and Jurong county. The higher portion of income from non-farm source in the labor-hiring households in Gongzhuling county implies that these households have more cash income. The favorable land-labor ratio in Jurong county's labor-hiring households indicates that these households have larger agricultural surplus and, as a result, larger cash reserves.

3. Capital Services Market

After the household responsibility system was adopted, irrigation, in general, has still remained as a collective function that is performed by the village. Plowing and harvesting are also coordinated by the village. However, whether these two functions are performed by the village depends on whether draft animals and tractors are still collectively owned. None of our sample villages collectively owns draft animals and tractors. Sampled farmers either used their own or rented draft animals or tractors from specialized households to do plowing and harvesting.

Draft animals, tractors and other farm machinery were the most difficult assets to be divided when the household responsibility system was adopted. Several different measures were taken to deal with such assets. In all of the 16 surveyed villages in Gongzhuling county, tractors and draft animals were sold to individual households at prices that were negotiated and agreed upon by the villagers, and funds were paid to the villages in a three to five year installments. The prices for a big

tractor (25 HP) were about 4,000 to 6,000 yuan, and for a small tractor (12 HP) was about 2,000 to 4,000 yuan. The price for a draft animal ranged from 100 to 800 yuan (mostly between 500 to 800 yuan). Since a village had about one hundred to three hundred draft animals when the land was allocated, about half of the households in a village had opportunity to buy a draft animal. In Tai county, most villages contracted the tractors to specialized households. Each year these households gave about 150 to 200 yuan to the village as rent. Draft animals were also contracted to specialized households. Since arable land is very limited in Tai county, feeding draft animals was a big burden on these households. Therefore, in one village the draft animals were given free to a household. The only obligation is that this household has to plow the other households' plots without charge for two years. In another case, the village gave 2.5 mu of land as feed plot to the specialized household. In two other villages, the specialized households were subsidized at 150 yuan a year for feeding a draft animal. Tractors and draft animals in Jurong county, in general, were also sold to individual households at prices negotiated among households in a village, as in Gongzhuling county. The prices for tractor and draft animals were also similar to those in Gongzhuling county. However, the average operational size in Jurong county is not big enough to maintain a tractor or even a draft animal, therefore, tractors and draft animals are often jointly owned by several households.

The different arrangements of ownership of tractors and draft animals imply different intensities of capital services market. In Gongzhuling county, 40.5 percent of the sampled households used only hired animals or tractors in farming. In Jurong county, most households (58 percent) used both family-owned and hired tractors or animals, and

relatively a few households (12.5 percent) used only hired equipment or animals. On the contrary, almost all households (96.5 percent) used only hired tractors and animals in Tai county (see Table 4.11). Draft animal and tractor services, in most cases, are provided by households in the same village.

Table 4.11: Capital Services Market

	Gongzhuling County	Tai County	Jurong County
% Using only family-owned draft animal or tractor	36.5	0.0	29.0
% Using only hired draft animal or tractor	40.5	96.5	12.5
% Using both family-owned and hired draft animal or tractor	22.0	1.0	58.0
% Not using any draft animal and tractor	1.0	2.5	0.5

Capital services, in general, were charged at a piece rate. The cost of plowing a mu is between 12 yuan and 20 yuan. The way that rental fees are paid is different in different areas. In most cases in Gongzhuling county, fees for hired animals or tractors were collected in cash after harvest. In Tai county and Jurong county, fees, in general, are collected when work is done. However, it is also possible to delay the payments until harvest. For hiring tractors, in addition to paying fees, a household needs also to provide fuel. This is because subsidized fuel is allocated to each household by the government according to each household's

operational acreage. Hired capital services are thus not a drain on cash resources before the harvest in Gongzhuling, but they are cash-requiring in Jiangsu for most households. The operational area, however, is quite small, and thus the amount of cash required is small as well.

4. Other Input Markets

Unlike land, labor and capital services markets, the material input (fertilizer, pesticides, etc.) markets have existed even before the recent reform. However, the adoption of the household responsibility system in rural areas increased the frequency of transactions in material input markets and brought dramatic changes in the forms of current markets.

A. Fertilizer. Fertilizer is the most important material input in agricultural production. Nitrogen is the main ingredient in the contents of fertilizer applied. As in other parts of China, farmers in these three counties used only a little potassium and phosphate.

Fertilizer is distributed to farmers through several channels. Tables 4.12a, 4.12b and 4.12c show the weights of different sources of fertilizer in each village. There are four main sources: "quota-linked fertilizer", "price-negotiated fertilizer", "planned fertilizer", and "free-market fertilizer".

Table 4.12A: Sources of Fertilizer: Gongzhuling County

Village Number	Quota-Linked Fertilizer (%)	Price-Negotiated Fertilizer (%)	Free-Market Fertilizer (%)
1	15	65	20
2	4	79	17
3	7	43	50
4	24	0	76
5	12	80	8
6	5	40	55
7	20	60	20
8	40	40	20
9	12	88	0
10	50	40	10
11	11	35	54
12	10	67	23
13	11	65	24
14	20	30	50
15	35	45	20
16	15	70	15

Table 412B: Sources of Fertilizer: Tai County

Village Number	Fertilizer (%)			
	Quota-Linked	Price-Negotiated	Free-Market	Planned
1	29	43	28	0
2	2	66	32	0
3	15	45	5	35
4	0	60	0	40
5	3	70	0	27
6	0	40	20	20
7	0	29	0	71
8	0	29	0	71
9	0	50	10	40
10	11	15	44	30
11	22	24	25	29
12	15	45	5	35

Table 4.12C: Sources of Fertilizer: Jurong County

Village Number	Quota-Linked Fertilizer (%)	Price-Negotiated Fertilizer (%)	Free-Market Fertilizer (%)
1	35	52	13
2	20	0	80
3	20	50	30
4	20	20	60
5	46	30	24
6	8	40	52
7	32	54	14
8	20	20	60

The "quota-linked fertilizer" is supplied by the central government, provincial government or county government to the township government according to the quota of grain that each township sells to the government. The township then allocates this fertilizer to the villages, and the villages ration it to the households according to each farmer's grain quota. Part of this fertilizer is produced in the giant state fertilizer plants, some is produced in the county government-owned small plants, and part of it is imported. This fertilizer is sold to farmers at the government-set price, which recently was about 50 percent of the free-market price.

The "price-negotiated fertilizer", in general, is purchased by various levels of governments from the fertilizer plants in other counties, provinces or some fertilizer importing agencies to supplement the quota-linked fertilizer. It is then distributed to the village and from the village to households at a price higher than the government-set price but lower than the free-market price. Two different methods are used in the distribution of the price-negotiated fertilizer. One is according to each

household's grain quota. The other method is based on each household's operational farm size.

The "planned" fertilizer allocation is observed only in Tai county. Tai county is self-sufficient in grain and it does not provide commercial grain to the state. The Tai county government procures some quota grain from farmers only to support the urban residents in the county. Since no grain is sold to the state, therefore, the state does not allocate quota-linked fertilizer to Tai county. Nevertheless, the county has two county-owned fertilizer plants. Part of the output of these two plants is distributed as quota-linked fertilizer to the households with grain quota obligations and part of it is distributed as "planned" fertilizer to the households without grain quota obligation. The distribution of planned fertilizer is mainly based on the operational farm size. The prices are similar to quota-linked fertilizer.

The fertilizer obtained through the above three sources is not sufficient for most household needs. The free-market is another source of fertilizer supply. However, the prices in the free market are much higher than the government prices. For example, the government set price for ammonia is 0.56 yuan per kg, while it is about 1.2 yuan in the free market. The percentage of fertilizer bought through the free market varies from village to village. It ranges between about 10 percent to about 80 percent of the total fertilizer consumption. The two-tier price structure encourages the diversion of fertilizer earmarked for quota-linked or negotiated fertilizer schemes to the free market. Farmers frequently complain that the government does not fulfill its promise of fertilizer delivery.

B. Diesel. The distribution of diesel is similar to the distribution of fertilizer. However, there are only three categories, that is , quota-linked diesel, planned diesel, and free-market diesel. In Tai county, the planned diesel was allocated according to the operational size of a farm. However, the diesel ration, in most cases, is distributed to the tractor operator who provides capital service and not to the farmers. In Jurong county, the quota-linked diesel was distributed to the individual households according to either the grain quota obligation of each household or the size of responsibility plots in each household. Gongzhuling county adopted the same methods as Jurong county to distribute quota-linked diesel. If a household does not have a tractor or other farm machinery, it can sell the diesel ration to a diesel station.

C. Herbicide and Pesticide. The supply channels of herbicides and pesticides are much simpler compared to those of fertilizer and diesel. Herbicides and pesticides are supplied by the township or village supply and marketing cooperatives. In general, farmers obtain them directly from the cooperatives. However, in some villages, the staff in the village scientific station buy the herbicides and pesticides from the county or township supply and marketing cooperatives and then sell them to the farmers in the village. A two-tier price system exists also in herbicides and pesticides. The government-set prices are about half of the market prices. Farmers frequently complain that it is very difficult to obtain herbicide and pesticide at the government set prices.

D. Market Constraints. Even though free markets for fertilizer, diesel, pesticides and herbicides exist, these markets are still very limited. Table 4.13 shows the fraction of farmers in each county that were willing to pay prices at the market rates or even higher but were

Table 4.13: Input Supply Constraints

	Gongzhuling %	Tai %	Jurong %
Fertilizer	10	14	54
Diesel	10	29	33
Pesticide	1	23	32
Herbicide	1	26	28

Note: The numbers show the percentages of respondents who stated that they were not able to obtain the needed inputs even though they were willing to pay higher than market prices.

unable to obtain the goods. In Jurong county about half of the respondents were unable to obtain enough supplies of fertilizer, diesel, pesticides and herbicides. The quantity constraints are less severe in Gongzhuling county. Only about 10 percent of the farmers there had difficulty in obtaining enough fertilizer and diesel, and only one percent could not obtain pesticides and herbicides. Perhaps this is because Gongzhuling county is the champion commercial grain producer in China. Therefore, the local government at various levels makes great efforts to deliver adequate supplies of each kind of material inputs into this county in order to maintain the high grain output and the distinguished leadership position of the county.

The phenomenon that some farmers are unable to obtain fertilizer, diesel, pesticides, and herbicides even though they are willing to pay higher than the market prices, implies that the free market is in a disequilibrium. For a full-fledged free market, the price of a good will

be equilibrated according to the demand and supply. The reason for the market disequilibrium may be due to the fact that a great portion of the supply in the free market is not from ordinary sources, and availability is localized and unpredictable. The market is thus highly segmented. In many cases, supplies which enter the free market are diverted from the quantities that are earmarked as quota-linked or planned, without sanction of authorities. Thus many retailers cannot guarantee a continuous supply of these products, and availability is unpredictable.

Diesel, pesticides, and herbicides, in general, are sold for cash payment. For fertilizer, the arrangement is more complicated. In many villages in Gongzhuling county, the quota-linked and price-negotiated fertilizer was distributed directly to farmers as a fertilizer loan. In the Jiangsu counties, rationed fertilizer is usually paid in cash. Free-market fertilizer, even in Gongzhuling county, is sold on a cash basis.

V. CREDIT MARKETS

There is a marked difference in the incidence of credit activities between Gongzhuling county and the two Jiangsu counties in the sample: Whereas only 21 percent of the former sample have not borrowed from any source, the share of non-borrowers in Jurong county was 78.5 percent, and 67 percent in Tai county. This difference is somewhat artificial, as the supply of subsidized fertilizer in Gongzhuling county is linked to credit in a procedure that forces farmers to become borrowers regardless of whether they really need credit.[11] In all counties the extent of informal credit transactions is very limited. Furthermore, most of the informal transactions reflect interest-free loans among relatives and friends (Table 5.1). Below we review in detail credit operations in the formal and informal sectors.

In Gongzhuling county, the overwhelming majority of the sampled farmers (74.5 percent) utilized formal credit during the season reviewed. Most of the loans were in kind in the context of fertilizer distribution. In Jurong county, only 12.5 percent of the sample obtained formal credit. The percent of formal sector borrowers is somewhat higher in Tai county (24 percent). Most of the formal credit transactions in Tai county reflect an advance cash payment made to cotton growers by the cotton marketing agency

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11/ The distribution of subsidized fertilizer is performed as a loan in kind, and no cash is collected from the farmer. The delivery of the fertilizer is registered in the credit cooperative as a loan, to be repaid after the corn harvest. Since most farmers wish to obtain fertilizers at the subsidized price, they become borrowers even if they would prefer to pay in cash.

as an inducement to grow cotton. The amount of liquidity entailed in these cash advances is rather small (less than a third of a typical credit cooperative loan). While half of the recipients of cash advances in Tai county did not perceive the advances as credit (because there is no explicit interest or payback), the procedure clearly adds to the liquidity of the household during the cultivation period, and may therefore diminish the need for credit or liquidity from other sources.

Table 5.1: Credit Activities (Percent)

County / Item	Gongzhuling (N=200)	Tai (N=200)	Jurong (N=200)
Non-borrowers	21.5	67.0	78.5
Borrowers from formal market only	56.0	20.0	8.5
Borrowers from informal market only	4.0	9.0	9.0
Borrowers from both formal and informal markets	18.5	4.0	4.0
Percent of informal transactions which are interest-free	68.0	75.0	100.0

The frequency of informal credit transactions is smaller than formal transactions in both Gongzhuling an Tai county, and is about equal in Jurong county. Only 22.5 percent of the Gongzhuling sample, and 13 percent of the Jiangsu counties sample had informal loans. In these latter counties the incidence of borrowing in both markets is less than the trend observed in recent years (Table 5.2). In Gongzhuling the incidence of borrowing in the informal market is slightly up while the incidence of borrowing in the formal market is within the range observed in recent years.

Table 5.2: Occurrence of Borrowing Over Time (Percent)

County	Gongzhuling		Tai		Jurong	
	Formal Market (N=200)	Informal Market	Formal Market (N=200)	Informal Market	Formal Market a/ (N=200)	Informal Market
1983	63.0	11.0	13.5	9.5	20.0	10.5
1984	70.5	11.0	10.5	10.5	27.5	14.0
1985	72.5	15.5	14.0	13.5	24.5	18.5
1986	78.5	19.5	15.5	20.0	23.5	18.0
1987	74.5	22.5	6.0	13.0	12.5	13.0

a/ Figures for formal market borrowing in Tai County exclude cash advances to cotton growers to allow comparability between 1987 figures and earlier years.

The basic structure of the institutional (formal) credit system is quite uniform in most areas of China: The Rural Credit Cooperatives (RCCs) are the main lending institution to farming households while the Agricultural Bank of China interacts very little with households in lending operations (it is more active in attracting deposits). Other agencies may provide credit in the context of input supply or marketing operations, and their role may be quite variable. This structure is evident in Table 5.3, which presents the composition of loans in the sample by source. In both Gongzhuling and Jurong counties, the RCCs are the most frequent institutional lender, with the ABC playing a very minor role. In Tai county, where cotton promotion efforts entail a cash advance to growers, the cotton marketing agency is the most frequent institutional provider of liquidity. However, if the volume of credit is considered, the RCCs would be the most significant institutional lender even in this county, as the

amount of cash advanced by the cotton agency is small. In the informal sector relatives provide most of the loans, and friends are the second major source. As indicated earlier, the overwhelming majority of these informal transactions is not profit-motivated and no interest rate is charged. The share of institutional credit in the total volume of credit is 66.5 percent in Gongzhuling, 33 percent in Jurong and 25 percent in Tai county. Thus in the two Jiangsu counties loans from relatives and friends account for the bulk of borrowed liquidity, by volume.

Table 5.3: Sources of Loans a/

County	Gongzhuling	Tai	Jurong
Source	(N=259)	(N=60)	(N=82)
I. Institutional	81.9	69.3	48.3
ABC	8.9	3.6	6.6
RCC	71.4	10.9	35.0
Other	1.5	54.8 b/	6.7
II. Non Institutional	18.1	30.7	51.7
Relatives	11.2	20.7	40.0
Friends	1.9	8.5	10.0
Other Farmers	5.0	1.5	1.7

a/ Unit of observation is loan transaction (not household).
b/ Cash advances to cotton growers.

Practically all of the loans from institutional sources are granted for a short-term maturity (Table 5.4). There are few medium-term loans, and no long-term institutional loans in the sample. Non-institutional loans in Gongzhuling and Tai county are also mostly short-term, while in Jurong country there is a significant share of informal loans with an indefinite maturity. Such loans may apparently be rolled over depending on the borrowers' ability to pay, as the transaction is among relatives. The maturity structure of loans in the sample thus

indicates that most of the medium term credit for agricultural households in our study areas (to the extent that such credit is utilized) is provided by non-institutional sources. This situation is different from that typically prevailing in less-developed countries, where most of the medium and long term credit is provided by institutional lenders. The reason for this apparent anomaly can be inferred from an inspection of the declared purpose of loans from the different sources (Table 5.5). A small part only of institutional credit is acquired for construction and social purposes such as weddings or funerals. Construction and special social events require large cash outlays which typically can not be covered from the farmers short run cash flow. It is an apparent policy of institutional lenders not to lend for such purposes.

Table 5.4: Duration of Loans (Percent)

County / Term	Gongzhuling		Tai		Jurong	
	Institutional	Non-Instit.	Institutional	Non-Instit.	Institutional	Non-Instit.
Short term (12 months or less)	99.0	79.0	100.0	88.0	89.5	32.3
Medium term (13-48 months)	1.0	21.0	0	0	3.4	3.2
Indefinite or Unknown	0	0	0	12.0	7.1	64.5
Sample Size	212	47	57	25	29	31

The farmers face difficulty in diverting other institutional credit to such purposes, as diversion is easily noticeable in the case of construction or significant social events. For the same reason, informal loans contracted for these purposes cannot be diverted for consumption.

Farmers thus tend to fund large expenses on non-productive items (which require medium term credit) from the informal sector. The low incidence of formal credit for machinery acquisition reflects apparently low demand, as farm sizes are rather small and do not justify investment in machinery by individual households. According to farmers' statements, most of the formal credit is acquired for production purposes, and this is indeed the declared policy of institutional lenders. Of the total volume of credit which is not earmarked for easily verifiable purposes (i.e., credit which is fungible for production and consumption), the formal sector provides 87 percent in Gongzhuling county, 67 percent in Tai county and 57 percent in Jurong county. The bulk of the fungible credit in the study areas thus comes from the formal sector.

Table 5.5: Distribution of Loan Purposes by Type of Lender (Percent)

Purpose / County and Source	Sample Size	Production	Farm Machinery	Construction	Consumption	Social (Marriage Funeral etc.	Other
Gongzhuling							
Institutional	212	93.0	4.0	2.0	0	1.0	0
Non-Institutional	47	11.0	4.0	23.0	15.0	26.0	21.0
Tai							
Institutional	57	89.0	2.0	4.0	0	0	3.0
Non-Instututional	25	20.0	0	32.0	0	20.0	18.0
Jurong							
Institutional	29	48.0	10.0	10.0	3.0	10.0	19.0
Non-Institutional	31	6.0	19 0	29.0	13.0	23.0	10.0

Interest rates on institutional loans in all three counties are in the range 7-12 percent per annum, which is within the range of government-prescribed interest rates for different categories of loans. Most of the

informal loans do not carry an interest charge, and in the few where interest is charged, the rate is usually similar to that of institutional lenders. There are only a few loans in the sample with high interest rates commonly observed in less developed countries. Given the non-profit character of much of at he informal credit in the sample, it is not surprising that these loans by and large are provided without a security. A few instances of third-party guaranty are observed. In the institutional sector, the grain quota is pledged as security in most of the loans of Gongzhuling county. In Jurong county, most of the institutional loans do not carry an explicit security, while in Tai county both third party guaranty and the expected cotton harvest are utilized as security.

The very small incidence of commercially oriented informal credit market transactions in the study areas (relative to other less developed countries) is probably a consequence of factors on both the supply and demand side. The status of private lenders is not clarified legally, and they may not get any official backing in the case of disputes. Lending for profit may still be viewed negatively by some. Collateral assets are not available for most farmers, as until recently land leases were not officially transferable. In other countries, conditional pledges of land-use rights serve as a common security for informal credit. However, in China it is not clear that such transfers can be put into effect, as they do not have official sanction. In the absence of effective enforcement mechanisms, it is not surprising that most of the informal transactions observed are conducted between relatives and friends, where the motivation to lend is not profit, and the inducement to pay derives from the close links between the parties. The market is thus extremely segmented, with

transactions taking place within small circles of related households which are not open to outsiders.

On the demand side, there are factors which limit households demand for informal credit. In Gongzhuling, authorities are keen on maintaining the high grain output which has characterized the county in recent years, and they arrange for substantial amounts of institutional credit through fertilizer loans. This diminishes the residual demand for informal credit. In the two Jiangsu counties, the overall demand for credit (both formal and informal) is low, as chemical inputs (fertilizers, pesticides) are rationed and there is a relatively thin free market for these inputs. In the absence of opportunities to purchase these cash inputs, the demand for liquidity is reduced (see Table 4.14). Another factor which reduces Jiangsu households' need for borrowed funds (whether formal or informal) is the prevalence of off-farm employment in these study areas: on average, close to half of the income of Jiangsu households in the sample is derived from off-farm employment (in Gongzhuling the proportion is .18). The cash incomes from such activities tend to be less seasonal and more stable as compared to farming activities, thus diminishing the need for borrowed liquidity. Farm sizes are much smaller in jiangsu relative to Gongzhuling (by a factor of 4). The demand for credit for working capital purposes would thus be smaller in Jiangsu.

Given the apparently ample supply of institutional credit in Gongzhuling, and the limited demand for credit in Jiangsu, the natural question is to what extent credit is a binding constraint in the study areas. Put differently, for what proportion of the households in our study areas would an increased allocation of institutional credit induce an increase in productive activities. The data collected in the context of

the present study allow inference on this subject, as borrowing households were asked if at the going interest rates they would have liked more institutional credit than the amount they actually received. Households which did not borrow were asked the reason for not borrowing. Those borrowers which indicated desire to obtain more credit, and the non-borrowers who answered that they could not get credit may be viewed as being credit-constrained. The most common reason for not borrowing was availability of sufficient resources from own savings, but in Tai county there is a significant group of individuals who apparently did not borrow because they already had a large outstanding non-institutional debt. These individuals would possibly have desired to have additional liquidity. It is not clear whether these should be treated as credit-constrained. Adopting a more extensive definition, the share of households affected by credit shortage would seem to be the highest in Gongzhuling (35 percent) and the lowest in Jurong (11.5 percent, see Table 5.6). The latter county is indeed the one with the most severe constraints on the availability of chemical inputs, as evident from Table 4.14. An interesting issue (which can be tackled only by a more detailed analysis) is the extent to which credit will become a binding constraint once the input supply problems are resolved (e.g., by allowing a free market in chemical inputs).

Table 5.6: Extent of Credit Constraints

Category	Gongzhuling		Tai		Jurong	
	Sample size	% Con-strained	Sample size	% Con-strained	Sample size	% Con-strained
Borrowers	157	40.8	65	21.5	44	30.9
Non-Borrowers	43	14.0	135	26.6	156	6.5
All	200	35.5	200	25.0	200	11.5

VI. LIQUIDITY, INPUT USE AND PRODUCTIVITY

Theoretically, constrained liquidity adversely affects the utilization of cash inputs and ultimately leads to lower output. The verification of these propositions has proven difficult, as typically researchers do not know which farmers are constrained by liquidity. Some works used the dichotomy between borrowers and non-borrowers, assuming that all non-borrowers are liquidity-constrained. This procedure is clearly not appropriate, as our data indicates that many of the non-borrowers had sufficient liquidity from their own resources and they have not borrowed precisely because they did not need additional liquidity. Below we examine various indicators of liquidity, cash requirements, input use and output employing the distinction between credit constrained and unconstrained households as defined in the preceding section. Ultimately, the analysis should employ more refined econometrics in order to control for various attributes (other than the liquidity situation) which differentiate farmers. Our study has not reached this stage yet, and some of the methodological issues involved are discussed in section VIII of this report.

Table 6.1 presents several liquidity items, standardized per unit of land to overcome differences in holding size among households. It is observed that in all counties the households which are categorized as credit-constrained have substantially lower savings accounts, and cash. Other data show that the share of non-farm income in the overall income of non-constrained households is higher. Since their own liquid resources are smaller than those of non-constrained households one would expect liquidity-constrained households to borrow more. This is indeed verified

by line (5) of Table 6.1, which demonstrates that liquidity-constrained households borrow more (by 40 percent - 80 percent) than other households.[12] Overall, the liquidity position of unconstrained households is substantially higher than that of constrained households. This strengthens our confidence in the criteria used to categorize households as constrained or unconstrained (preceding section), because these criteria were independent of liquidity variables.

Table 6.1: Liquidity Indicators
(Yuan per unit of operated land)

County	Gongzhuling		Tai		Jurong	
Item	Credit Con-strained (N=71)	Not Con-strained (N=129)	Credit Con-strained (N=50)	Not Con-strained (N=150)	Credit Con-strained (N=23)	Not Con-strained (N=177)
1. Savings accounts	1.9	21.8	42.5	132.7	11.5	43.4
2. Cash	31.5	49.1	35.4	78.8	15.0	37.6
3. Fungible formal credit	18.3	17.0	5.0	5.2	.5	5.1
4. Fungible informal credit a/	6.9	1.2	5.6	3.1	11.9	1.8
5. Total fungible borrowing	25.2	18.2	11.6	8.3	12.4	6.9
6. Total liquid resources	58.6	89.1	88.5	219.8	38.9	87.9

a/ Excludes loans for purposes which could be easily verified, such as construction, machinery, funerals, weddings etc. In Tai county, formal credit includes cash advances to cotton growers.

12/ The definition of borrowing utilized for this discussion excludes credit which is earmarked for non-production purposes and the utilization of which for the purpose contracted can be verified.

Table 6.2 presents expenditures on various inputs. The comparison between counties is hampered by the fact that not all items are cash-inputs uniformly in all counties. Thus, fertilizers are mostly obtained as loan in-kind in Gongzhuling, but not in the two Jiangsu counties. Similarly, payments for capital services in Gongzhuling county are typically settled after the harvest, while in Jiangsu these services are more commonly settled at the time of services. Another complication is the fact that even if some of the inputs are obtained as a loan-in-kind there is another portion which is acquired on a cash basis in the free market. For the case of Gongzhuling, an estimate of the cash expenses on inputs is obtained by assuming that all fungible formal credit (Table 6.1, line [3]) was utilized for fertilizers. Deducting this item from the expenditure on fertilizers yields an estimate of the cash expenditure on this input. Adding other cash costs (seeds, pesticides, other materials and hired labor), indicates a cash expenditure of 12.4 Yuan per unit of land among credit constrained households as compared to 16.6 Yuan among unconstrained households (a difference of 33 percent). In Tai and Jurong counties (assuming all reported expenditures are in cash) the differences are smaller, 7 percent and 12 percent, respectively. The actual utilization of nitrogen (the most important fertilizer) as measured in nutrient-equivalent units is consistently higher among unconstrained households (by 8.4 percent - 16.4 percent). The data are thus compatible with the proposition that credit-constrained households will spend less on cash inputs as compared to unconstrained households.

The comparison of output levels among the sub-groups of farmers (lines (9)-(10) of Table 6.2) indicates that only in Gongzhuling county the data for <u>agricultural</u> output are compatible with the proposition that

Table 6.2: Expenditures on Inputs and Output Indicators (Yuan per unit of operated land)

County	Gongzhuling		Tai		Jurong	
Item	Credit Con-strained (N=71)	Not Con-strained (N=129)	Credit Con-strained (N=50)	Not Con-strained (N=150)	Credit Con-strained (N=23)	Not Con-strained (N=177)
1. Seed	6.8	7.2	8.5	8.2	7.2	6.2
2. Fertilizer	22.9	25.5	23.8	28.8	19.1	20.1
3. Pesticides	.5	.4	4.8	6.1	5.8	5.7
4. Other material input	.4	.3	9.5	6.9	4.0	5.7
5. Hired labor	.1	.2	2.6	2.5	4.8	5.3
6. Hired capital services	7.1	5.2	4.0	4.6	3.7	6.0
7. Total input cost	37.8	38.9	53.3	57.0	44.5	49.7
8. Quantity of nitorgen used a/ (kg)	16.6	18.0	11.6	13.5	13.6	14.9
9. Value of agric. output b/	138.5	166.4	255.8	249.7	268.7	268.6
10. Value of agric. output plus non farm business income b/	143.1	174.9	306.1	335.6	301.8	297.5

a/ Measured in pure nutrients.

b/ Value of crops calculated at free market prices plus value of fruits and vegetables plus income from livestock and other specialized agricultural activities.

c/ Calculated as line (9) plus the income from non-farm business activities.

credit-constrained households have a lower output (by about 20 percent), while in the other counties agricultural output is practically identical for the two subgroups. However, if all the household's economic activities (whether agricultural or non-agricultural) are viewed as an aggregate performance criterion (a justifiable approach, as production credit is fungible across activities) the data show (line (10) of Table 6.2) that in both Gongzhuling and Tai counties, total output is higher among unconstrained households (by 22 percent in Gongzhuling, and 10 percent in Tai). The implication of these results could be that while in Gongzhuling the infusion of additional formal credit would increase the agricultural output of credit-constrained households, in Tai county additional credit, even if intended for agriculture, will increase non-agricultural output, as long as the present system of material inputs markets is not changed. Such tentative conclusions need, of course, to be confirmed through a more rigorous econometric analysis.

VII. INVESTMENT IN PRODUCTIVE AND NON-PRODUCTIVE ASSETS

The household responsibility system has brought a dramatic increase in income to rural areas in China. While in 1980 the average net income for a peasant was 191 yuan nationally, it increased to 424 yuan in 1986. The same dramatic change occurred in the sample areas. The average income for a farmer in 1986 was 635 yuan in Gongzhuling county, 448 yuan in Tai county, and 531 yuan in Jurong county. In all of the three sample counties, the per capita income is above the national average.

The direct impact of the sharp increase in per capita income is the improvement in living standards. Table 7.1 summarizes the comparison of percentages of sample households owning television, radio/recorder and other appliances between 1983 and 1987. The numbers of households owning TV sets, radio/recorder, and electric fan more than tripled in all three counties. The numbers of households owning sewing machine and watches have also increased about 50 percent. On the average, each household owned about half a bicycle in 1983. Ownership increased to about one bicycle in 1987.[13]

The most significant investment in consumer durables since the adoption of the household responsibility system is in the improvement of housing (see Table 7.2). About 60 percent of the households in Gongzhuling county, 68 percent in Tai county, and 56 percent in Jurong county have

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13/ Watch, sewing machine, and bicycle are the traditional "three big pieces." Television, radio/tape, and electric fan are the new "three big pieces" in rural areas.

either built new houses or improved their old houses. Now almost all houses in Tai county and Jurong county have tile roof and non-earth wall.

Table 7.1: The Changes in Living Standard

	Gongzhuling		Tai		Jurong	
	1983 (N=200)	1987	1983 (N=200)	1987	1983 (N=200)	1987
Percent own T.V.	6	42	2	26	11	38
Percent own radio/tape	3	14	2	12	3	17
Percent own sewing machine	46	57	11	31	27	37
Percent own watch	64	83	53	81	69	94
Percent own electric fan	0	1	1	25	9	32
Average no. of bicycle	.62	.96	.39	1.05	.41	1.08

Table 7.2: Improvement in Housing

	Gongzhuling		Tai		Jurong	
	1983 (N=200)	1987	1983 (N=200)	1987	1983 (N=200)	1987
Percent with tile roof	22	51	50	83	93	96
percent with non-earth floor	11	23	15	44	12	26
Percent with non-earth wall	22	48	51	85	84	95
Percent Who invested in house improvement	60		68		56	

About a quarter of the houses in Jurong county and two-fifth of the houses in Tai county have non-earth floor. Although the housing conditions have

also improved greatly in Gongzhuling county, they only reached the levels which prevailed in Tai county and Jurong county in 1983. About half of the houses in Gongzhuling county have tile roof and non-earth wall, and about a quarter of the houses have non-earth floor. The housing conditions in Gongzhuling county are obviously lower than those in Tai county and Jurong county.

The household responsibility system has also brought dramatic changes in production practices. In the old collective system, all production activities were managed and equipment was provided by the production team or brigades. As described in Section 4.3, when the household responsibility system was adopted, not only land was divided among individual households, but also some productive assets, such as tractors and draft animals, which were sold to individual households. Production management as well as productive investment have become the responsibility of individual households. Table 7.3 summarizes the percentages of households owning productive assets in 1983 and 1987. In 1983, the average value of productive assets (tractors, trucks, cars, pumps, engines, motorcycles, treshers, small tools, draft animals, pigs, poultry and other animals) owned by households in Gongzhuling county was only 570 yuan (47 percent of this was in pigs and poultry), in Tai county 250 yuan (84 percent of it in pigs and poultry), and in Jurong county 403 yuan (50 percent in pigs and poultry). The average value of productive assets by households owned has more than doubled by 1987. The values were respectively 1,477 yuan in Gongzhuling county, 578 yuan in Tai county, and 913 yuan in Jurong country.

In a relative sense, the increase in value of productive assets is very substantial in all three counties. However, in absolute levels, the

investment in productive assets is only a fraction of the amount invested in the improvement of housing. Table 7.4 compares the average investment per household in housing and productive assets. The value of productive assets was broken into three categories, namely equipment, draft animals, and other animals. The difference is largest in Tai county, where on average, each household spent 3,559 yuan on house improvement, but only 327 on acquiring new productive assets between 1983 and 1987. The difference is also quite substantial in both Gongzhuling county and Jurong county.

Table 7.3: Change in Productive Assets

	Gongzhuling		Tai		Jurong	
	1983	1987	1983	1987	1983	1987
	(N=200)		(N=200)		(N=200)	
Percent own tractor	1	9.5	0	0	3.5	8.0
Percent own truck/car	0	0.5	4.5	26.0	0	0
Percent own pump engine	1	2	0	1.5	6	11.5
Percent own thresher	0	3	0	0.5	2.5	12
Percent own buffalo/oxen	5	19	0	3.0	53	77
Percent own pigs	81	66	86.5	66.5	85	84.5
Percent own other draft animal	15	30	.5	0.0	1.5	0
Average value per household (Yuan)*	570	1477	250	578	403	913

Note: The values for 1987 reported in the table are undeflated. The price index for the agriculture productive equipments increased by 15 percent between 1983 and 1987. Therefore, in constant prices of 1983, the average value of agricultural productive assets that each household in the sample owned were 1,284 yuan in Gongzhuling county, 502 yuan in Tai county, and 990 yuan in Jurong county.

Table 7.4: Productive and Housing Investment (Yuan)

	Gongzhuling (N=200)	Tai (N=200)	Jurong (N=200)
Equipment	603	165	220
Draft animal	200	12	76
Other animal	104	50	214
Total productive investment	907	327	510
Housing	2461	3559	1820

Note: The numbers represent the average total investment per household between 1983 and 1987.

In these two counties, the expenditures on house improvement were 2.5 times as high as the productive investments. Moreover, it is noted that 48 households in Gongzhuling county, 35 in Tai county and 21 in Jurong county had disinvestment in productive assets. The average levels of disinvestment in these households were 574 yuan, 149 yuan, and 505 yuan respectively in Gongzhuling county, Tai county, and Jurong county.

The low incentive for acquiring productive assets and the high incentives for housing investment may be related to the perception of different degree of security in ownership rights. Houses have always been privately owned in rural areas. As a result, private ownership rights in houses are respected and well defined. Hence, once funds are available, the investment in housing becomes the first priority for most households. Secondly, the high investment in housing may be related to the age structure. A new house has become a precondition in rural areas for a young male adult to get married. The babies born during the baby boom in

early 60s have reached marriage age. The recent house construction boom in rural areas is thus a by-product of the baby boom in early 60s. The latter hypothesis is partly supported by the age structure of household heads in Tai county, where the investment in houses is the highest among these three samples. About 60 percent of the household heads in Tai county's sample are aged between 41 to 60, compared to 29 percent in Gongzhuling county and 40 percent in Jurong county (see Table 4.6). Their children are about 20 to 30 years old. Therefore, there were more marriage age young adults in Tai county's sample households.

The investment in housing was lowest in Jurong county. This fact seems to be inconsistent with the above mentioned hypothesis because there were more household heads aged between 41 to 60 in Jurong county than in Gongzhuling county. However, Jurong county had the best housing condition in 1983. In two indicators, tile roof and non-earth wall, Jurong county living conditions in 1983 were even better than Gongzhuling's condition in 1987 (see Table 7.2). They were also better or about the same as the conditions in Tai county in 1987.

The relatively low investment in productive assets (compared to housing) may also be related to the small size of farms after the household responsibility system: The average size of farm in Tai county's samples was only 4.63 mu, compared to 6.86 mu in Jurong county and 20.31 mu in Gongzhuling county. Tai county has the smallest land endowment. Its average productive investment per household was 327 yuan, which was about two-thirds of that in Jurong county and about one-third of Gongzhuling's investment. Although the average farm size in Jurong county is about 1.5 times as large as in Tai county, it is already too small for a household to independently own a draft animal or tractor. Therefore, the ownership

arrangements in Jurong county differ from those in Gongzhuling county. In general, tractors or draft animals are separately owned by independent households in Gongzhuling county. In Jurong county, on the contrary, they are jointly owned by several households. Joint ownership overcomes the issue of small farm size. Nevertheless, it creates other problems. Farmers may not have the appropriate incentives to take good care of the jointly owned buffaloes or tractors. This incentive issue will be more serious in Tai county than in Jurong county because the farm size is smaller in Tai county. This may explain why no households in Tai county invested in tractors and only 6 households owned buffaloes.

VIII. IMPLICATIONS FOR FUTURE ANALYTICAL WORK

1. Stylized Facts

Several major stylized facts emerge from our preliminary analysis of the three survey counties of Gongzhuling, Jurong and Tai. First, it is found that for these three countries, the formal and informal credit markets are quite segmented and cannot in general be considered effective alternatives for each other from the point of view of the potential borrower. In the first place, the formal loans are restricted as to purpose -- primary for the financing of production and not available for other personal or consumption uses. In the second place, the formal loans generally have a very short maturity -- approximately equal to the length of the production cycle. In the third place, the informal loans are almost always tied to largely exogenous, lumpy and highly visible special consumption purposes such as funerals and weddings or investment purposes such as construction of new housing. As such they cannot be easily diverted for other uses without detection by the informal lenders who are typically relatives and friends of the borrowers. Moreover, the fact that no interest is generally charged on these informal loans is further indicative of the non-profit nature of these informal loans which confers upon the informal lenders the moral authority to assure that they are used for their intended purposes. As a result, the informal loans are almost always used directly as intended and consequently do not normally increase the net liquidity available to the farm household for production purposes.

Given the lack of anonymity in the informal credit market (and indeed, in even the formal credit market) and the general geographical immobility of the potential borrowers, informal loans are really not good

substitutes for formal loans and vice versa. Households that are constrained in the formal credit market, that is, whose demands for production credit cannot be met there, cannot expect to have their unmet demands satisfied in the informal credit market. Likewise, households that are constrained in the informal credit market cannot expect to have their unmet consumption credit demands satisfied in the formal credit market. Thus, in the analysis of production behavior of the agricultural households in the three study counties in China, it is justifiable to assume that the formal and informal credit markets are not interrelated and that the volume of informal credit for a farm household, to the extent that it has an effect on farm production, say, through some risk preference on the aggregate volume of outstanding debt of the household, may be regarded as exogenously determined. This finding has important implications on the analytical work because it allows us to use the much simpler single market disequilibrium model rather than the dual market disequilibria model in our analysis of the data from Gongzhuling county. It is quite different from our expectations as we have originally formulated a dual market disequilibria model similar to the one employed by Bell, Srinivasan and Udry (1988).

Second, a significant proportion of farm households in Gongzhuling county, almost 80 percent, were actual borrowers from the formal credit market. By contrast, the corresponding proportion are 12.5 percent for Jurong county and 24 percent for Tai county. However, approximately 35 percent of farm households in Gongzhuling reported being constrained by credit, compared to 11.5 percent for Jurong county and 25 percent for Tai county. The relatively low proportion of households in Jurong county reporting being constrained by credit makes it necessary for use to pool the sample of households from both Jurong and Tai counties.

Third, there is little or no variation in the rates of interest paid by the borrowers on their formal loans, regardless of amount and credit standing of the borrower.

Fourth, for various reasons as discussed in previous sections, there is very little hired labor (although significant exchange labor in Jurong and Tai counties) and very little land subleasing, either in or out. Land under operation may therefore be also considered to be predetermined to the farm household in our analysis.

Fifth, a significant proportion of farm households in Jurong county, and to a lesser extent in Tai county, are constrained by the supply of chemical fertilizers, and by other purchased inputs such as diesel fuel, herbicide and pesticide. This observation also has important implications for the analytical work because it requires us to consider the possible simultaneous disequilibria of both the formal credit and the input markets. For example, a farm household might have reported that it was not credit-constrained precisely <u>because</u> it was constrained by the supply of one of the inputs. Thus, additional credit does the farm household no good. However, this does not necessarily mean that if the supply of the input were increased, output would have been increased, because then the farm household might find itself to be credit-constrained. Since chemical fertilizer was by far the most important purchased input in terms of expenditure, we shall focus on only chemical fertilizer in our analysis of the input-supply constraint for the Jurong and Tai countries.

Sixth, non-farm activities can be an important source of liquidity as well as an important end use for credit. They were especially important in Jurong and Tai countries, accounting for almost 50 percent of the incomes. The dominant portion of the income came from non-farm employment,

which was more likely to provide additional liquidity than to use additional credit. However, a significant portion of the income also came from non-farm business activities, which might increase the net demand for credit. In any case, income from non-farm activities cannot be considered exogenous because it affects not only the formal credit demand and possibly supply but also the utilization of labor and other inputs in farm production. It should be considered as an endogenous variable to be determined simultaneously with the other endogenous variables.

Definition of Credit-Constrained

A farm household is said to be credit-constrained in the formal credit market if its demand for formal credit is positive and greater than the supply of credit to it by formal financial institutions, in this case, by the agricultural bank and/or the agricultural credit cooperative. As unmet demand cannot be directly observed (recall that observed actual formal credit is the minimum of formal credit demand and formal credit supply), one can in general only infer whether a farm household is credit-constrained by comparing the credit demand and supply projected for that household from the econometrically estimated formal credit demand and supply functions. This approach, however, is not exact, and is subject to possibly large stochastic errors. Fortunately, unlike most other studies on credit, we have additional information on whether a farm household is credit-constrained obtained through direct questions addressed to the head of the farm household as to whether he had any problems in obtaining all the formal credit that he needed. This direct response information can be combined with the information on actual formal credit in the econometric

estimation of the formal credit demand and supply functions to obtain more efficient estimates.[13] (This case is sometimes referred to in the literature as the "known sample separation case). Alternatively, this information can be used to provide a test as to the degree of correspondence between the survey responses by and the econometric predictions for the farm households.[14] If it is determined that this type of direct questions provide informationally meaningful responses, perhaps they can be more widely used, not only in surveys involving other credit markets, but in other markets in general.

The Important Policy Questions

The most important policy question that we hope to answer through an analysis of this set of data is, primarily: What is the effect, if any, of an increase in formal credit availability in rural China on agricultural production? For example, if the total supply of credit to Chinese agricultural households is increased by ten percent, what is the effect on the supply of agricultural output and the demands for agricultural inputs? And secondly: How are these effects enhanced or attenuated depending on the supply conditions of the other inputs, or on the opportunities for non-farm employment and business activities?

Of course, these are interesting questions only insofar as there are farm households in China which are at least potentially credit-

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13/ This, to the best of our knowledge, has not been attempted before.

14/ This, to the best of our knowledge, has also not been done before.

constrained. If there is no evidence that Chinese farm households are credit-constrained at all, there is no point in pursuing this analysis further. However, we do find a significant proportion of households in our three study counties reporting that they were credit-constrained, and the proportion might well have been larger had some farm households not been input supply-constrained. It is therefore meaningful to ask what will happen if appropriate policy measures are undertaken so that the credit constraints can be alleviated for these households.

The answers to these questions are critically important to the formulation of an effective agricultural credit policy (and program) in China. Whether it is worthwhile for the Chinese government to attempt to alleviate the credit constraint problem in the rural areas depends on the benefits that the removal of such credit constraints will bring. Our analysis provides the tools and parameters with which these benefits and costs can be estimated and evaluated. In addition, it also throws light on how the evaluation may change depending on the underlying conditions in the other input markets that may differ from county to county and from household to household. It will thus be directly useful at the operational level as well.

Identification and Estimation of Credit Demand and Supply Functions - Credit Market Disequilibrium Only

In order to estimate and evaluate the effect of the removal of the formal credit constraint, it is necessary to separately identify and estimate the formal credit demand and supply functions. Formal credit demand may be assumed to be a function of the characteristics of the head

of the household, including age, education and sex, the level of liquidity (as perceived and known to the household), the level of total indebtedness, the quantity of land under operation (quality adjusted if possible), the quantity of productive capital, the quantity of potential labor, and the township or village dummy variables. Formal credit supply may be assumed to be a function of the characteristics of the head of the household, the levels of total and different types of ascertainable financial assets, the level of total indebtedness, the quantity of capital and land, the level of past total income, previous loan experience, and whether anyone in the household had an official position either in the government administration or in the party. (Recall that the rate of interest is constant in nominal terms).

Identification of the formal credit demand and supply functions depends on the existence of variables which affect demand and not supply and also variables which affect supply but not demand. In addition, there must be at least a significant proportion of households with positive actual formal loans. If actual formal loans are all zero, then it is impossible to identify separately the credit demand and the credit supply functions. Finally, there must be at least a significant proportion of households with positive actual formal loans that reported being credit constrained as well as those that reported not being credit constrained. Otherwise, one can only estimate one of the two functions but not the other. For example, if no one household reported being credit-constrained, then credit supply must have been greater than credit demand for every household with a positive credit demand. This means that all the observed actual formal loan amounts lie on the credit demand function. Thus the credit demand function can be estimated but the credit supply function cannot be identified.,

The Problem of Cell Size

We have to treat Jurong and Tai counties differently from Gongzhuling county. In Gongzhuling, there were enough borrowers who reported being credit-constrained, approximately 60 out of 160, so that the formal credit supply as well as the demand functions can be identified. In Jurong, however, the number of borrowers who reported being credit-constrained was only approximately 13 out of 45, hardly enough to allow the estimation of all the parameters of the formal credit supply function. In Tai, the comparable number was 13 out of 65, again hardly enough to allow the estimation of all the parameters of the formal credit supply function. Since the two counties are geographically proximate to each other and have other similar characteristics, it was decided that the data from the two counties will be pooled in the analysis, but allowing county-specific dummy variables whereever appropriate.

The Method of Estimation

The method of estimation is by maximum likelihood. Under the assumption of a bivariate normal distribution of the stochastic disturbance terms of the formal credit demand and supply functions, a likelihood function for the sample (consisting of either Gongzhuling county or Jurong and Tai counties) is maximized, using a variant of the Davidson-Fletcher-Powell method. There are still, however, technical problems with implementing this method of estimation, and various alternatives are being pursued.

The addition of output Supply and Input Demand Functions

It is possible to improve the efficiency of our estimators by making use of the fact that depending on whether the household is credit-constrained, the farm household will behave differently in terms of both output supply and input demand. For example, the response of the output of farm household to an increase in the number of adults (labor power) in the household may well depend on whether the credit constraint is binding. This may be modeled by specifying the joint distribution of the stochastic disturbance terms of not only the formal credit demand and supply functions but also the reduced form output supply and input demand functions as multivariate normal, conditional on whether the household is credit-constrained. This approach, which enhances the separation of the sample, appears to be new.

In addition, it is possible to use a structural form approach, that is, to make explicit assumptions about the form of the production function of the household and to derive a set of interrelated output supply and input demand functions, conditional on whether the farm household is credit-constrained or not. The principal advantages of the structural form approach are that it reduces the number of unknown parameters to be estimated and enables a more straightforward interpretation of the results. The principal weakness of the structural form approach is that it depends on the specific functional forms that we assume and in particular on the degree of risk-aversion of the farm households. If farm households are not risk neutral, as they most likely are not, then the derived structural form is no longer simple, even though it may still be feasible to implement a linearized or logarithmic linearized approximation.

Simultaneous Identification and Estimation of Credit and Fertilizer Demand and Supply Functions - Credit and Fertilizer Market Disequilibria

An additional complication arises from the fact that while the farm households in Gongzhuling are generally not input-supply constrained, many farm households in Jurong and Tai counties reported themselves to be input-supply constrained in addition to or instead of being credit-constrained (See Table 4.14). This complication requires the formulation of a statistical model with two interrelated disequilibrium markets. Our current thinking is to rely heavily on the structural form and to make use of those restrictions in the estimation process. Simplifying assumptions based on the sequentiality of credit and input decision will be explored. As mentioned earlier, only constraints in chemical fertilizer supply will be considered.

Simulating the Effects of the Removal of the Credit Constraint

At the conclusion of our estimation, we shall estimate the effect of alleviating the credit constraint. We shall perform this exercise by hypothetically raising the formal credit supply function by, say, 10 percent across the board. We shall then calculate the effect on output supply and on input demand for each household and adding them together for the whole sample. There are of course other ways of simulating an increase in overall credit availability; for example, one may assume that the government attempts to allocate the additional credit to those households with the highest use for credit. In order to do the latter, however, the government needs to possess a degree of information and practice a degree of discrimination that do not seem likely. Of course, an increase in formal credit availability may be simulated in many different ways.

Long-Term Credit

We have discussed only credit over the production cycle, or credit for working capital. We have not discussed the availability of long-term credit, which is necessary to finance fixed investment. Our survey of the three counties indicate that long-term credit is generally not available from the formal financial institutions. We also suspect that short-term credit cannot be easily rolled over indefinitely so that it becomes de facto long-term credit, although this remains to be more thoroughly investigated. In order to analyze the long-term investment behavior of the households, it will be necessary to look at the time-series information on the approximately half of our sample households that are included in the Chinese national probability sample.

Record Removal Notice

The World Bank Group Archives & Records Management

File Title	Barcode No.
Rural Credit Markets, Investments and Agricultural Productivity in China (RPO # 674-34) - 1v	1447676

Document Date	Document Type	
November 5, 1987	Form	

Correspondents / Participants
Phi Anh Plesch

Subject / Title
The World Bank/IFC Budget Transfer Request

Exception(s)
Personal Information

Additional Comments

The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information or other disclosure policies of the World Bank Group.

Withdrawn by	Date
Shiri Alon	April 19, 2017

THE WORLD BANK/INTERNATIONAL F NCE CORPORATION

OFFICE MEMORANDUM

DATE November 3, 1987

TO Messrs. G. Edward Schuh, Director, AGR and
S. J. Burki, Director, AS3

FROM Dennis de Tray, Chairman, REPAC

EXTENSION 33480

SUBJECT Research Proposal: "Rural Credit Markets, Investments and Agricultural Productivity in China"

1. Thank you for your October 28 memorandum indicating your acceptance of the conditions attached by REPAC to its funding of the above proposal.

2. The project's identification code and financial authorization for Phase I are now issued as follows:

i)	Identification Code	674-34
ii)	FY88 Authorization	$98,000
iii)	Total Authorization	$98,000

Please use the identification code in all financial documents and other correspondence related to this project, including letters of appointment to consultants.

3. While the project is jointly sponsored by AGR and AS3, I understand that AGR is responsible for its financial management and overall supervision.

4. The closing date of this project is tentatively set for October 30, 1989, assuming the tranching of the work in two phases will not cause any delay beyond the originally scheduled completion date stated in the proposal. If necessary, it will be revised when and if REPAC approves funding for Phase II.

PAP/ea

cc: Messrs./Mmes. G. Feder, A. Braverman, B. McLaughlin, AGR
R. Deshpande, A. Ody, J. Goldberg, B. Merghoub, AS3
S. Panickaveetil, M. Tonson, PBD
J. Fernandez, K. Hannemann, CTR
S. Thavamoney, OPN
A. Aiyar, V. Mataac, B. Ross-Larson, PPR
REPAC Members

THE WORLD BANK/INTERNATIONAL F' NCE CORPORATION

5-13-135

OFFICE MEMORANDUM

DATE: October 28, 1987

TO: Mr. Dennis de Tray, Chairman, REPAC

FROM: Messrs: G. Edward Schuh, Director, AGR and S. J. Burki, Director, AS3

EXTENSION: 37500 and 72571

File

SUBJECT: **Research Proposal: "Rural Credit Markets, Investment and Agricultural Productivity in China"**

In response to your memorandum of September 29th regarding the approval of the above proposal, we would like to confirm the acceptance of the conditions set out in the memorandum. The enclosed budget describes expected expenses for the two phases of the study.

cc. Messrs: Braverman, Feder (AGRAP); Merghoub, Ody (AS3CO); Goldberg, Deshpande (AS3AG).
Mrs. Plesch (PPR)

Phi Anh -
Does this look okay?
D

Record Removal Notice

The World Bank Group Archives & Records Management

File Title	Barcode No.
Rural Credit Markets, Investments and Agricultural Productivity in China (RPO # 674-34) - 1v	1447676

Document Date	Document Type	
N/A	Budget	

Correspondents / Participants

Subject / Title
Study of Rural Credit Markets, Investment and Agricultural Productivity in China

Exception(s)
Personal Information

Additional Comments

The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information or other disclosure policies of the World Bank Group.

Withdrawn by	Date
Shiri Alon	April 19, 2017

190ct87

To: Oktay Yenal

From: Dennis de Tray (3-3480)

Oktay:

Re: Mr. Goldberg's concerns about the China/AGR proposal on rural credit. The China department's cosponsorship of this proposal (see attached cover sheet) was the main reason we rushed it through and approved it in the face of several unresolved issues raised by reviewers. In particular, China's involvement led us not to push the policy relevance issue raised by at least one reviewer. I'm thus a little puzzled to read that at least one of those who signed off on the proposal has serious reservations about the usefulness of the study. I agree in principle with Mr. Goldberg that the project should take advantage of changing conditions, but I worry that he sees it as a substitute for ESW, which, of course, it can never be.

I would be more than glad to sit down with you and the other principals and discuss any concerns at your convenience. Independent of that I would also appreciate a chance to hear your views on research at the Bank and how its value can be improved. Perhaps we can get together for coffee in the not too distant future.

Dennis

FORM NO. 710
(10-83)

THE WORLD BANK

ROUTING SLIP	DATE October 16, 1987

FROM THE OFFICE OF THE
REGIONAL VICE PRESIDENT

NAME	ROOM NO.
Mr. Dennis de Tray	S13-135

	APPROPRIATE DISPOSITION		NOTE AND RETURN
	APPROVAL		NOTE AND SEND ON
	COMMENT		PER OUR CONVERSATION
	FOR ACTION		PER YOUR REQUEST
	INFORMATION		PREPARE REPLY
	INITIAL		RECOMMENDATION
	NOTE AND FILE		SIGNATURE

REMARKS Re: CHINA: Proposed PPR Research Study
Rural Credit Markets

I hope Mr. Goldberg's very valid concerns are taken seriously and the project design modified. I would like to follow up after Mr. Goldberg has discussed the issue with Mr. Feder.

Reply in d-oktay

Thanks

cc: Goldberg

FROM

O. Yenal OY

THE WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

Mr. Yenal
- Phi Anh
- file

DATE: October 14, 1987

TO: Mr. Shahid Javed Burki, Director, AS3

why did Burki co-sponsor?

FROM: J. Goldberg, Chief, AS3 JG

EXTENSION: 72445

SUBJECT: CHINA - Proposed PPR Research Study of Rural Credit Markets, Investment, and Agricultural Productivity in China

1. As you know, I have been somewhat concerned that the subject study might take an excessively academic direction (e.g. in establishing that convexity assumptions underlying Slutsky-type equations are actually observed in the behavior of informal rural credit markets in China), perhaps to the extent that the eventual results would be of greater interest to the US/UK academic community than to those of us attempting to assist the actual process of political economic reform in China. If such were the case, three highly qualified economists (Professors Larry Lau and Justin Lin, and Mr. Feder, the Task Manager) would have devoted much of their effort to a small matter while the most momentous events in the field of economic development in the last four decades occur around them, without their involvement. The waste of these resources, particularly when compared to those available for the actual design of rural reforms, would be unfortunate. Also unfortunate would be the diversion of staff of the Research Center for Rural Development, virtually all of whom are responsible for designing, organizing, and lobbying for specific reform experiments in specific locations. This practical reform work will have total priority, both in China and in our departmental agricultural work, over the next eight months. I say this here both to express my concern and to emphasize to PPR the incredible opportunity which is now available to contribute to shaping monumental events.

not research, however

2. Given the above, we support Phase I of the study. The surveys planned appear to be addressing rural credit and rural financing issues on which hard field data are negligible. One of the four surveys will now be directly sited in one of the pilot reform areas which we hope to support under a Rural Sector Adjustment Loan; two others (in Jiangsu) will be sited in or near coastal areas which may be included in the pilot reform areas, or at least will be similar to coastal areas finally selected.

pre-project wk

3. Upon Mr. Feder's return from China, we would like to review with him both the issues he intends to investigate on the basis of those surveys and the methodology to be employed. We have already requested Mr. Klaus Berg of the Asia Technical Department, who has managed Bank support for rural credit activities in virtually every region of the world, to review

the original proposal and REPAC panel comments, to assess and hopefully make comments to improve the overall operational usefulness of the study. We hope to achieve an amicable consensus with Mr. Feder on this question by next month, which would in turn determine the design of Phase II.

4. When this study was initiated, there was no Bank involvement in, and hardly any knowledge of, the proposed program for the second stage of rural reform in China. This has changed, with your and Mr. Qureshi's September visit, and the collaboration established in the wake of that visit. I'm sure the PPR managers, staff, and consultants involved will wish to seize this chance to tailor their work in China over the next year or two to this opportunity. We certainly need their help.

cc: Messrs. Yenal, Tidrick, Braverman, Feder (o/r), Burcroff, Berg, Wickrema, Deshpande (o/r)

ap

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

DATE September 29, 1987

TO Messrs. G. E. Schuh, Director, AGR
S. J. Burki, Director, AS3

FROM Dennis de Tray, Chairman, REPAC

EXTENSION 33480

SUBJECT Research Proposal: "Rural Credit Markets, Investment and Agricultural Productivity in China"

1. This proposal was considered by a REPAC subcommittee whose views and recommendations were subsequently endorsed by the other members of REPAC. This special procedure was adopted as the only feasible means of achieving consensus on this proposal under the time constraints faced by the proposal sponsors. The subcommittee has benefited from comments of four reviewers whose reports are attached.

2. The subcommittee noted there was unanimous agreement among the reviewers that i) research in the proposed area has considerable merit as it attempts to fill a gap and address important issues which are currently of great interest to both the Bank and Chinese policymakers; ii) the project is supported by a highly qualified research team; and iii) the active collaboration of the Chinese Research Center for Rural Development should be valuable both to the project and to all parties involved. Being jointly sponsored by AGR and the China Department, the project also benefits from strong regional support and staff participation.

3. The reviewers, however, raised a number of questions on various aspects of the proposal which they urged should be addressed in the research. Some questions related to the sampling procedures, others to the model specifications. Institutional issues particular to the context of China were also brought up. There were questions about the availability of existing data and information, about the size of the survey sample, the tight scheduling of the work, and so on. These issues and concerns are laid out in more detail in the reviewers' reports.

4. After weighing all the above considerations and consulting with the sponsors on a phased approach to the work, the subcommittee has recommended that the proposal be approved for full funding (i.e., $169,600 as requested) subject to the following conditions:

i) The research be conducted in two phases. Phase I would consist of the field visits and data collection work followed by a preliminary descriptive analysis that would test the validity of the data and model.

ii) At the end of Phase I, the sponsors undertake to organize a workshop to discuss initial results and to rethink the analytical framework and econometric modeling required for subsequent analysis. They will report to REPAC on the findings of Phase I and on the outcome of the workshop.

iii) REPAC will then decide on whether and how to proceed with Phase II.

5. If the above conditions are acceptable to you and the sponsors, and upon submission of the budget for each of the two phases within the total authorization limit of $169,600, REPAC will issue the financial authorization and an identification code for the project.

PAP/ea

cc and cleared with: Mr. D. W. Hopper, SVPPR

cc: Messrs. G. Feder, A. Ody, R. Deshpande,
A. Braverman, B. Merghoub, J. Goldberg
REPAC Members

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

DATE September 24, 1987

TO REPAC Members

FROM Phi Anh Plesch, Secretary, REPAC PAP

EXTENSION 31063

SUBJECT Research Proposal: "Rural Credit Markets, Investment and Agricultural Productivity in China"

Please refer to my memorandum of September 9 explaining the reasons for the special procedure being applied to this proposal. Enclosed is the draft decision memorandum based on the REPAC subcommittee's views and recommendations made earlier. Please call me as soon as possible to let me know whether you approve or do not approve these recommendations.

Thank you.

THE WORLD BANK/INTERNATIONAL F. .NCE CORPORATION

OFFICE MEMORANDUM

DATE September 24, 1987 DRAFT

TO Messrs. G. E. Schuh, Director, AGR
S. J. Burki, Director, AS3

FROM Dennis de Tray, Chairman, REPAC

EXTENSION 33480

SUBJECT Research Proposal: "Rural Credit Markets, Investment and Agricultural Productivity in China"

1. This proposal was considered by a REPAC subcommittee whose views and recommendations were subsequently endorsed by the other members of REPAC. This special procedure was adopted as the only feasible means of achieving consensus on this proposal under the time constraints faced by the proposal sponsors. The subcommittee has benefited from comments of four reviewers whose reports are attached.

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aspects of the proposal which they urged should be addressed in the research. Some questions related to the sampling procedures, others to the model specifications. Institutional issues particular to the context of China were also brought up. There were questions about the availability of existing data and information, about the size of the survey sample, the tight scheduling of the work, and so on. These issues and concerns are laid out in more detail in the reviewers' reports.

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5. If the above conditions are acceptable to you and the sponsors, and upon submission of the budget for each of the two phases within the total authorization limit of $169,600, REPAC will issue the financial authorization and an identification code for the project.

PAP/ea

cc: Messrs. D. W. Hopper, SVPPR
G. Feder, A. Ody, R. Deshpande,
A. Braverman, B. Merghoub, J. Goldberg
REPAC Members

September 18, 1987

Marcelo:

Dennis told me that you are still on REPAC. Hurrah! I am truly glad to learn this. But, because I thought that you had effectively resigned, I did not send you this proposal, now under consideration by a subcommittee. I apologize and rush to send you the relevant documents. My September 9 memo to REPAC members explains the exceptional procedures being applied to this proposal. I shall contact you as soon as the subcommittee arrives at its final recommendations.

Best regards,

Phi Anh Plesch

THE WORLD BANK/INTERNATIONAL F. NCE CORPORATION

OFFICE MEMORANDUM

DATE September 17, 1987

TO Messrs. Vittorio Corbo (LA2CO) and I. J. Singh (AS3IF)

FROM Phi Anh Plesch, Secretary, REPAC PAP

EXTENSION 31063

SUBJECT Research Proposal on "Rural Credit Markets, Investment and Agricultural Productivity"

The sponsors of the proposal which you discussed yesterday have indicated that there are problems with phasing the data collection work in the manner you recommended because of the seasonality issue (see Gershon Feder's note in attachment). They have already prepared a draft questionnaire (also attached) which they intend to test with a panel of some 40-50 households randomly chosen in one province just prior to the full survey (i.e., mid-October). The questionnaire is said to be quite comprehensive in terms of data coverage. Gershon will be present in China for the revision phase following the pilot testing of the questionnaire. They argue that phasing the work as the subcommittee envisaged would lengthen the study by one year and significantly increase its cost.

The alternative they would suggest is to maintain the original data collection schedule and scope. As originally described in the proposal, the first analytical thrust is to generate stylized facts based on field visits and data tabulations and to get better understanding of the situation. They undertake to organize a workshop to discuss the preliminary results and to assess the suitability of rethinking or improving the analytical and econometric approaches and the requirement for additional data, if any. REPAC and other colleagues (inside and outside the Bank) will be invited to the workshop. This alternative they say may not involve any extra cost relative to the original proposal, if it turns out that the original design is satisfactory. Should changes be required, the extra cost involved (in both cash and time) would be less than the option you recommended.

Regarding the availability of existing data, they say that the existing household surveys do not offer a comprehensive and consistent set of data that will tie together credit, input use and production. Thus the need for the proposed larger scale survey, even for the purpose of stylized facts.

Regarding the issue of access, the sponsors assured that RCRD staff have done provincial data collection work before. It is part of their mandate for which they have strong political backing.

In light of the above issues, you might wish to consider the merits of the phasing suggested by the sponsors as compared to the phasing recommended by you at yesterday's meeting. Let me know your reactions by telephone and I shall try to get in touch with Dennis in Canada in the next two days. Or if you prefer the subcommittee to meet again, I can schedule the meeting for next Monday.

cc: D. de Tray (O/R)

Attachments

G. Feder

POSSIBILITIES AND IMPLICATIONS OF PHASING DATA COLLECTION WORK IN THE PROPOSED STUDY OF RURAL FINANCIAL MARKETS IN CHINA

1. General

a. Surveys were planned for end of October and the months of November and December because this coincides with the immediate post-harvest period of the summer/fall season (wheat season) in central and north China. From our experience this is the best time for collection of data about input and credit used during the season and output harvested. The following season (winter/spring) is relatively minor and involves less intensive cropping. Our focus is on the main season. Pilot testing of questionnaires was planned for mid-October. The usual practice is to interview some 40-50 farmers (4 days work) using the draft questionnaire, and revise the questionnaire design if situations or patterns not envisaged at the outset are detected.

b. A draft questionnaire has already been prepared in July and has been ~~received~~ viewed by the Chinese collaborators. Programming for fast data entry and processing has been completed, and a programmer from RCRD has been specifically trained in AGR during end August/September.

c. Four separate samples of about 200 households each in four provinces are planned. This is designed to provide insights on possibly different situations in different agro-climatic environments.

2. Possibilities for Phasing

Other than the pilot testing of questionnaires mentioned in 1b. above, the only possibility for phasing data collection is surveying one province in the harvest period for the present summer/fall season, and the rest in the harvest period for the following summer/fall season (November 1988). It is not practical to obtain detailed information on the present summer/fall season after farmers have already undertaken major activities for the subsequent winter/spring season. It is not worthwhile to focus on the minor winter/spring season.

3. Implications of Phasing

a. Study period will be extended by one year.

b. Amount of staff and collaborator time required will increase considerably (by at least 50%). It takes practically the same time to tabulate data from one province or four provinces when it is done at once. It takes double time when it is done in two separate batches.

c. Cash cost (consultants, travel, computer time) will also increase substantially (about 50%, i.e., about $50,000).

4. Alternatives

Maintain the original data collection schedule and scope. Suppose field visits and initial analytical work indicate unexpected additional data requirements or unanticipated scenarios which necessitate rethinking of the analytical approach and additional data. These supplementary resurvey can be undertaken during the first half of 1988. The extra cost of supplementary survey and other associated costs will be significantly less than those of the phasing option in 3 above, and the study time will be extended by only six months.

6/19/87

FINANCIAL MARKETS, INVESTMENT AND PRODUCTIVITY IN RURAL CHINA

Farmer Questionnaire

INTERVIEWEE'S NAME: INTRNAME DATE: DATE
(Interviewee should be the Household Head, or the one actually managing farming operations).

ADDRESS: ADDRESS

PART I: IDENTIFICATION

SURVEY NO.	1	1			SURVEYNO
PROVINCE:	2				PROVINCE
COUNTY:	3				COUNTY
TOWNSHIP:	5				TOWNSHIP
VILLAGE:	7				VILLAGE
HOUSEHOLD NO.:	9				HHNO
CARD NO.:	12	0	0	1	CARD01

ENUMERATOR'S NAME: ENUMNAM

SUPERVISOR'S NAME: SUPERNAM

PART II: FAMILY BACKGROUND

THE FOLLOWING QUESTIONS TO BE ADDRESSED TO THE HOUSEHOLD HEAD ONLY. (THE HOUSEHOLD HEAD IS THE PERSON MAKING THE MAIN DECISIONS ON FARMING OPERATIONS).

Name of Respondent: HEADNAME
(Should be the decision maker of this farm).

2.1 Age of respondent. AGE 15 ☐☐

2.2 Number of years of education. EDUHEAD 17 ☐☐

2.3 How many males between the ages of 14 and 65 are in the household (including the respondent). NMALES 19 ☐☐

2.4 How many females between the ages of 14 and 65 are in the household (including the respondent, if the decision maker is female). NFEMALES 21 ☐☐

2.5 How many children (males and females) under the age of 14 and old people over the age of 65 are in the household. NCHILD 23 ☐☐

2.6 Are you a member of:

(a) Cooperative Credit Group (Yes = 1, No = 2) MEMBCOOP 25 ☐

(b) Informal Credit Group (Yes = 1, No = 2) MEMBINFR 26 ☐

2.7 How many years of experience in agriculture do you have. YEARSEXP 27 ☐☐

2.8 Have you ever managed a private farm before the household responsibility system. (Yes = 1, No = 2) PRIVFARM 29 ☐

If the answer to Q 2.8 is "No", go to Q 2.10
If the answer to Q 2.8 is "yes" ask Q 2.9.

2.9 How many years of experience on managing private farm? _____ years. YRSPRIVF 30 ☐☐

2.10 Have you ever been a production-team leader or brigade leader? LEADER 32 ☐
(Yes = 1, No = 2)

If the answer to Q 2.10 is "No", go to Q 2.12 If the answer to Q 2.10 is "yes" ask Q 2.11

2.11 How many years of experience as leader did you have? _____ years. YRSLEADR 33 ☐☐

2.12 Have you or any member of your immediate family ever been a cadre in the production team, brigade, commune or other government branch? CADREMEM 35 ☐
(Yes = 1, No = 2)

2.13 How long have you been taking the major responsibility for managing this farm? _____ years. YRSMANAG 36 ☐☐

2.14 How much land did you operate when you started taking responsibility for this farm _____ mu. OPBFLAND 38 ☐☐

2.15 How much land have you operated this season ____ mu. OPLAND 40 ☐☐☐

PART III LAND TENURE PERCEPTIONS

3.1 How likely is it, do you think, that the plots contracted to you will be reallocated before the contract expires? 43 ☐ REALLOC

(a) Very likely (Code = 1)
(b) Likely (Code = 2)
(c) Little likely (Code = 3)
(d) Unlikely (Code = 4)

3.2 How likely is it, do you think, that the same parcels of land contracted to you will be allocated to you again after the contract expires? 44 ☐ ALLOCATE

(a) Very likely (Code = 1)
(b) Likely (Code = 2)
(c) Little likely (Code = 3)
(d) Unlikely (Code = 4)

3.3 Have you ever experienced disputes over land boundary? (Yes = 1, No = 2) DISPUTE 45 ☐

3.4 Would you prefer to have your parcels of land consolidated into a smaller number of parcels (say 3-5)? (Yes = 1, No = 2) SMPARCEL 46 ☐

If the answer to Q 3.4 is "No", go to Q 3.6
If the answer to Q 3.4 is "yes" ask Q 3.5

3.5 Is it possible to consolidate plots by voluntary exchange (Yes = 1, No = 2) VOLEXCH 47 ☐

3.6 Would you like to have the current contract to be extended to a longer period? (Yes = 1, No = 2) EXTCONTR 48 ☐

If the answer to Q 3.6 is "No", go to Q 3.8
If the answer to Q 3.6 is "Yes" ask Q 3.7

BENEFIT

3.7 What, in your view, is the most important benefit of a longer contract? 49 ☐

(a) Facilitating investment in land improvements (Code = 1).

(b) Can use it as security to get meore credit (Code = 2).

(c) Easier to lease land in and out (Code = 3).

(d) Other (Code = 4).

Now go to Q. 4.1

OPPOSE

3.8 What is the main reason that you oppose the extension of the current contract duration? 50 ☐

(a) The land/labor ratio in my family is too small (Code = 1).

(b) The quality of the land assigned to me is lower than the average (Code = 2).

(c) Reallocation of plots will enable consolidation (Code = 3).

(d) Other (Code = 4).

PART IV: PUBLIC INFRASTRUCTURE

4.1 Have you or members of your family participated in any communal road repair activity since 1983? (Yes = 1, No = 2)

PARTIROD 51 ☐

4.2 Have you or members of your family participated in any communal repair or maintenance of irrigation canal since 1983? (Yes = 1, No = 2)

PARTICAN 52 ☐

4.3 Do you think that the quality of roads in your area has changed since the introduction of the household responsibility system? (Yes = 1, No = 2)

ROADIMP 53 ☐

If the answer to Q 4.3 is "No", go to Q 4.5
If the answer to Q 4.3 is "yes" ask Q 4.4

4.4 In what way has the quality of roads changed?

ROADCHNG 54 ☐

(a) Roads have deteriorated (Code = 1)

(b) Roads have improved (Code = 2)

4.5 Do you think that the quality of canals or other irrigation facilities in your area has changed since the introduction of the household responsibility system? (Yes = 1, No = 2)

CANLCHNG 55 ☐

4.6 In what way has the quality of canals or irrigation infrastructure changed?

CANLIMP 56 ☐

(a) Canals and irrigation infrastructure deteriorated (Code = 1)

(b) Canals and irrigation infrastructure improved (Code = 2)

PART V: NON-PRODUCTIVE ASSETS

5.1 Consumer durables: Did you have, and do you have now, the following items:

	Now	1983
Television (Number owned)	TELEVNOW 57☐	TELEVBEF 58☐
Radio/tape (Number owned)	RADIONOW 59☐	RADIOBEF 60☐
Bicycle (Number owned)	CYCLENOW 61☐	CYCLEBEF 62☐
Sewing machine (Number owned)	SEWNOW 63☐	SEWBEF 64☐
Watch (Number owned)	WATCHNOW 65☐	WATCHBEF 66☐
Electric fan (Number owned)	FANNOW 67☐	FANBEF 68☐

5.2.1 Housing

		Now	1983
Quality: (i) Roof type:	Tin (=1), Tile (=2), Concrete (=3), Straw (=4)	ROOFNOW 69☐	ROOFBEF 70☐
(ii) Floor type:	Concrete (=1), Wood (=2), Earth (=3)	FLOORNOW 71☐	FLOORBEF 72☐
(iii) Wall type:	Brick (=1), Concrete (=2), Mud (=3), Other (=4)	WALLNOW 73☐	WALLBEF 74☐

5.2.2 Since 1983, did you improve the quality of your house? (Yes = 1, No = 2) 75☐ HOUSEIMP

> If the answer to Q 5.2.2 is "No", go to Q 6.
> If the answer to Q 5.2.2 is "yes" ask Q 5.2.

5.2.3 How much money did you spend on improving your house. (Yuan) 76☐☐☐☐☐ COSTIMP

Duplicate "IDENTIFICATION" (Columns 1-11) Card No. 12 002 CARD02

PART VI: PRODUCTIVE ASSETS

LET US TRY TO RECALL WHAT ASSETS YOU HAD IN 1983.

ATTENTION: THIS MAY BE DIFFERENT FROM WHAT THE FARMER OWNS AT PRESENT.

6.1 INITIAL ASSETS

6.1.1 EQUIPMENT	VALUE IN THOUSANDS YUAN IN 1983	
(i) Tractor - 4 wheel (big) (25 hp or above)	15	ITRACTBV
(ii) Tractor - 4 wheel (small) (below 25 hp)	18	ITRACTSV
(iii) Tractor - 2 wheel	21	ITRACT2V
(iv) Water Pump	24	IWATPUMV
(v) Engine Sprayer	27	IENGSPRV
(vi) Motorcycle	30	IMOTCYCV
(vii) Cart (Bian Che) One wheel/two wheel	33	ICARTIWV
(viii) Thresher	36	ITHRESHV
(ix) Cart for two-wheel tractor	39	ICART2WV
(x) Any other tools	42	IOTTOOLV

6.1.2

ANIMALS		VALUE IN YUAN OF 1983	
(i)	Buffaloes (Adult)	45	IBUFFALV
(ii)	Oxen (Adult)	50	IOXENV
(iii)	Other draft animals (Donkey, Horse, etc)	55	IDRAFTV
(iv)	Other animals (Pigs, Chickens, etc.)	60	IOTANMLV

6.2 PRESENT PRODUCTIVE ASSETS (At the time of interview).
LET US NOW REVIEW YOUR CURRENT ASSETS.

Duplicate: "IDENTIFICATION" (Columns 1-11) Card No. 12 003 CARD03

6.2.1	EQUIPMENT		PRESENT VALUE (IN 1,000 YUAN)		BOUGHT HOW MANY YEARS AGO	
(i)	Tractor - 4 wheel (big)	PTRACTBV	15		18	PTRACTBY
(ii)	Tractor - 4 wheel (small)	PTRACTSV	19		22	PTRACTSY
(iii)	Tractor - 2 wheel	PTRACT2V	23		26	PTRACT2Y
(iv)	Water Pump	PWATPUMV	27		30	PWATPUMY
(v)	Engine Sprayer	PENGSPRV	31		34	PENGSPRY
(vi)	Motorcycle	PMOTCYCV	35		38	PMOTCYCY
(vii)	Cart (Bian Che) one/two wheel	PCARTV	39		42	PCARTY
(viii)	Thresher	PTHRESHV	43		46	PTHRESHY
(ix)	Cart for two-wheel tractor	PCART2WV	47		50	PCART2WY
(x)	Any other tools	POTTOOLV	51		54	POTTOOLY

VALUE IN YUAN

6.2.2 ANIMALS

(i) Buffaloes (Adult) 55 PBUFFALV

(ii) Oxen (Adult) 60 POXENV

(iii) Other draft animals (Donkey, Horse, etc) 65 PDRAFTV

(iv) Other animals (Pigs, Chickens, etc.) 70 POTANMLV

6.3 LAND PROPERTY

6.3.1 How many plots of land do you operate (including the home plot) 75 TOWNPLS

6.3.2 How many plots of land have you leased in this fall/summer season which just ended 77 TRENTPLS

6.3.3 How many plots of land have you leased out this fall/summer season? 78 TRENOPLS

6.3.4 How many plots of land have you cultivated this fall/summer season (including the home plot) 79 TCULTPLS

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PART VII: PLOT INFORMATION

LET US REVIEW THE PLOTS WHICH BELONG TO YOU OR WHICH YOU HAVE CULTIVATED THIS FALL/SUMMER SEASON, ONE BY ONE.

FIRST PLOT

7.1 Plot No. 15☐ PLOTNO

7.2 Plot Type (irrigated = 1; not irrigated = 2, home plot = 3) 16☐ PLOTTYPE

7.3 Area of plot _____mu. 17☐☐ PLAREA

7.4 Has this plot been allocated to you or to your family by the production team? (Yes = 1, No = 2) 19☐ PLOTALLO

If the answer to Q 7.4 is "Yes", go to Q 7.5
If the answer to Q 7.4 is "No" ask Q 7.8

7.5 Is this plot a "private plot" (Code = 1), a "food ration" plot (Code = 2), a "responsibility plot" (Code = 3) or any other plot (Code = 4) 20☐ PLOTKIND

7.6 Is this plot cultivated by you or by your family? 21☐ PLOTCULT

If the answer to Q 7.6 is "Yes", go to Q 7.9
If the answer to Q 7.6 is "No" go to Q 7.7 and Q 7.9

7.7 What are you doing with this plot?

Status 22 ☐ PLOT STAT

(i) Lease out (for cash or kind) (=1)
(ii) Emply a sharecropper (=2)
(iii) Give free to someone (=3)
(iv) Give back to production team (=4)
(v) Left fallow (=5)

Now go to Q. 7.9

7.8 What is the basis for your cultivation of this plot? 23 ☐ PLOTBAS

(i) Lease in from another household (=1)
(ii) Share cropping (=2)
(iii) Received free from relative or friend (=3)
(iv) New claimed land (=4)

7.9 For how long a lease (or other arrangement) do you have this plot? _____ years. 24 ☐☐ YRSLEASE

7.10 How many years ago did this arrangement start? _____ years. 26 ☐☐ STARTLS

PLOT CHARACTERISTICS

NATURAL CHARACTERISTICS

7.11 Soil Quality: 28 ☐ SOILTYP

(i) Black soil (=1)
(ii) Slightly sandy soil (=2)
(iii) Sandy soil (=3)
(iv) Other (=4)

7.12 Slope: 29 ☐ SLOPTYP

(i) Flat (=1)
(ii) Moderately steep (=2)
(iii) Very steep (=3)
(iv) Mixed flat and steep (=4)

7.13 Access to Irrigation: 30 ☐ IRACCESS

(i) All year (=1)
(ii) Dry season only (=2)
(iii) Wet season only (=3)
(iv) Rainfed only (=4)

7.14 Type of Irrigation: 31 ☐ IRRITYP

(i) Major canal (=1)
(ii) Minor canal (=2)
(iii) Well (=3)
(iv) River (=4)
(v) Pond (=5)
(vi) Lake, dam (=6)

7.15 Location of Plot:

(i) How long (in minutes) does it normally take to get from your home to this plot? 32☐☐☐ HOMETIME

(ii) Of what type is the road from your home to this plot? 35☐ ROADHOME

(a) Dirt road (=1)
(b) Gravel (=2)
(c) Asphalt (=3)

(iii) How long (in minutes) does it normally take to get from this plot to the nearest private market for output? 36☐☐☐ MARKTIME

(iv) Of what type is the road to the nearest private output market? 39☐ ROADMKT

(a) Dirt road (Code = 1)
(b) Gravel road (Code = 2)
(c) Asphalt (Code = 3)

Man-Made Characteristics of the Plot

7.16 How well is this plot cleared of tree stumps/shrubs and bushes? 40☐ PLOTCLRD

(i) Completely cleared (=1)
(ii) Almost cleared (=2)
(iii) Partially cleared (=3)
(iv) Little cleared (=4)

7.17 Did you or your family undertake the clearing of this plot? (Yes = 1, No = 2) 41☐ FAMCLRD

If the answer to Q 7.17 is "Yes," ask Q 7.18
If the answer to Q 7.17 is "No" Go to Q 7.19

7.18 How many years ago was the major clearing done? 42☐☐ YRSCLRD

7.19 Are there bunds on this plot of land? (Yes = 1, No = 2) 44☐ BUND

If the answer to Q 7.19 is "Yes," ask Q 7.20
If the answer to Q 7.19 is "No" Go to Q 7.22

7.20 Did you or your family undertake the bunding of this plot? (Yes = 1, No = 2) 45☐ BUNDWHO

If the answer to Q 7.20 is "Yes," ask Q 7.21
If the answer to Q 7.20 is "No" Go to Q 7.22

7.21 How many years ago was the bunding undertaken? 46☐☐ BUNDYRS

7.22 Has this plot been levelled by machine? (Yes = 1, No = 2) 48☐ LEVEL

If the answer to Q 7.22 is "Yes," ask Q 7.23
If the answer to Q 7.22 is "No" Go to Q 7.25

7.23 Did you or your family undertake the levelling of this plot? (Yes = 1, No = 2) 49☐ LEVELWHO

If the answer to Q 7.23 is "Yes," ask Q 7.24
If the answer to Q 7.23 is "No" Go to Q 7.25

7.24 How many years ago was this levelling undertaken? 50☐☐ LEVELYRS

7.25 Are there any fruit trees planted on this plot? (Yes = 1, No = 2) 52☐ FRTREES

If the answer to Q 7.25 is "Yes," ask Q 7.26
If the answer to Q 7.25 is "No" Go to Q 7.27

7.26 How many years ago were these fruit trees planted? _____ years 53☐☐ FRTYRS

7.27 What amount of contribution to the public funds and taxes are levied on this plot? _____Yuan. 55☐☐☐☐ PLOTTAX

7.28 If you could rent out this land for one year how much would your reasonably request (excluding contributions and taxes)? _____ Yuan. 59☐☐☐☐☐ PLRENTV

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PART VIII: CROPPING PATTERN ON FIRST PLOT IN THE LATEST FALL/SUMMER SEASON

LET US REVIEW THE CROPS WHICH YOU HAVE GROWN ON THIS PLOT DURING THE WET SEASON WHICH JUST ENDED.

FIRST CROP:

8.1 Crop Name: _____ Crop Code: (From Code List) 15 [ ][ ] CRCODE

8.2 Area of this crop in this plot (planted) _____ mu 17 [ ][ ] CRAREA

8.3 INPUT USE ON FIRST CROP

(i) LABOR

	Family Labor (Days)			Hired Labor	Exchange Labor	
	Male CFML	Female CFFL	Child CHLD	Days CHIRD	Cost (Yuan) CHIRC	Days EXLD
PREP Preparation	19 [ ][ ] 21	[ ][ ] 23	[ ][ ]	25 [ ][ ]	27 [ ][ ] 29	[ ][ ]
PLNT Planting	31 [ ][ ] 33	[ ][ ] 35	[ ][ ]	37 [ ][ ]	39 [ ][ ] 41	[ ][ ]
TAKI Taking Care	43 [ ][ ] 46	[ ][ ] 48	[ ][ ]	50 [ ][ ] 53	[ ][ ] 56	[ ][ ]
HARV Harvest Labor	58 [ ][ ] 60	[ ][ ] 62	[ ][ ]	64 [ ][ ] 67	[ ][ ] 70	[ ][ ]

(ii) ANIMAL

	Family Owned Animal (Days) CFOWD	Hired Animal Days CHHRD	Hired Animal Cost (Yuan) CHHRC
ANL	72 [ ][ ]	74 [ ][ ]	76 [ ][ ][ ][ ]

(*) NOTE: Variable names for Q 8.3 is a combination of column name and row name
Eg. CFMLPREP, CFFLPREP, etc.

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(iii) MACHINE USE (First Crop, First Plot)

	Family Owned Machine (Hours)	Hired Machine Hours	Hired Machine Cost (Yuan)
	CFOWH	CHHRH	CHHRC
MCH	15	18	21

(iv) ORGANIC FERTILIZER (First Crop, First Plot)
How much organic fertilizer did you apply (Jin) 25

(v) MATERIAL COST (First Crop, First Plot)

		(Yuan)
Seeds	29	CSEEDCOS
Fertilizer	33	CFERTCOS
Pesticide	37	CPESTCOS
Herbicide	41	CHERBCOS
Other Material	45	COTMACOS
Total (If the farmer cannot recall items)	49	CTTMACOS

(vi) OUTPUT Quantity (kg.) COUTQNTY 53

(vii) OUTPUT VALUE

	Quantity (kg.) COUTQ	Value (Y) COUTV	
(a) Sold to government	58	63	GOV
(b) Sold in private market	68	73	MKT

(viii) Did your output suffer from disease, drought, etc.? CDISEASE
If yes

(ix) What kind of problem? CPROBLEM

Flood/Drought	Disease/ Pest	Other
78	79	80
(Code = 1)	(Code = 1)	(Code = 1)

CARDS	
7,8	Input-Output of second crop, first plot
9,10	Input-Output of third crop, first plot
11	**Description of second plot**
12,13	Input-Output of first crop, second plot
14,15	Input-Output of second crop, second plot
16,17	Input-Output of third crop, second plot
18	**Description of third plot**
19,20	Input-Output of first crop, third plot
21,22	Input-Output of second crop, third plot
23,24	Input-Output of third crop, third plot
25	**Description of fourth plot**
26,27	Input-Output of first crop, fourth plot
28,29	Input-Output of second crop, fourth plot
30,31	Input-Output of third crop, fourth plot
32	**Description of fifth plot**
33,34	Input-Output of first crop, fifth plot
35,36	Input-Output of second crop, fifth plot
37,38	Input-Output of third crop, fifth plot
39	**Description of sixth plot**
40,41	Input-Output of first crop, sixth plot
42,43	Input-Output of second crop, sixth plot
44,45	Input-Output of third crop, sixth plot

46	**Description of seventh plot**
47,48	Input-Output of first crop, seventh plot
49,50	Input-Output of second crop, seventh plot
51,52	Input-Output of third crop, seventh plot
53	**Description of eighth plot**
54,55	Input-Output of first crop, eighth plot
56,57	Input-Output of second crop, eighth plot
58,59	Input-Output of third crop, eighth plot
60	**Description of ninth plot**
61,62	Input-Output of first crop, ninth plot
63,64	Input-Output of second crop, ninth plot
65,66	Input-Output of third crop, ninth plot

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PART IX: OTHER FARM INCOME (YUAN)

9.1 Net income from major cropping winter/spring season (Jan-June 87) WNETINC 15

9.2 Income from rent (cash or kind, or share cropping).

(i) In the winter/spring season (starting Jan'87) WRENINC 20

(ii) In the fall/summer season (starting July'87) DRENINC 25

9.3 Net income from sale of fruits, vegetables and other products not previously mentioned.

(i) in the winter/spring season (starting Jan'87) WVEGINC 30

(ii) in the fall/summer season (starting July'87) DVEGINC 35

9.4 Specialized agricultural activities (chicken, duck, pig, fish)

(i) in the winter/spring season WAGRINC 40

(ii) in the fall/summer season DAGRINC 45

PART X: NON-FARM INCOME (YUAN)

10.1 How much net cash income did your household earn from non-farming activities such as crafts, services, commerce etc. (There should be a list of activities here, to help the farmer calculate the total income).

(i) in the winter/spring season WNFAINC 50

(ii) in the fall/summer season DNFAINC 55

10.2 How much net income did your household earn from off-farm employment? (Such as in the industry, office).

(i) in the winter/spring season WOFMINC 60

(ii) in the fall/summer season DOFMINC 65

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PART XI: FINANCIAL ASSETS AS OF THE BEGINNING OF FALL/SUMMER SEASON '87

(Yuan)

1.	Money deposited in credit cooperative	15	DEPCOOPV
2.	Money deposited in banks and financial institutions	20	SAVBANKV
3.	Loans outstanding made to other people	25	LOANOUTV
4.	Value of jewllery, gold, silver	30	JEWELRYV
5.	Value of product stored	35	PRODSTOV
6.	Cash	40	CASHV
7.	Other	45	OTHERV

PART XII: FINANCIAL EXPERIENCE

12.1 Have you ever in the past ten years been unable to withdraw money from the credit cooperative because of fund shortage? (Yes = 1, No = 2) 50 [ ] FUNDSHRT

12.2 Have you experienced any time in the past nine years an inability to repay a loan on the time originally agreed with an institutional lender such as bank or cooperative?

(i) Principal (Yes = 1) (No = 2) 51 [ ] DEFFORMP

(ii) Interest (Yes = 1) (No = 2) 52 [ ] DEFFORMI

12.3 Have you experienced any time in the past nine years an inability to repay a loan on the time originally agreed with a non-institutional lender such as a merchant, or neighbor?

(i) Principal (Yes = 1) (No = 2) 53 [ ] DEFINFP

(ii) Interest (Yes = 1) (No = 2) 54 [ ] DEFINFI

12.4 Is the credit cooperative located in your village? (Yes = 1, No = 2) 55☐ CREDTLOC

If the answer to Q 12.4 is "Yes," go to Q 12.6
If the answer to Q 12.4 is "No" ask Q 12.5

12.5 How much time does it take to reach your credit cooperative? _____ minutes. 56☐☐☐ CREDT TIM

12.6 Is the Agricultural Bank of China (ABC) office located in your village? (Yes = 1, No = 2) 59☐ ABCLOC

If the answer to Q 12.6 is "Yes," go to Q 12.8
If the answer to Q 12.6 is "No" ask Q 12.7

12.7 How much time does it take to reach the nearest ABC branch? _____ minutes. 60☐☐☐ ABCTIM

12.8 Did you ever borrow money from ABC? (Yes = 1, No = 2) 63☐ ABC BORR

If the answer to Q 12.8 is "Yes," ask Q 12.9
If the answer to Q 12.8 is "No" ask Q 12.10

12.9 How long does it usually take until the loan is processed? _____ days. 64☐☐☐ LOAN PROC

12.10 Did you ever borrow money from the credit coorperative? (Yes = 1, No = 2) 67☐ COOPLOAN

If the answer to Q 12.10 is "Yes," ask Q 12.11
If the answer to Q 12.10 is "No" ask Q 12.12

12.11 How long does it take until the loan is processed? _____ days. 68☐☐☐

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12.12 Let us review the loans you took in the last 5 years

(*)

Year		LOANAI Loans from Institutional lenders (Y)	LOANAN Loans from Non-Institutional lenders (Y)
1983	83	15	20
1984	84	25	30
1985	85	35	40
1986	86	45	50
1987 (spring/winter)	87	55	60

12.13 Did you have any loans outstanding by the beginning of this fall/summer season? (Yes = 1, No = 2) 65 ☐ LOANOUTS

If the answer to Q 12.13 is "Yes," ask Q 12.14
If the answer to Q 12.13 is "No" go to Q 12.15

12.14 How much debt did you have outstanding at the beginning of fall/summer season?

(i) Institutional lender (Yuan) 66 ☐☐☐☐☐ DEBTFORM

(ii) Non-institutional lender (Yuan) 71 ☐☐☐☐☐ DEBTINF

12.15 Did you undertake any new loans between beginning of fall/summer season and harvest time? (Yes = 1, No = 2) 76 ☐ NEWLOANS

If the answer to Q 12.15 is "No" ask Q 12.16
If the answer to Q 12.15 is "Yes" ask Q 12.17

(*) NOTE: Variable names for Q 12.12 are formed by combining column names and row names eg: LOANAI83, LOANAN83.

12.16 The reason for not taking any loans is: 77 ☐ RENOLOAN

(i) I had enough money for my requirements from my own savings or from my family and did not need a loan. (=1)

(ii) I could not get any loans from institutional lenders and informal lenders charge a high interest rate. (=2)

(iii) I could not get any loans from either institutional or non-institutional lenders (=3)

(iv) Other (=4)

12.17 Would you have liked to get more institutional credit at the current interest rates than what you actually got this season: (Yes = 1, No = 2) 78 ☐ MORECRDT

12.18 Would you have liked to borrow more money from non-institutional sources? (Yes = 1, No = 2) 79 ☐ MORECRNI

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PART XIII: LOANS TAKEN

13.1	Loan No. _____ (First Loan)	15 ☐ LOANNO
13.2	Type of loan (Cash = 1) (Kind = 2) (Mixed = 3)	16 ☐ LOANTYP
13.3	Source of loan (See Code List A)	17 ☐ LOANSOR
13.4	Amount of loan in cash (Yuan)	18 ☐☐☐☐☐ LOANCASH
13.5	Amount of loan in kind (Value at time of borrowing in Yuan)	24 ☐☐☐☐☐ LOANKIND
13.6	Original duration of the loan (months)	30 ☐☐ LOANTERM
13.7	Purpose of the loan (See Code List B)	32 ☐ LOANPURP
13.8	Rate of interest per month (if no interest, enter zero)	33 ☐☐ LOANRATE
13.9	Type of security (See Code List C)	35 ☐ LOANCOLL
13.10	Loan No. _____ (Second Loan)	36 ☐ LOAN2
13.11	Type of loan (Cash = 1) (Kind = 2) (Mixed = 3)	37 ☐ LOANTYP2
13.12	Source of loan (See Code List A)	38 ☐ LOANSOR2
13.13	Amount of loan in cash (Yuan)	39 ☐☐☐☐☐ LOANCAS2
13.14	Amount of loan in kind (value at time of borrowing (Yuan)	45 ☐☐☐☐☐ LOANKND2
13.15	Original duration of the loan (months)	51 ☐☐ LOANTEM2
13.16	Purpose of the Loan (See Code List B)	53 ☐ LOANPUR2

13.17	Rate of interest <u>per month</u> (if no interest enter zero)	54 ☐☐ LOANRAT2
13.18	Type of security (See Code List C)	56 ☐ LOANCOL2
13.19	Loan No. _____ (Third Loan)	57 ☐ LOAN3
13.20	Type of loan (Cash = 1) (Kind = 2) (Mixed = 3)	58 ☐ LOANTYP3
13.21	Source of loan (See Code List A)	59 ☐ LOANSOR3
13.22	Amount of loan in cash (Yuan)	60 ☐☐☐☐☐ LOANCAS3
13.23	Amount of loan in kind (Value at time of borrowing in Yuan)	66 ☐☐☐☐☐ LOANKND3
13.24	Original duration of the loan (months)	72 ☐☐ LOANTEM3
13.25	Purpose of the loan (See Code List B)	74 ☐ LOANPUR3
13.26	Rate of interest per month (if no interest enter zero)	75 ☐☐ LOANRAT3
13.27	Type of security (See Code List C)	77 ☐ LOANCOL3

Code Lists

A. Sources of Credit

Formal/Institutional	Informal/Institutional
1. ABC	4. Relatives
2. RCC	5. Friends
3. Other government finance	6. Other farmers
	7. Traders
	8. Other

B. Purpose of Loan

1. Production
2. Tractors and Transport equipment
3. Farm machinery/Animals
4. Land aquisition
5. Labor
6. Construction
7. Consumption
8. Marriage/Funeral/Medical
9. Other

C. Loan Security

1. No security
2. Land contract
3. Agric. product
4. Other product
5. Machinery/livestock
6. Guarantor
7. House
8. Other

D. Crop Codes

(To be specified)

QUESTIONNAIRE FOR RCC/ABC MANAGER OR LENDING OFFICER

Name of Interviewee: _____ Position: _____

RCC/ABC Branch Name: _____ Location: _____

1. How much were the total deposits in this branch of RCC/ABC in the past five years.

	End of March		End of June		End of September		End of December	
	Household (Yuan)	Collective (Yuan)	Household (Yuan)	Collective (Yuan)	Household (Yuan)	Collective (Yuan)	Household (Yuan)	Collective (Yuan)
1982	.....	.....	.....	.....	.....	.....	.....	.....
1983	.....	.....	.....	.....	.....	.....	.....	.....
1984	.....	.....	.....	.....	.....	.....	.....	.....
1985	.....	.....	.....	.....	.....	.....	.....	.....
1986	.....	.....	.....	.....	.....	.....	.....	.....

2. What were the breakdowns of the length of loans* to private households and collectives in the past five years:

	Household			Collective		
	Short term (Yuan)	Medium term (Yuan)	Long term (Yuan)	Short term (Yuan)	Medium term (Yuan)	Long term (Yuan)
1982	.....	.....	.....	.....	.....	.....
1983	.....	.....	.....	.....	.....	.....
1984	.....	.....	.....	.....	.....	.....
1985	.....	.....	.....	.....	.....	.....
1986	.....	.....	.....	.....	.....	.....

* Short term: Less than 1 year (including 1 year).
Medium term: 1 to 3 years (including 3 years).
Long term: Longer than 3 years.

3. What were the rates of delinquency in the past five years?

	Household %	Collective %
1982	.....	.....
1983	.....	.....
1984	.....	.....
1985	.....	.....
1986	.....	.....

4. What were the breakdowns of purpose of loans to private households in the past five years?

	Consumption (Yuan)	Current Input (Yuan)	House Construction (Yuan)	Investment	
				Farm (Yuan)	Non-farm (Yuan)
1982	.....	.....	.....	.....	.....
1983	.....	.....	.....	.....	.....
1984	.....	.....	.....	.....	.....
1985	.....	.....	.....	.....	.....
1986	.....	.....	.....	.....	.....

5. Are there normally upper limits on the amount of money you will lend to a household?

Consumption (Yuan)	Current Input (Yuan)	House Construction (Yuan)	Investment	
			Farm (Yuan)	Non-farm (Yuan)
.....	.....	.....	.....	.....

6. What is the current interest rate charged for each type of loan? (monthly rate).

Consumption (Yuan)	Current Input (Yuan)	Construction (Yuan)	Investment	
			Farm (Yuan)	Non-farm (Yuan)
.....	.....	.....	.....	.....

7. What, in your opinion, is a reasonable interest rate for each type of loan? (monthly rate.

Consumption (Yuan)	Current Input (Yuan)	Construction (Yuan)	Investment	
			Farm (Yuan)	Non-farm (Yuan)
.....	.....	.....	.....	.....

8. Is there any type of loan security you require from borrowing households for each of the following prupose of loan?

Purposes of Loan	Type of Loan Security
(a) Consumption	1. No security
(b) Current input	2. Guarantor
(c) Construction	3. Product
(d) Investment (farm)	4. Other (Specify)
(e) Investment (non-farm)	

9. When a loan is granted for a specific purpose, such as production or investment, is it possible to strictly ensure it is being used for that purpose?

	Yes	No
(a) Consumption		
(b) Current input		
(c) Construction		
(d) Investment (farm)		
(e) Investment (non-farm)		

THE WORLD BANK/INTERNATIONAL F NCE CORPORATION

OFFICE MEMORANDUM

DATE September 9, 1987

TO REPAC Members

FROM Phi Anh Plesch, Secretary, REPAC PAP

EXTENSION 3-1063

SUBJECT Research Proposal: "Rural Credit Markets, Investment and Agricultural Productivity in China"

This proposal was submitted late last June. It has been reviewed by two internal and two external referees whose reports have now all been received. The Bank sponsors are now under pressure to obtain a quick decision on the proposal from REPAC (see the attached telex from their Chinese collaborators). In order not to delay the review process further, and because a meeting of the whole REPAC cannot be convened in the next two or three weeks due to the anticipated absence of two of the five current members, the Chairman has suggested that the following procedures be applied on an exceptional basis.

First the proposal will be evaluated by a subcommittee consisting of Messrs. de Tray, I.J. Singh and V. Corbo. This subcommittee will meet early next week. Its recommendations will be conveyed - either by telex or over the phone - to the other two members for their approval on a no-objection basis.

If anyone of you disagrees with these procedures, he should inform us immediately.

Enclosed are copies of the proposal and the four referee reports.

Enclosures:

cc and cleared with: Mr. D. de Tray

Distribution: REPAC Members: Messrs. V. Corbo
S. O'Brien
I.J. Singh
L. Squire

Copied to file 9/3/87

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INTBAFRAD BEIJING, CHINA, SEPTEMBER 3, 1987
ATTN: FEDER

RURAL FINANCIAL MARKETS STUDY, URTLX OF AUG 20 AND MINE OF AUG 25.
TO FACILITATE PROGRAMMING OF ITS STAFF, RCRD WANTS ASSURANCES THAT
BANK FUNDING HAS BEEN SECURED FOR RURAL FINANCIAL MARKET STUDY AS
JOINTLY AGREED. PLS CONTACT RCRD DIRECTLY, COPIED TO RMC. REGARDS,
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DISCONNECTED

Clive Bell

RURAL CREDIT MARKETS, INVESTMENT AND
AGRICULTURAL PRODUCTIVITY IN CHINA

I. In most respects, this proposal is well-conceived and carefully thought out. The emphasis on describing the nature and extent of transactions in the various sections of the credit markets before any attempt at prescribing what public policies are desirable is surely correct. The outline of the formal econometric work reveals that the most glaring deficiencies of earlier studies have been clearly identified, together with ways to remedy them. And in Professors Lau and Lin, the project will have consultants who are manifestly the right men for the job.

II. Starting with description, investigating the household's sources and uses of funds is a very time-consuming and rather delicate matter, requiring rapport and trust between interviewer and respondent. The proposal envisages that 40 interviewers will descend on 800 households and collect these data (and others) in just two months. I do not doubt that numbers will be collected, but how closely they reflect what is actually happening is quite another matter. On p. 13, the authors refer to an "examination of stylized facts" (emphasis added). There is a fair chance that this is precisely what the investigation will yield, though I am confident that the authors intended no such irony.

Where the sampling procedure itself is concerned, the proposal is rather reticent. It appears that choice-based sampling has been ruled out; so that the 800 households will surely include many non-borrowers. There are some good grounds to avoid choice-based sampling, of course. But will the sample be large enough for the authors' purposes, given

the "range of agro-climatic environments" (p. 11)? Even 800 is not a large sample if investment activities are to be investigated: not much can be expected here.

Turning to the credit transactions themselves, it appears that there are several institutional lenders. In that case, the existence of moral hazard gives lenders a strong incentive to insist on exclusive contracts or to coordinate their actions towards a particular borrower. Now, exclusivity is hard to enforce, even, I suspect, in the PRC. Hence the widespread use of collateral to secure an exclusive claim. Land, if alienable, serves this purpose nicely; but in China this collateral is not available. Careful investigation of this important point is needed.

Where private lenders are concerned, the legal and cultural environment has some parallels with East Africa. The discussion of this matter in Collier and Lal (1985) is pertinent and useful. It is also possible that there will be some interlinking of transactions, for reasons that are well-known. Yet there are no references to this phenomenon, except an implicit one in the existence of marketing cooperatives which advance credit. More generally, the reforms appear to be so extensive as to encourage the emergence of arrangements found in other rural economies with incomplete markets. In that case, the project should benefit from a deeper consideration of what has been learned from studies of other countries. Some valuable conclusions may result from such comparisons.

III. The econometric work envisages the estimation of a system of equations for: the supply of, and demand for, credit; the use of variable inputs; and the supply of output. The salient feature of the

proposal is the recognition that there may be rationing, and if there is, that an endogenous switching condition is involved.

On p. 16, the authors claim that the estimation entails "rather mild restrictions on the specification used." If I understand correctly, this is an opinion I cannot share. The object of the estimation is valuable in itself and for policy. Moreover, estimation of the system as a whole will yield gains in efficiency--though the number of parameters to be estimated is surely large even with a sample of 800 observations. The potential drawback is that there may be serious misspecification. We are told elsewhere in the proposal that agriculture is risky in many parts of China. If, like their counterparts elsewhere, Chinese peasants are risk-averse, it is extremely difficult, if at all possible, to derive the input use and output supply equations in closed-form without making very strong assumptions indeed. Furthermore, the household's behavior will also be influenced by characteristics that do not appear in the proposal, namely, family size and composition, assets, other income (if exogenous in the short period) and the variability of the economic and natural environment. This seems to me to strengthen the case for concentrating on the credit market alone, especially as there may be additional complications stemming from the segmentation of that market. Correspondingly, estimation of the entire system should receive less attention.

On a technical point, it is my recollection that Maddala does deal with the case of endogenous switching. The acute difficulties that arise when sample separation is unknown have been discussed at length in various places. As Maddala puts it: one is asking a lot of the data to settle the assignment problem. This can be accomplished by maximum

likelihood methods, but only at the cost of imposing a very strong structure. Thus, the question of misspecification arises once again. It is known that ML estimates are often not very robust, so this is not a minor quibble. Indeed, some experts would now pursue consistency over efficiency for precisely this reason. I am not suggesting that ML-estimation of this sort is inappropriate, and with Professor Lau as a consultant, I am sure the matter is, or will be, dealt with carefully. As it stands, however, the proposal is too cavalier on this important matter.

IV. Experience with similar studies suggests that the time and money allocated to data cleaning, processing and tabulation is inadequate, to say nothing of the bills that could be run up attempting ML-estimation of a simultaneous system with unknown sample separation.

V. To sum up, this is a promising proposal on a topic of considerable importance; but significant questions about the scope and methods of inquiry remain to be settled satisfactorily.

Reference

Collier, P. and Lal, D. (1985), Labour and Poverty in Kenya: 1900-1980. London: O.U.P.

Ben King

Rural Credit Markets , .vestment & Agricultural Productivity in Chir

1.Fish

This proposal is a fishing expedition. This is not meant pejoratively. The fish seem well worth catching and the fishermen have excellent credentials. But one must first of all find out what kind of fish to catch and how to do the catching. This argues for a two-stage operation , much as outlined on pages 11 ff. of the proposal.

2.Stages

Stage 1 is essentially exploration of existing knowledge ,both qualitative and quantitative , plus some to be gathered during Stage 1. Then one can determine the lineaments of Stage 2 :

[1] What policy issues appear important (cf p.4)
[2] What are the stylized facts.
[3] What hypotheses seem worth testing.
[4] How the model should be specified.

At this stage there should be a second review conducted , but in order to preserve the momentum of the project , it should be a delegated review. Consideration should be given to an appointed review board , perhaps a joint one , which should be prepared to act quickly. Consideration might also be given to having the review take place in Beijing.

3.Existing Data

There is one serious understatement of the existing information. There is a great deal of data , at a fairly aggregate level , but certainly far better than nothing, in the annual household surveys conducted by the State Statistical Bureau (SSB). It exists but the question is whether it is available. This problem is addressed in the next section.

In broad terms , the surveys contain the following information (in more detail than shown here) :

Income	Expenditure
From collectives	Consumption
Gross sideline	Fixed assets
LESS Inputs	
Net sideline	
Other(e.g. transfers)	Other(e.g. transfers)
---	---
Total Current	Total Current
Capital transactions	Capital transactions
---	---
Total inflow	Total outflow

In the yearbooks (e.g 1985 pages 570-575) , only the three current income categories are reported at the national level and the total of the three at the provincial level. Only consumption expenditure , with a broad breakdown , is reported at both levels on the expenditure side.

Specimens of the kind of data collected for fixed assets and capital transactions are shown in the attached Tables 4 & 7 for Hubei province in 1981 and 1982 . Similar , though perhaps less detailed , data exist for 1954-1958 , 1965 and 1979 & 1980. And ,of course , they have continued since 1982 , possibly in more detailed form and possibly with socioeconomic data at the household level.

4. Availability of data.

The data exist but their availability is another matter. The SSB seems to guard them jealously. Despite repeated pleas , they never agreed to release individual household data for the joint consumption study with the Chinese Academy of Social sciences (CASS). It was with the greatest difficulty that CASS was able to obtain aggregate provincial data for Hubei & Beijing.

The problem is that the SSB is responsible for keeping state secrets. Statistical evidence can , as in the standard British police warning , be taken down and used against you. There is a tug-of-war going on between cautious reticence and the desire for more study of development problems (see Gregory Chow's article in the August 1986 American Statistician , Vol 40/3).

What should the Bank do in these circumstances ? It does not make sense for the Bank to go on engaging in joint research with other Chinese bodies , when they are denied access to a large body of pertinent and useful data. It certainly should be the Bank's objective to induce the Chinese to analyze their own statistics ; and that can't be done by burying them. But one must be realistic. Beijing was not built in a day.

There are two possible lines of attack. The first is to try to persuade the SSB to release the aggregate provincial data which they must have for the missing expenditure categories and the capital transactions , if possible in as much detail as they receive them.

The second is to negotiate at the provincial level or even the county level. Samples are taken from 7+ counties in each province and 60+ households per county ; in Hubei there were over 900 households interviewed. There might be some merit in choosing the four study sites (page 11) in counties which are used for the national survey , if one can have access to the household data in the county.

If one can move some way on either of these fronts (preferably both) , then the project could go ahead. There is , however , a real question , whether one should proceed if there is a completely blank wall.

5. The model and consumption

Although specification of the model should ultimately take place at the end of the first stage , one comment is perhaps in order on the one presented in the proposal. It is hard to see the relevance of a model which specifies consumption before the harvest as exogenous(p. 17). What is "before the harvest" ? From Jan 1 or the Chinese New Year ? One would suppose that decisions are made by peasants on a harvest-to-harvest basis. Moreover , how can a model supposedly based on Barnum & Squire (p. 17) treat consumption as exogenous?

Consumption patterns have been changing with great rapidity in rural China. Even if prices have not changed that much (though quality may have) , "virtual" prices (see DRD 243 , Feltenstein,Lebow & van Wijnbergen) certainly have , as scarce consumer durables have become more abundant. Expenditure on housing has risen. Surely the demand for credit cannot be independent of these changes.

6. Miscellaneous comments

One illustration of the value of the aggregate sample survey data may be of interest. If one extrapolates , with great boldness , from the Hubei and Beijing data , plus some indications from national data , one comes to the conclusion that rural deposits with the RCC's and ABC are far too low to accomodate the increase in Bank deposits by farmers. The SSB , when asked about this , agreed that many so-called "urban" deposits are in fact made by rich suburban farmers , who want to keep their wealth anonymous (cf. pages 49 & 55 of the proposal). The surveys moreover contain data on cash holdings and , even more important , stocks.

The discussion of credit rationing on page 23 is not wholly clear. To the extent that data used are based on new questionnaires , why is not possible to ask the respondent questions designed to show whether there was rationing or not ?

BBK 7/13/87

HUBEI RURAL SAMPLE SURVEYS

Table 4: ANNUAL EXPENDITURE; NET INCOME (all units Yuan)

Category	Item	B.Ref.no.	1981	1982	Notes
5	Expenditure	83 *	1,168,851	1,482,140	= 84 + 98 + 105 + 110
5.1	Daily consumption	84 *	1,010,236	1,217,417	= 85 + 97
5.11	Material consumption	85 *	979,960	1,183,995	= 86 + 90 + 91 + 92 + 94
5.111	Food	86 *	630,771	754,364	= 87 through 89
5.1111	Staples	87	359,276	420,772	
5.1112	Meat, vegetables	88	222,432	255,398	
5.1113	Other	89	49,063	78,194	
5.112	Clothing	90 *	124,108	151,602	
5.113	Fuel	91 *	56,824	66,237	
5.114	Housing	92 *	85,548	99,395	Includes new construction during year
	OW: electricity, rent	93	n.a.	4,225	
5.115	Other	94 *	82,709	112,397	
	OW: furniture	95	20,428	21,446	
	: publications	96	1,928	2,494	
5.12	Nonmaterial consumption	97 *	30,276	33,422	
5.2	Sidelines production costs	98 *	83,600	136,466	= 99 through 104
5.21	Agriculture & forestry	99 *	22,096	35,073	Identified as 14369 + 7727
5.22	Poultry & animals	100 *	51,855	80,031	
5.23	Handicrafts	101 *	3,414	3,620	
5.24	Fishing	102		177	
5.25	Other sidelines	103	3,828	12,049	
5.26	Taxes	104	2,407	5,516	
5.3	Fixed assets	105 *	4,956	45,916	
	OW: Working cattle	106	1,878	21,014	
	Steel & wooden farm tools	107	) 1,808	(10,180	
	Machinery for agric.	108	)	(6,374	
	Sideline machines	109	?	3,053	Either nil or n.a.
5.4	Other expenditure (non-credit/debt	110 *	70,059	82,341	111 through 113
5.41	Remittances to outside	111	2,89[illegible] 97	1,633	
5.42	Gifts	112	41,914	55,353	
5.43	Other	113	25,248	25,355	
6	Net income	114	1,195,245	1,534,455	= 56 (Table 3) - 98

HUBEI RURAL SAMPLE SURVEYS

Table 7: CASH CAPITAL ACCOUNTS (all units Yuan)

Category	Item	C.Ref.no.	1981	1982	Notes
1	Bank savings, beginning of year	1 *	20,106	18,010	
2	Cash " " "	2 *	56,693	74,356	
3	Cash inflow during year	3	751,385	1,064,130	See Table 8
3.6	Capital inflow	28	130,620	180,181	C29 through 32
3.611	Bank withdrawals	29	21,117	22,068	
3.622	Loans, from banks, coops	30	4,924	31,031	
3.633	Borrowing from collectives & others	31	91,802	104,296	
3.644	Repayments of debt by others	32	12,777	22,786	
4	Cash expenditure during year	34	728,163	1,029,902	See Table 9
4.5	Capital outflow	61	86,777	181,621	C62 through 65
4.51	Bank deposits	62	20,373	42,409	
4.52	Repayment of loans to banks	63	4,499	27,124	
4.53	Lending to others	64	12,951	32,910	
4.54	Repayments of debts to others	65	48,954	79,178	
6	Cash at end of year	68 *	79,915	108,584	= 2 + 3 - 34
7	Bank savings at end of year	69 *	19,362	38,351	= 1 + 62 - 29

Note: C33, 66 and 67 not applicable to annual returns

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION

O F F I C E M E M O R A N D U M

Date: July 15, 1987

To: Ms. Phi Anh Plesch

From: Alan Gelb

Extension: 75094

Subject: Review of Rural Credit Projects in China

1. Attached please find a review of the above research proposal, which I have done rather hastily to get it in before mission travel. Work in this area for China has considerable merit, yet there are aspects of the proposal which give rise to concern. I think that the authors of the proposal should have the opportunity of replying to such questions soon. This would facilitate the REPAC review.

AGELB:Ip

REVIEW OF RESEARCH PROPOSAL: RURAL CREDIT MARKETS, INVESTMENT AND AGRICULTURAL PRODUCTIVITY IN CHINA

This proposal has some points in its favor, but also some questionable aspects.

First, the good points. The economic reforms in China, and in particular, the introduction of the household responsibility system, have had a major impact on agricultural production and factor use, and have led to the emergence of "specialised households", forerunners of commercial farming on a private basis. The reforms call for an appraisal of the way in which factor markets work and how market institutions should evolve, not only for credit, but also for labor, other inputs and land. Relatively little is known of the workings of these (in some cases potential) markets in post-reform China, so that a case can be made for a project involving careful survey research. The "stylised facts" of how institutions are working and evolving would be a valuable output.

Further, the staffing of the proposed project is of high quality, both in terms of consultants and in the choice of the Research Center for Rural Development, Beijing. Collaborative projects of this kind are valuable for China's social scientists; as is apparent to anyone who has read research pieces emanating from China, these are invariably descriptive and with little analytical rigor (this is not to say that the work of Chinese researchers is not insightful or useful). Therefore the technical assistance element of the proposed project is very much endorsed.

Now for the other side. As written, the proposal emphasises a particular question--the possible impact of credit rationing on input and output decisions--and develops a model to enable this to be estimated. The basis of the model is that, with credit rationed, input use will be below "optimal" levels (as set by marginal conditions). The model can be extended to allow for the possibility of informal credit markets, in which case the "switching" becomes quite complex. Apart from this issue, the proposal offers only the vaguest hints of what questions the research aims to answer.

As noted in the proposal, similar research on credit and output has been done for other countries (although the same model may not have been estimated). The proposal does not indicate the nature of the results, and whether they have been useful in the formulation of policy.

The proposal also does not address some important questions affecting model specifications. For example, how is it proposed to account for farmers' risk aversion, which also may cause a divergence between actual and "optimal" use of purchased inputs? As so much hinges on the model, such issues need to be addressed.

In "free" credit markets, rationing is usually taken to reflect the imperfection of information, and, subject to this, does not necessarily indicate an imperfection in the way in which the credit market itself functions. In China, it is reasonable to depart from the proposition that formal credit markets are rationed--by region (province, county), type of borrower and function--independently of the problem of lender-borrower information, because such controls are an integral part of how monetary policy is implemented. The question regarding rationing is, then, whether own resources and the informal market are sufficient to compensate. Given the recentness of the reforms, and the still-powerful social restraints towards egalitarianism, will it be possible to obtain accurate information on these vital components of finance? See p49 of the proposal.

Is the intention to estimate the quantitative effect of rationing on output? If so, how would this relate to policy? Suppose China reduced the extent of intervention in the allocation of credit; this might reduce certain types of rationing, but others might remain. It is for such reasons, as well as a check on the usefulness of the approach, that a review of the policy relevance of the other studies is needed.

The proposal is also tentative on the possibility of estimating the model, and it is not obvious why consumption should be exogenous. Especially if the household has own funds (as do many rural households), one would expect consumption to be closely related to credit rationing, since the marginal return to own funds rises sharply if cheap formal credit is unavailable.

Although investment features prominently in the title, the proposal notes the difficulty of assessing the impact of credit on investment using only one period's data. Note too that some of the types of investment singled out in the proposal, such as small-scale land improvements, may be done with little capital.

In sum, it is felt that the present proposal may promise too much, and this in a particular, limited, direction. In addition to addressing the above questions, it would be helpful to have an indication of how the rich data base to be collected by the project would be used. What kinds of stylised facts is it desired to collect, and how would these be related to the types of data to be collected? For example, is it intended to write a paper on rural land markets? On the ABC's and the RCC's lending procedures? Are draft questionnaires or interview schedules available?

BROWN UNIVERSITY *Providence, Rhode Island • 02912*

July 14, 1987

Phi Anh Plesch
Secretary to the Research Projects Approval Committee
Policy, Planning and Research
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433

Dear Ms. Plesch:

Enclosed, please find my report on the proposal "Rural Credit Markets, Investment and Agricultural Productivity in China." Since there were no guidelines and this was my first report, I do not know whether it meets the committee's requirements. I also enclose a copy of my c.v. as requested.

Yours sincerely,

Louis Putterman

Louis Putterman
Professor of Economics

Report on "Rural Credit Markets, Investment and Agricultural Productivity in China", World Bank Research Program Proposal

This is a well-formulated proposal on an important topic involving highly qualified researchers.

The project is well justified. In the first place, the topic of credit in rural China is important and insufficiently researched, as the proposal argues. Rural credit and investment should be top priority research issues with regard to China. The secondary rationales are also valid. In particular, the spill-over to general research on agricultural credit could be useful. Moreso the positive impacts of the data collection and analysis exercises on the upgrading of capabilities for those kinds of work in China, with substantial pay-offs for the country's economic development and ability to participate in or undertake on its own similar research in the future.

The formulation overall is quite good. The review of the available literature on credit markets in rural China is well-done (and a valuable contribution in its own right). The assumption of applicability of theories and empirical observations of the operation of rural credit markets elsewhere for rural China as it is currently evolving is definitely on the mark. The formal modelling is excellently developed (although I didn't notice a discussion of functional forms and of the acceptability of linear functions for the econometrics based on it). The expressed philosophy regarding the roles of formal analysis, econometrics, and consideration of social context, is commendable; likewise the plans for dissemination in different forms to different audiences.

The capability of the personnel involved seems high. I am most able to comment on the preparation of Professor Lau and

Dr. Lin, both of whom are excellently suited to participate in this project.

I would make a number of specific comments more by way of offering a contribution on the margin than of critique of the proposal, although I urge that these points be given some consideration if the project is funded.

First, it is my impression that a very large part, possibly the great majority, of rural credit from the channels discussed actually goes to nonfarm rather than farm projects. It should be a priority to establish: how much? In fact, the credit institutions themselves may not know the answer. There is a question of displacement and fungibility here, for example. If the focus of the study is on agriculture, as the title implies and the proposal seems to assume, then knowing when and why available funds go to non-agricultural activities is important. The proposal mentions that investment problems may sometimes be explained more by output prices than by credit system factors. This is clearly very pertinent to the agriculture/non-agriculture issue. However, if the question of which constraints are operative is to be taken seriously, the research must go beyond restating the obvious on this. It is not clear how the theoretical set-up can be adapted to deal with the sectoral allocation issue under Chinese conditions of managed farm prices (despite ongoing 'commercialization'), interventions on acreage, and rationing of credit also probably influenced by sectoral goals of the authorities. What are the plans here?

Second, in the Annex's discussion of what is known about the credit system and where credit goes, I see discussion of what percentage of credit goes to what kind of units, but not of what percentage of units of each kind get credit, and what the distribution of credit is among those units. E.g., a certain

amount of credit goes to individual households. But what percentage of households get credit? Moreover, what percentage of the credit to households is concentrated in what percentage of the households? And so forth. Distributive issues, especially, but allocative efficiency issues also, will not have been properly addressed without asking the questions in this way.

Third, two points related to the previous one. The first, rather minor point, is that new economic unions or partnerships (xin jingi lianheti) are not mentioned at all. They are supposed to be becoming an important form of enterprise alongside the household, village, and township enterprises. Are loans made to them counted in the statistics as loans going to households? The more important question is: where do farm cooperative units such as agricultural service teams, stations, etc., fit in? My impression is that many townships have set up village level units to take care of such functions as dispensing inputs to their households, and plowing their land. Where households get inputs from such units, do households pay on delivery, or are they extended credit by them? If the latter, then how are the cooperative service teams or stations financed? It could be very important to find out if this is happening on a large scale, because it would mean that many households that do not appear to be receiving credit are getting credit through the intermediation of those local cooperative units. On the other hand, if the statistics somehow list the households receiving such credit through their agricultural service cooperatives as recipients of formal credit, a serious misimpression regarding household access to formal channels of credit will be given unless this factor is considered explicitly. This is obviously one of the central areas for detailed analysis of the way in which the farming system is working on the ground.

Fourth, the possibility that 'influence' plays a role in the allocation of scarce and apparently rationed credit is mentioned, but no specifics for China are alluded to. Yet the Western social science literature on recent developments in rural China are full of discussions of influence in the countryside, usually centering on the role of Party cadres. It is very premature to imagine that this is a disappearing remnant of the past, being replaced by market relations. There are far too many disequilibrium prices in rural China, including the price of formal credit itself; and in one form or another, guanxi (connections) is clearly crucial for allocation. Thus, individuals applying for credit in many circumstances seem to require a recommendation from their village committee, which in practice may mean village level cadres. The latter cadres and bank officials may be part of a certain local network, etc. Policymakers in China seem to have almost welcomed the creation of rent-earning situations that allowed some people to get rich and become examples to other peasants, but there may be economic and social problems resulting if the rent-earners are not randomly distributed in the population. It must also be noted again that a lot of allocative decisions are being influenced by pressures from those controlling scarce resources, and there is interlinking of markets in the sense that cadres may control allotments of inputs (sometimes subsidized), including but not limited to credit, according to individuals' willingness to follow certain instructions. The fact that it is not profitable to produce grain in many rural areas, yet cadres have targets for grain production in their areas, is the most obvious situation giving rise to cadre interference in production decisions, and powers over input and credit distribution are likely to be used. Peasants in these circumstances can at best maximize subject to constraints, constraints that appear to be missing from the formal model. To what extent will the study be able to deal with such issues?

Finally, the issue of investment in infrastructure which is mentioned several times in the proposal (including pp. 4, 12, and 13) is a very important one. However, it isn't clear from the proposal how the links with institutional structure are to be explored. It seems likely to the reviewer that most of this problem must be investigated on the credit demand side, and has little to do with the functioning of the credit market per se. Rather, it is a matter of mechanisms for decision-making and investment in public goods and the need to replace some mechanisms that functioned during the collective era, where projects above the household level are concerned, and (at the household level) of household incentives to invest in agricultural infrastructure given the configuration of property rights and the history of policy change. In passing, I would urge those working on the latter set of issues to consider the problem of property rights in land multi-facetedly; i.e., the question cannot be broken down into an either or of ownership or non-ownership. A system of contracting lands under control of a local authority may be assisted by mechanisms for appraising and compensating land improvements, for example. The issues raised, in sum, are certainly important topics for research--on a par, I would say, with credit markets. But since most of the proposal seems to be concerned with credit (for example, the formal analytical set-up is centered around that) it is not clear how easily this can be tacked on. How much emphasis is to be given to it here? Should a separate study on the infrastructure issue be considered?

THE WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

DATE June 26, 1987

TO Mr. Gershon Feder

FROM Phi Anh Plesch, Secretary, REPAC TAP

EXTENSION 33484

SUBJECT Research Proposal: "Rural Credit Markets, Investment and Agricultural Productivity in China

This is to acknowledge the receipt by REPAC of the above proposal on June 25, 1987. The proposal will be reviewed according to REPAC's rules and procedures and decisions on its funding will be communicated to you as soon as the review process is completed.

cc: Messrs. A. Ody, R. Deshpande

Record Removal Notice

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Subject / Title
The World Bank Research Program Request for Research Support Budget (RSB) Funding - "Rural Credit Markets, Investment and Agricultural Productivity in China".

Exception(s)
Personal Information

Corporate Administrative Matters

Additional Comments

The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information or other disclosure policies of the World Bank Group.

Withdrawn by	Date
Shiri Alon	April 19, 2017

RURAL CREDIT MARKETS, INVESTMENT AND AGRICULTURAL PRODUCTIVITY IN CHINA

A Research Proposal

June 1987

RURAL CREDIT MARKETS, INVESTMENT, AND AGRICULTURAL PRODUCTIVITY IN CHINA

Summary

In many less developed countries, rural credit markets are known to play an important role in facilitating levels and allocative quality of investment and production which would not be achievable with a less developed or less efficient credit system. With rural households now acting as entrepreneurial units in China's new economic system, it is expected that the efficiency and scope of interactions between households and rural financial markets will be important for sustained agricultural growth. Agricultural development is an important policy objective of China's government and is a focus of the Bank's activities in China. The credit market in China developed rapidly after the economic reforms of the late 1970's and early 1980's. Aside from the expansion of the volume of transactions between households and institutional lenders (essentially the Agricultural Bank of China and the Rural Credit Cooperatives), a significant non-institutional credit market has apparently developed. While aggregate information is available on credit and deposit volumes in the formal sector, there is a lack of detailed information on, or analysis of, many of the crucial issues which can be affected by government policies in the rural financial sector. These issues include: reasons for the apparent paucity of long-term credit, extent of credit rationing to different types of rural borrowers, modes and roles of collaterals and their efficiency implications, scope and procedures of the non-institutional credit market, the causes and extent of credit market segmentation (by lender, borrower and purpose) and factors affecting liquidity-holding behavior.

Related to the dearth of information on the above aspects of financial markets, there is little knowledge to enable assessment of the effects of the existing situation in the financial sector on household investments, input use and productivity in the rural economy. The lack of information hampers the design and evaluation of necessary policies. If, for example, shortage or mis-allocation of credit is a significant factor, remedial policies seeking to facilitate and expand lending to affected groups of farmers would be appropriate. But if prices or supply bottlenecks are the main obstacles to increased agricultural productivity, credit market policies would not be effective.

The objective of the study is to gain understanding of factors affecting credit demand by and supply to households within the agricultural sector of China, and the implications of the present credit system for agricultural investment and productivity. The knowledge gained will be used to assess and help formulate policies and projects, both current and potential, which deal directly or indirectly with the credit market and hence affect productivity.

In order to achieve these objectives, detailed micro-level data on agricultural households' activities are necessary. Samples of farmers from four study sites will be selected, and information obtained through

structured surveys. Officers from lending institutions and relevant local leaders will also be interviewed.

The first phase of the analysis will utilize the survey data, as well as other existing data, to formulate stylized facts. This phase will be mostly descriptive, and can thus be accomplished within a short span of time. The second phase of the analysis will develop an econometric model where credit supply and demand are interrelated with input demands, output supply and investment demand. The approach will recognize the disequilibrium which typically characterizes credit markets due to rationing. It will also incorporate the distinction between formal and informal credit markets. The tracing of the implications of credit market disequilibrium to input and output decisions provides for a more appropriate specification of the model, and is an innovative feature of the analytical approach. The estimates will clarify the extent of credit rationing as well as enabling an assessment of the productivity and investment effects of credit. Such insights are typically of much relevance in Bank work on agricultural development.

The study is thus expected to contribute to knowledge of an important issue in agricultural development, namely, the role of credit markets. An innovative and more realistic approach for estimating the productivity effects of credit will be developed and applied. This will provide an analytical tool of general applicability in the analysis of the interaction of credit and factor or output markets. Simultaneously, specific policy issues which arise in the context of China and other socialist economies will be investigated, such as the implications of an uncertain legal status on non-institutional credit transactions.

The execution of the study will be a collaborative undertaking involving the Agriculture and China Departments of the World Bank, and the Research Center for Rural Development of the State Council of the People's Republic of China (RCRD). Qualified consultants will also be involved. RCRD is a key source of policy advice on rural reforms to China's top national leadership. The study is expected to build up RCRD's capacity to undertake empirically based policy-oriented research. Exposure to rigorous sampling and analytical techniques, upgrading of computer software and training of programmers are investments with pay-off beyond the immediate needs of the present study, but of much value given the key role of RCRD and the Bank's long term interest in China.

The study is aimed at policy-makers, development officers and development scholars within China, Bank staff involved with operations in China, development officers in other bilateral and multilateral agencies and the international development community. It is expected that both the formulation of policy and the design of projects affecting rural credit markets and the agricultural sector will be improved through the better knowledge of rural credit markets and agricultural performance to be derived from the proposed study. Study results will also have significant spin-off benefits for the analysis of credit issues in other socialist economies.

The study results will be disseminated through interim and final reports (in both English and Chinese) and an integrated monograph. Shorter reports will also be written for policy-makers and officials, utilizing

less technical language and highlighting project and policy implications. Similarly, seminars for different audiences will be organized, with the content and presentation tailored appropriately.

Research work is expected to span twenty months. The expected cash costs are $169,600 and 70 man weeks of staff time will be required. A matching manpower input from the Chinese collaborator institution has been agreed.

TABLE OF CONTENTS

I. OBJECTIVES AND STRATEGY

A. Background

China is the most populous country in the world, and one of the largest Bank borrowers. Most of China's population is rural, and agriculture and small scale rural enterprises are the main source of income for this population. Average income levels in most rural areas are still below those in urban areas. Increasing agricultural productivity and rural incomes are among the most important policy objectives of the Chinese government. The desire to accelerate agricultural growth underlies the adoption, in the late 1970s and early 1980s, of a series of reforms, including introduction of the "household responsibility system." Under this system, many households operate farms as individual decision units. Similarly, under the new system, households (or groups of households) have greater freedom to set up profit-oriented small scale enterprises. The improved incentives offered to households by the reforms have brought about a significant increase in agricultural output (Lin, 1986) and in rural incomes. The new system has radically changed the nature of economic activities in the rural sector by facilitating the emergence of output and, within limits, factor markets, in which households (as distinct from communes or other collective bodies) are active participants.[1]

One specific market which has developed rapidly is the rural credit market. Prior to the economic reforms in the rural sector,

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1/ Use of hired labor is now possible within certain legal limits (whose enforcement appears spotty). There is no formal private ownership of agricultural land, but the use of fifteen years leases between the authorities and farmers is rapidly becoming standard.

households did not have a substantial direct involvement with financial institutions: (i) there was little need for households to engage in borrowing for production and investment purposes since production and investments were handled by collective bodies; (ii) households had little surplus income available for savings. The situation changed radically with the introduction of the household responsibility system and the recent favorable price changes (Jiang, 1984). Many households now need cash seasonally or over a longer term in order to finance production and investments costs. Many other households have a surplus of cash beyond consumption and production costs. This creates the opportunity for development of active credit markets. The extent of the changes is evident from Table 1, which illustrates the growth in deposits and loans of the rural credit cooperatives, the main formal primary financial institutions serving rural households.

Another component of rural financial systems which has emerged in China is an informal, or non-institutional, credit market. While informal credit markets are prevalent in LDCs and frequently handle a larger volume of liquidity than that of institutional lenders, their occurrence in rural China prior to the economic reform was apparently minor, both because such activities were illegal, and because of limited demand for liquidity and availability of surplus funds. With the new economic system, informal credit operations appear to be widely tolerated by authorities, and the imbalance between cash-surplus and cash-deficit households (together with interest rate controls affecting the formal sector and the uneven geographical development of formal institutions) is understood to have contributed to the emergence of a significant non-institutional credit market. Unlike the institutional credit system, however, relatively little

is currently known about the scope, procedures and efficiency of the non-institutional credit market in China.

In many less developed countries, rural financial markets are believed to play an important role in facilitating a volume of investment and production which would not be achievable with a less developed or less efficient credit system. With households acting as entrepreneurial units in China's new economic system, it is expected that the efficiency and scope of interactions between households and the rural financial markets will be important for sustained agricultural growth. This premise underlies a significant reform of the institutional credit system initiated by the government since 1979, in part with World Bank participation through several credit projects. The Agricultural Bank of China (ABC) was reestablished as the main government institution for mobilization of resources in the rural sector, and as provider of leadership to rural credit cooperatives. The ABC lends mainly to rural industrial and commercial enterprises (70 percent of the loans in 1985), while the rural credit cooperatives lend mainly to individual households and to township enterprises (48 and 41 percent of loans, respectively in 1985).

The Government of China, with assistance from the World Bank, has taken steps to expand and improve the functioning of the ABC and credit cooperative system. However, to date formal sector lending remains largely seasonal, rather than long-term, in nature. In addition, as shown in Annex 1, even now only a relatively small proportion of ABC lending goes to individual households. While aggregate information is available on credit and deposit volumes, there is a paucity of detailed information on, or analysis of many of the issues which can be affected by government policies in the rural financial sector. These issues include: reasons for the

apparent paucity of long-term credit, extent of credit rationing to different types of rural borrowers, the implied effect of additional liquidity , modes and roles of collaterals and their efficiency implications, scope and procedures of the non-institutional credit market, the causes and extent of credit market segmentation (by lender, borrower and purpose) and factors affecting liquidity-holding behavior.

Related to the dearth of information on the above aspects of financial markets, there is little knowledge to enable assessment of the effects of the existing situation in the financial sector on household investments, input use and productivity in the rural economy. The composition of investments undertaken by households, and the incentive structure affecting such investments in rural China have not been studied in detail, although the resolution of important policy issues is dependent on such knowledge. Indeed, satisfactory data do not exist to answer basic questions on trends in overall agricultural investments. For instance, there is a whole range of investments which under the pre-reform system were handled by collective units (e.g. small scale land improvements and irrigation development and maintenance) but which may or may not be taken up by households under the new systems. The need for additional government-initiated interventions to promote such investment is maintained by many observers, but detailed knowledge of the scope of various investments (and the extent to which it is affected by deficiencies in the financial system rather than deficiencies in the incentive structure) is not available.[2] Thus the design of policy measures has to be undertaken on

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2/ "China: Long Term Issues and Options," World Bank report no. 5206--CHA., Annex B, p46-47. The authors state:" Little is known of public sector investment outside the state budget or on farm investment by individual households".

the basis of limited information. Similarly, there is a perception that in some regions purchased inputs (e.g. fertilizers and pesticides) are not used at the optimal level of intensity. But there are no detailed data to infer whether present input utilization levels are affected mostly by supply difficulties, input/output price ratios or cash constraints. If shortage of credit is a significant factor, remedial policies seeking to facilitate and expand lending to affected groups of farmers could be appropriate, but if prices or supply bottlenecks are the main obstacle, credit market policies would not be effective in this respect.

The proposal to study credit markets, investment and productivity in rural China is the outcome of a perceived need within the Bank's Regional Office for better information on and understanding of the functioning of the financial system and of the rural economy in china. Similar concerns motivated the Chinese counterpart in the proposed study, the Research Center for Rural Development (RCRD, a centrally-placed research institution, with close links to senior policy-makers), to seek Bank cooperation in developing the research agenda on rural financial markets.

Interest in understanding the way in which rural credit markets function in China and their impact on agricultural performance stems also from considerations not related solely to China per se. The Bank now operates in several socialist countries, where some of the institutional and ideological constraints are similar to those of China, e.g., no private ownership of land and no legal sanction for non-institutional credit. The insights gained from understanding the implications of absence of real

estate collateral assets, lack of legal and cultural framework to back private lenders and the structure of investment incentives in a socialist economy could be valuable for other countries.

World Bank lending in many countries focusses on the rural credit sector. Some of the analytical approaches to be developed in this study as well as the insights to be gained will be useful in Bank operations related to the rural sector in many countries.

B. Objectives and Procedures:

The objective of the study is to gain understanding of factors affecting credit demand by and supply to households within the agricultural sector of China, and the implications of the present credit system for agricultural investment and productivity. The knowledge gained will be used to analyze relevant policies and project activities (existing and potential) and development of institutions (existing or potential).

The paucity of household-level information at present is a major constraint on assessment of policies. Moreover, for certain aspects of the rural economy even "stylized facts" are not properly documented (e.g. the extent of informal credit utilization, the extent of segmentation in rural credit markets). Additionally, while scattered reports on rural financial issues in Chinese are available in various forms, they have not been synthesized in a form useful for policy formulation by the Chinese government, neither are they accessible to the development community.

The study proposed here will thus make a contribution initially by documenting, on the basis of properly designed surveys and synthesis of existing reports, the prevalence of various types of credit transactions, as well as farmers' perceptions, types of investment, etc. The data

collected will then be utilized in further analysis using appropriate analytical methods. The insights gained from field visits, survey data and the analytical work will be integrated to produce a consistent analysis of the relation between the existing structure of rural credit markets in China and agricultural performance. The analysis will be operationally oriented, highlighting issues and areas where policies and projects can (or do) have impacts on the credit market and ultimately on agricultural performance.

C. Expected Contribution

The study is expected to contribute to knowledge of an important issue in agricultural development, namely, the role of credit markets. An innovative and more realistic approach for estimating the productivity effects of credit will be developed and applied. This will provide an analytical tool of general applicability in the analysis of the interaction of credit and factor or output markets. Simultaneously, specific policy issues which arise in the context of China and other socialist economies will be investigated. Examples of detailed topics which the study will seek to clarify include: the scope and terms of non-institutional lending in an environment with limited private assets, extent of segmentation by borrower, lender and loan purpose, reasons for paucity of long-term credit, extent of credit rationing for different types of borrowers, the impact of credit on different types of investment, input use and productivity, extent of savings and resource mobilization and factors affecting it, modes and roles of collaterals and their impact on lending.

The study is also aimed at building up RCRD's capacity to undertake empirically based policy-oriented research. Exposure to rigorous

sampling and analytical techniques, upgrading of computer software and training of programmers are investments with pay-off beyond the immediate needs of the present study, but of much value given the key role of RCRD and the Bank's long term interest in China.

D. Relationship to Other Research

Rural financial markets in LDCs have been the focus of a large volume of research by development economists. Some relevant literature is summarized in Section II below. However, very little quantitative research based on micro-data has focused on Chinese rural credit markets and on household investment. A Ph.D. student (Ms. Loraine West) at the Stanford Food Research Institute is undertaking a dissertation study of financial markets and rural performance in Southern China (field work to commence in late 1987). Since the geographical focus of the present study would be on the Central and Northern regions of China, some complementarity between the studies is expected and we are in contact with Ms. West. An on-going Bank sponsored study ("Chinese Collective Industry" RPO-674-05) focuses on small-scale rural enterprises, but not on household-managed activities.

Another Bank-sponsored study, "Agricultural Investment, Rural Financial Intermediation, and Socio-economic Mobility" (RPO-673-35) deals with a related issue in India. The focus in the latter study is on investment (rather than productivity), and on the formal credit system. Some of the objectives of the present study overlap with those of RPO-673-35, but the analytical approaches differ. Specifically, the impact of the formal financial system on investment in the latter study is measured by variables representing the level of development of the institutional credit system, while in the present study the impact analysis is based on the

credit transactions of individual farm households. Since both RPO-673-35 and the present study are sponsored by the Agriculture and Rural Development Department, coordination and the drawing of comparative insights will be easier to accomplish.

Close coordination will be maintained with the Research Department of the Agricultural Bank of China, where several relevant studies will be undertaken under a forthcoming IDA Third Rural Credit Project. These studies will focus inter alia, on lending policies, lending procedures and resource mobilization in both the ABC and the RCCs, and are thus relevant to the present study. We are planning to have a regular exchange of views on analytical approaches and on interim results, so as to make the ABC studies and the present study mutually beneficial.

E. Audience and Research Output

The study is aimed at policy-makers, development officers and development scholars in China, Bank staff involved with operations in China, development officers in other bilateral and multi-lateral agencies and development scholars. It is expected that both the formulation of policy and the design of projects affecting rural credit markets and the agricultural sector will be improved through the better knowledge of rural credit markets and agricultural performance to be derived from the proposed study.

The study results will be disseminated through interim and final reports (in both English and Chinese) and an integrated monograph. Shorter reports will also be written for policy-makers and officials, utilizing less technical language and highlighting project and policy implications. Similarly, seminars for different audiences will be organized, with the context and presentation tailored appropriately.

F. Choice of Country

China is the largest LDC, and the rural population of China accounts for a large portion of the world's rural population. Lending to China accounts for a significant share of Bank funds, and the agricultural sector in China is an important focus both of the lending program to China and of the Bank's policy dialogue with China's government. In view of its size and importance, there is inadequate knowledge about China's agricultural economy under the new economic system. In particular, financial and investment activities at the household level have been little studied. The Bank's present clientele includes a significant number of socialist countries. Lessons learnt from a socialist economic system adopting reforms could be valuable in the policy dialogue with the governments of these countries and in the design of credit and other agricultural projects for such countries.

II. DESIGN

A. Background

In most LDCs, a tradition of micro-economic data collection and research provides a body of so called "stylized facts." These are usually sets of interrelated descriptive statistics based on reliable large scale samples, which, while not necessarily confirming cause-and-effect economic relations, give rise to more refined hypothesees or explanations of economic phenomena. Stylized facts are therefore an important interim stage in the process of research. In the case of China, there are considerable gaps in the availability of reliable descriptive information on many aspects of agricultural activities. This lacuna stems in large part from the well-known gaps in data for the pre-reform period and the relatively brief experience to date of implementation of the new system of agricultural organization. While recent micro-level studies have addressed aspects of credit operations and production activities of agricultural households, information is not yet adequate. A review of evidence on financial markets (Annex 1) points out the small samples typically utilized, the lack of clear sampling frames and sampling criteria, and the absence of complementary information on the agro-climatic and infrastructural environment.

The first task of the study proposed here is therefore to provide a set of stylized facts based on reliable information from a range of agro-climatic environments. This will be done by drawing random samples from four study sites (about 200 households per site) located in different parts of China, representing a broad range of economic environments,

from relatively poor to relatively advanced agriculture. The data to be collected will cover farmers' agricultural activities (inputs and outputs), sideline activites, prices, credit transactions, investment (current, and by recall, past), household characteristics, aggregate consumption, ownership of durables and access to infrastructure. The descriptive analysis based on such data can clarify issues such as the composition of households' investments, which types of informal loans carry interest and at what rates, the characteristics of households engaging in informal credit transactions, the role of non-government financial enterprises in lending to agriculture, the distribution of loan sizes from both formal and informal sources, borrowing levels relative to the amount of land operated, etc. Additionally, structured data on farmers' experiences and opinions will be collected to shed light on issues such as: the complexity of obtaining credit from banks and rural credit cooperatives, and any liquidity problems encountered when attempting to withdraw deposits from credit cooperatives. Is there a significant unmet need for long-term loans? Are institutional loans constrained by declared purpose and is there effective enforcement? Is local public infrastructure (local roads, irrigation facilities) properly maintained? 1/

Another focus of the data collection will be on interviewing local officers in lending institutions (the Agricultural Bank of China, Rural Credit Cooperatives and supply and marketing cooperatives providing

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1/ A recently completed Bank study in Thailand (RPO-673-33) involved a large scale agricultural household survey with similar types of data to those proposed here. The favorable experience of the Thailand study will be incorporated in designing the survey instruments for the present study.

production credit to farmers). Through structured interviews, information will be obtained on lending practices, decision criteria, magnitudes of typical loans of different categories, extent of rationing by lender type and loan purpose, ability to enforce compliance, experience with default, opinions regarding the role of guarantees, collaterals and other risk reducing procedures, attitudes towards long-term loans, the efficiency implications of annual credit plans, etc. Additional information will be sought from local leaders and officials regarding general problems affecting farm households, investment in infrastructure, availability of credit and adequacy of existing institutional arrangements. The examination of stylized facts and other background information obtained from the fieldwork will facilitate an improved specification of the models underlying the more rigorous analytical work which will supplement the initial insights and tentative conclusions.

The second phase of the analysis will utilize econometric techniques to analyze the effects of credit and liquidity on agricultural households' performance. The process involves estimates of credit demand and supply functions, as well as input demands, output supply and possibly an investment demand function. The approach taken here differs markedly from earlier attempts to grapple with the problem of linking credit markets to agricultural performance. The econometric analysis will not be an end by itself, but will be incorporated with other insights and with less formal analytical discussions to generate an integrated analysis of some of the factors affecting agricultural productivity in China, and an assessment

of the adequacy of existing or potential policies and projects which are related to these factors.

In order to highlight the advantages of the formal analytical approach suggested here, as compared to past studies dealing with the link between credit markets, input markets and output, we briefly review below the relevant literature.

The conceptual model underlying much of the earlier empirical work is essentially neo-classical. When liquidity is a binding constraint, the amounts and combinations of inputs used by a farmer deviate from their hypothetical optimal level, i.e. the level that would be utilized if liquidity were not a binding constraint. The marginal contribution of credit is therefore to bring input levels closer to the optimal level, thereby increasing productivity. The essence of the empirical work is therefore to identify the productivity effects of credit as distinguished from other factors affecting farm productivity.

Many studies attempt to accomplish this identification by estimating separate production functions or supply functions for borrowers and non-borrowers, then proceeding to compare the different estimates (see review in David and Meyer, 1980, pp. 206-215). Most of these use cross-sectional data. One major weakness of this approach is the implicit assumption that all non-borrowers are homogenous with respect to their credit demand/supply, and similarly that all borrowers are alike. This is most likely not a valid assumption, as many non-borrowers may actually have sufficient liquidity from their own resources. Since money is essentially

fungible, the impact of liquidity from own resources or from credit is identical. Similarly, the marginal impact of credit may actually be zero for some borrowers, for whom credit is not a binding constraint.

The same criticism applies to other studies which group all sampled observations and estimate production functions (or output supply functions) with credit as a production input or as a supply determinant. As will be shown in a subsequent section, the supply function is different (both in parameters and in composition of variables) depending on whether credit is or is not a binding constraint. Estimates which do not take account of these restrictions on the specification are therefore flawed. When credit is treated as a production input, there is an additional problem in that variable cash inputs and credit measure a similar effect. If credit is to be explicitly incorporated in the estimated functional form, it is more appropriate to estimate an output supply function, which depends on exogenous explanatory variables (e.g. prices, agro-climatic environment) and not on inputs, which are decision (endogenous) variables.

A variant of models estimating production functions with credit as an explanatory variable is a line of studies where the utilization of credit is linked to the extent of deviation from marginal efficiency rules (e.g. the difference between marginal value product and input price). Some studies simply compare deviations from optimality among borrowers and non-borrowers (e.g. Rao, 1973), while others distinguish among farmers by other criteria (e.g. initial capital availability) but introduce credit as an explanatory variable (e.g. Chung and Tamin, 1971). The approach in these studies is subject to the same criticism as those dealing directly

with production functions, i.e. it can not be assumed a priori that all farmers are credit constrained.

A different analytical approach is adopted in programming models, where credit is introduced as a constraint which may or may not be binding, depending on the scenario and parameters assumed. A detailed review of programming models involving credit as a constraint is provided by David and Meyer (1980, pp. 220-230). The validity of programming models depends, of course, on the realism of the assumptions made regarding behavioral rules, as these need to be specified parametrically a priori. The main utility of such models is in pointing out optimal decisions for specified categories of households rather than describing observed behavior. For our purposes, it is more appropriate to extract from the data the description of reality, with rather mild restrictions on the specification used, rather than to derive suggested optimal patterns. We thus prefer to pursue an econometric approach, designed with due attention to the weaknesses afflicting earlier studies. The central feature is the recognition that credit transactions, at the household level are not necessarily in equilibrium. That is, there is no inherent tendency towards equalization of the amount of credit desired and the amount offered, so that supply rationing (with unsatisfied demand) and refraining from borrowing (while supply is potentially available) are possible (Braverman and Guasch, 1986). A detailed discussion of the economic and econometric specifications is provided in the subsequent three sections.

B. Conceptual Framework for Econometric Work

The conceptual framework underlying this research is essentially the household model as propounded in a number of recent works (Barnum and Squire, 1979; Iqbal, 1986). The household is perceived as an economic agent making decisions about production, consumption and investment in a manner which optimizes an objective function, subject to various constraints. One specific constraint is the credit constraint, where the availability of liquidity from own sources and borrowing may determine households' activites. 1/

Consider a short-term horizon, which encompasses essentially production decisions. Capital and land are thus treated as given. In addition, consumption is set at some level perceived as exogenous, and the actual determination of desired consumption takes place after production is resolved and income is realized.

For illustrative purposes, we conduct the derivation with production specified as a Cobb-Douglas function.

Denote:

Y = output

Z = fixed inputs (capital, land)

X = variable cash inputs (e.g. fertilizer)

C = cost of unit of variable inputs

L_O = amount of own liquidity

L_D = amount of desired borrowing

r = rate of interest

M = Consumption before harvest

1/ The focus on the household implies that collective activities and state farms, which still account for some portion of the agricultural economy of China, will not be covered by the present study.

Output price is set at unity, without loss of generality. The production function is

$$(1) \qquad Y = Z^{\alpha} \cdot X^{\beta}$$

The household's short-term objective is to maximize operational profit, Π, subject to the liquidity constraint, i.e.

$$(2) \qquad \underset{X,\, L_D}{\text{Max}}\ \Pi = Z^{\alpha} \cdot X^{\beta} - C \cdot X - r \cdot L_D$$

subject to $C \cdot X = L_D + L_o - M$

The cash constraint can be used to express X in terms of L_D, L_o, M

$$(3) \qquad X = (L_D + L_o - M)/C$$

Substituting for X in equation (2) utilizing equation (3) yields

$$(4) \qquad \underset{L_D}{\text{Max}}\ \Pi = Z^{\alpha} \cdot (L_D + L_o - M)^{\beta} \cdot C^{-\beta} - (1+r) \cdot L_D + M$$

The first order condition for maximimum requires

$$(5) \qquad \partial\Pi/\partial L_D = \beta \cdot Z^{\alpha} \cdot (L_D + L_o - M)^{\beta-1} - (1+r) = 0$$

From equation (5), the desired amount of borrowing (L^*_D) is derived, with some manipulation

$$(6) \qquad L_D^* = \beta^{1/(1-\beta)} \cdot Z^{\alpha/(1-\beta)} \cdot C^{-1/(1-\beta)} \cdot (1+r)^{-1/(1-\beta)} + (M - L_o)$$

where * denotes optimality.

Equation (6) defines the notional demand for loans, i.e. the farmer's desired amount of borrowing. Note that the demand function as derived here exhibits plausible properties, i.e. the desired amount of credit is positively related to the amount of fixed assets (e.g. land) and is negatively related to the price of inputs and to the interest rate. If $L^*_d<0$, in the present context, it is implied that the farmer lends (i.e. deposits money in an interest bearing activity) a portion of his initial liquidity.

The supply of credit is given by a variable L_S, which is determined by the farmer's creditworthiness and other factors exogenous to the farmer. We denote the determinants of credit supply by a vector H. The vast literature on rural credit markets suggests quite a few relevant variables which can be used in specifying the vector H. (See Feder et al, 1987, Chapter 4). In addition, interviews with lending officers in credit institutions will provide further insights into factors affecting lending decisions. Coordination with the Research Department of the ABC is also likely to provide useful information. Under an IDA rural credit project, the Research Department will undertake several studies dealing with lending procedures and related issues. These insights will be integrated in the specification of the supply function. In particular, differences in criteria and procedures between the ABC and the RCCs can be represented and verified through the explicit differentiation of credit by source.

As explained in the extensive literature on credit rationing (see review by Braverman and Guasch, 1986), credit markets may be in disequilibrium, in the sense that the quantity demanded by any single farmer will not necessarily be equal to the amount offered by the lender,

and even if the interest rate were to move freely, there are likely to be situations where the interest rate will not be increased beyond a certain point, while supply and demand are still not equal. When the interest rate is constrained by government regulation, it is even more likely that credit supply and demand, at the household level, are not equal. The actual amount which is borrowed is therefore L, where

$$(7) \qquad L = \min. (L_D^*, L_S)$$

The development of the analytical model needs to take account of two possible scenarios. The first is a situation where the supply of credit exceeds the demand by the household under consideration, i.e.

$$(8) \qquad L_S > L_D^*$$

In this case, the household obtains all the credit desired, and $L=L^*_D$. It is possible then to calculate the output which will be forthcoming when credit is not a binding constraint. By inserting equation (6) in equation (1), the amount of output corresponding to the situation characterized in inequality (8) is obtained

$$(9) \qquad Y(L_S>L_D^*) = \beta^{\beta/(1-\beta)} \cdot Z^{\alpha/(1-\beta)} \cdot C^{-\beta/(1-\beta)} \cdot (1+r)^{-\beta/(1-\beta)}$$

In an analogous fashion the demand for the variable input can be calculated, yielding

$$X = \beta^{1/(1-\beta)} \cdot Z^{\alpha/(1-\beta)} \cdot C^{-1/(1-\beta)} \cdot (1+r)^{-1/(1-\beta)}$$

The second scenario takes place when the demand for credit exceeds supply, i.e.

$$(10) \qquad L_S < L_D^*$$

In this case, the actual amount borrowed is equal to the amount offered by the lender ($L=L_S$), and the optimization rule given by equation (5) does not hold. Rather, the amount of liquidity available ($L_o + L_S - M$) determines the amount of cash input utilized, namely,

$$(11) \qquad X = (L_s + L_o - M)/C$$

The calculation of the output supply equation corresponding to condition (10) is done by inserting equation (11) in equation (1), obtaining

$$(12) \qquad Y(L_S > L_D^*) = Z^{\alpha} \cdot C^{-\beta} \cdot (L_S + L_o - M)^{\beta}$$

Comparing equations (12) and (9), we note that the two output supply equations differ in the composition of variables. Specifically, when credit is a binding constraint, the amount of liquidity is a determinant of output supply, but the rate of interest does not have an effect. When credit is not a binding constraint, the rate of interest has a negative effect on output, but the amount of liquidity does not affect output. In addition, the coefficients of variables common to both equations (e.g. fixed factors, input price) are not identical. The system of equations we need to estimate is

$$L_D = L_D\ (Z,\ C,\ r,\ L_o,\ M)$$
$$L_S = L_S\ (H)$$
$$L = \text{min.}\ (L_S,\ L_D)$$
$$Y = Y(Z,\ C,\ r) \text{ if } L_D < L_S$$
$$Y = Y(Z,\ C,\ L + L_o - M) \text{ if } L_D > L_S$$
$$X = X(Z,\ C,\ r) \text{ if } L_D < L_S$$
$$X = X(Z,\ C,\ L + L_o - M) \text{ if } L_D > L_S$$

where output and inputs are determined by switching regressions with an endogenous shift. This is a disequilibrium system. In principle the econometric methodology to estimate such a system has already been developed in recent years (Maddala, 1983). In the present case, however, a modification needs to be developed to the existing literature, as the condition governing the switch of the Y and X equations from a credit-demand-constrained situation to a credit- supply-constrained situation is not only endogenous, but in addition there are no indicators to establish which constraint is binding. A further complication is the fact that the credit market includes two types of lenders, formal and

informal, with possibilities for rationing in either sub-market. We address these issues in the following section. Note, however, that once such a system is estimated, it is possible to determine the extent of credit rationing (i.e. unsatisfied demand). This is done in a probabilistic sense, i.e. for each observation it will be possible to calculate the probability that the demand for credit is greater than supply. The average probability of credit rationing, or the percentage of observations with a rationing probability exceeding 0.5, can be taken as indicators of the extent of rationing. For rationed households, the marginal impact of additional liquidity on output and input use can be estimated. The resulting information is of much operational relevance in the context of credit projects and policies affecting liquidity supply in agriculture. Other variables of interest for policymakers, which are usually incorporated in output supply estimates, are various elements of public infrastructure (roads, irrigation, agricultural extension) and holding size. While price elasticities are typically of much interest in supply equations, the cross-section data to be utilized in this study do not allow estimates of price elasticity. Any variation in interest rates could, however, allow an estimate of interest rate elasticity.

C. Accounting for Formal and Informal Credit Markets

As explained in Section I and Annex I, existing evidence suggests that, at least in certain areas of rural China, aside from the institutional credit system (the Agricultural Bank and the Rural Credit Cooperatives), an active and substantial informal credit market has

emerged. The distinction between these two sources of credit is highlighted by many studies of rural development. The literature on rural credit markets suggests several important differences between these two sources of finance, which have implications for their availability to different groups of farmers or for different types of activities.

All lenders face the risk of borrower default (or arrears), and they therefore require information which is borrower-specific, aside from general information which pertains to large groups of borrowers or potential borrowers (e.g. product price forecasts). The acquisition of information is costly, and this aspect defines one of the main distinctions between institutional and non-institutional lenders. The latter are frequently part of the farmer's environment. They either live in the village or in the township, or visit these areas frequently. They have established a close acquaintance with the farmer, his family and his social group. They may, in fact, be part of it. They thus have (or can collect at low cost) detailed and reliable information on the farmer, his skills, his background, his past record, the quality of his land, etc. Institutional lenders, on the other hand, do not usually have such detailed personal familiarity with farmers, although they may gain more information over time, if the farmer borrows repeatedly (Timberg and Aiyar, 1984; Miracle, 1983). Collecting detailed information is more costly for institutional lenders. With less information, a borrower is more risky from an institutional lender's perspective as compared to a non-institutional lender.

Another aspect which may further distinguish institutional from non-institutional lenders' risk perceptions relates to the borrower's incentive to default and the lender's ability to enforce repayment. Since a non-institutional creditor is a member of the farmer's social environment, he can mitigate against default by exercising social norms and pressures (e.g. concern for loss of status in the community) which are not available to an institutional creditor (Von Pischke, 1983, p. 228). An informal lender can also apply enforcement procedures or threats which institutional lenders cannot (Bottomley, 1983, p. 284). As a result of these considerations, an institutional lender will be more inclined to use formal measures that reduce loan riskiness, such as requiring a loan security. The term loan security usually refers to the borrower's pledging collateral or providing a collateral substitute.

Farmers who operate in areas where suitable collaterals are not common, such as rural China, or who do not have acceptable collaterals, will resort to using collateral substitutes (Binswanger et al., 1985) to obtain loans or to increase loan amounts. A frequent form of collateral substitute is a third party guarantee. The lender may agree to accept in lieu of a collateral the pledge of another person (guarantor) to assume responsibility for repayment. For this arrangement to be viable, the guarantor has to be less risky than the borrower and his risk should not be highly correlated with that of the borrower.

Ownership of tradeable assets (machinery, animals) serves as an implicit collateral, since the borrower may have an incentive to generate liquidity by sale of assets rather than lose future borrowing access in the case of default. Owners of substantial assets are thus preferable to those who have few assets, even if no formal collateral is pledged.

Institutional lenders in China, as in many LDCs, are heavily regulated and they have to abide by set interest rate ceilings which dictate relatively low rates of interest on deposits and loans (compared to what would probably prevail if no constraints were imposed). Non-institutional lenders are not effectively regulated. As a result, non-institutional lenders almost always charge higher interest rates than institutional lenders. The exceptions are credit transactions among relatives, which in China and in other LDCs often do not carry any interest charges. Motives for intra-family transactions are very different from those for profit-oriented transactions (Ben-Porath, 1980). For analytical purposes, it may be more appropriate to treat no-interest loans from realtives as part of the farmer's own liquidity.

While information costs are comparatively low for the non-institutional lender, there are other factors which generate higher lending costs. A non-institutional lender operates within a confined geographical area and there is therefore a high degree of co-variability among his clients and fewer possibilities for risk diversification as contrasted with a nation-wide bank operating in different agro-climatic zones. Non-institutional lenders also usually fund their operations from equity rather than deposits. This stems from reasons related to the synchronic timing of deposit withdrawals and credit demand, as well as the

high co-variation in incomes of borrowers and depositors (Binswanger et al., 1985). Institutional lenders, on the other hand, have more diversified sources of funding, and can thus maintain a lower reserve/lending ratio, contributing to a lower lending cost.

Transaction costs incurred by the borrower are a frequently mentioned aspect differentiating institutional credit sources from non-institutional ones. In many areas, the procedures required to obtain institutional loans are time consuming, both in terms of actual time spent by farmers (obtaining appropriate documentation, filling forms, meeting relevant officials) and the time elapsed between loan application and credit approval. Non-institutional lenders do not impose time consuming procedures, they may be located within the farmers' environment, and loans can be agreed upon and disbursed within days. This would imply that if borrowing needs are small, the farmer may prefer non-institutional credit even-though the interest rate is higher (Ladman, 1984; Adams and Nehman, 1979). It is not clear whether transaction costs are high in China, and this will be one of the issues to be clarified in the empirical research.

If borrowing from institutional lenders entails relatively low transaction costs and the institutional interest rate is significantly lower than non-institutional rates, farmers would prefer to borrow from an institutional source. However, institutional credit is likely to be rationed due to the fixed interest rate, and unsatisfied credit demand may be covered by non-institutional sources. As Stiglitz and Weiss (1981), Virmani (1985), and other works reviewed by Braverman and Guasch (1986) have demonstrated, even when interest rates can move freely, credit rationing can be optimal due to adverse selection and asymmetric information. It is thus possible that farmers are rationed by

non-institutional lenders as well. In the case of rural areas with highly localized non-institutional lenders, asymmetry in the information between lender and borrower may be small. Hence, the likelihood of rationing by non-institutional lenders is lower. Incidentally, experience in other LDCs suggests that interest rate ceilings and credit rationing tend to result in preferential access to credit for wealthier and more influential farmers.

The discussion above implies that it may not be appropriate to aggregate together all types of credit in the analytical work, as different behavioral rules are likely to affect the supply of formal and informal credit. This distinction needs to be reflected in the underlying economic structure and the econometric specification. Below, we expand the illustrative model of the preceding section to incorporate specifically two types of credit. No- interest loans from relatives are included in the household's initial liquidity.

We introduce the following notation in addition to symbols used earlier:

L_{FD} = demand for credit from formal lenders

L_{PD} = demand for credit from informal lenders

L_{FS} = supply of credit from formal lenders

L_{PS} = supply of credit from informal lenders

L_F = observed amount of borrowing from formal lenders

L_P = observed amount of borrowing from informal lenders

r = rate of interest on formal loans

δ = rate of interest on informal loans

If transaction costs are not too high, the farmer will prefer to obtain credit from the lower interest cost lender, i.e. the formal

lender. We can thuse conceive of a hypothetical sequence of decision-making where the farmer first optimizes his production plan as if there is no limit to the amount of formal credit available to him. The solution to this problem and the resultant notional demand for formal credit and the corresponding output supply are identical to the specifications presented in equations (5), (6) and (9) of the preceding section, with the index D changed to FD and S changed to FS. If the demand for formal credit is less than the supply of formal credit

$$(13) \qquad L_{FD} < L_{FS}$$

then, the right-hand side of equation (9) describes the supply of output. If, however, the demand for formal credit exceeds the supply available from formal lenders, i.e.

$$(14) \qquad L_{FD} > L_{FS}$$

then, the farmer borrows the whole amount of formal credit available (L_{FS}) and reformulates his optimization plan taking the amount of liquidity from own sources and from the formal lender as given, but assuming, at this stage, that there is no limit to the amount of informal credit which can be obtained at the rate of interest δ

$$(15) \qquad \underset{X,\, L_{PD}}{\text{Max}}\ \Pi = Z^{\alpha} \cdot X^{\beta} - C \cdot X - r \cdot L_{FS} - \delta \cdot L_{PD}$$

subject to $C \cdot X = L_o + L_{FS} - M + L_{PD}$.

As before, the cash constraint can be used to express X in terms of liquidity variables

$$(16) \qquad X = (L_o + L_{FS} - M + L_{PD})/C$$

Using equation (16) in the objective function (15), the optimization problem can be rewritten

$$(17) \qquad \underset{X,\ L_{PD}}{\text{Max}}\ \Pi = Z^{\alpha} \cdot X^{\beta} - C \cdot X - r \cdot L_{FS} - \delta \cdot L_{PD}$$

The first order condition for a maximum is

$$(18) \qquad \beta \cdot Z^{\alpha} \cdot (L_o + L_{FS} - M + L_{PD})^{\beta-1} \cdot C^{-\beta} \leq 1 + \delta$$

Strict equality in equation (18) will be maintained only if there is a positive demand for informal credit. If at $L_{PD} = 0$ the condition holds with strict inequality, then the demand for informal credit is zero. Such a sitution is possible even though, by assumption, there is excess demand for credit at the formal interest rate r. The reason is the "jump" in interest rates from r to the higher rate δ prevailing in the informal credit market. We deal with these two cases (i.e. strict equality and strict inequality) separately. First, suppose that condition (18) holds with strict equality. One can then calculate the notional demand for informal credit by rearranging equation (18), yielding

$$(19) \qquad L^{*}_{PD} = \beta^{1/(1-\beta)} \cdot (1+\delta)^{-1/(1-\beta)} \cdot C^{-\beta/(1-\beta)} \cdot Z^{\alpha/(1-\beta)} + (M - L_o - L_{FS})$$

where * denotes optimal (desired) level. If the household is able to obtain this amount of credit from the informal sector, i.e., if

$$(20) \qquad L^*_{PD} < L_{PS}$$

then, (19) can be used to calculate the corresponding output supply equation by substituting X in equation (1) using equations (16) and (19)

$$(21) \qquad Y(L^*_{PD} < L_{PS}) = \beta^{\beta/(1-\beta)} \cdot Z^{\alpha/(1-\beta)} \cdot C^{-\beta/(1-\beta)} \cdot (1+\delta)^{-\beta/(1-\beta)}$$

Note that equation (21) is similar to equation (9), the only difference being the rate of interest entering the right-hand side.

If, however, the demand for informal credit exceeds the amount available from informal lenders, i.e.

$$(22) \qquad L^*_{PD} > L_{PS}$$

then the optimal plan as implied by the first-order condition (18) is not applicable, and the farmer simply pools the liquidity available from all sources and spends it (minus consumption requirements) on input purchasing. Thus, if condition (22) holds, it follows

$$(23) \qquad X(L^*_{PD} > L_{PS}) = (L_o + L_{FS} + L_{PS} - M)/C$$

Utilizing equation (23) in (1) yields the output supply equation corresponding to a situation where the farmer is rationed in both the formal and informal credit markets

(24) $Y(L^*_{PD} > L_{PS}) = Z^{\alpha} \cdot C^{-\beta} \cdot (L_o + L_{FS} + L_{PS} - M)^{\beta}$

The case where the demand for formal credit exceeds supply but demand for informal credit is zero (i.e. the case where condition (18) holds with strict inequality for $L_{PD} = 0$) yields an output supply equation similar to equation (24), except that liquidity does not contain informal credit. This is because in such a situation it is not optimal to borrow any amount of informal credit, although there is excess demand for formal credit. It follows that marginal changes in the formal interest rate will not affect the demand for formal credit in this case, and hence the supply of output will not be affected by marginal changes in either formal or informal interest rates, but will be affected by marginal changes in the amount of formal credit offered at the prevailing interest rate. Thus

(25) $Y(L_{FS} < L^*_{FD}, L^*_{PD} = 0) = Z^{\alpha} \cdot C^{-\beta} \cdot (L_o + L_{FS} - M)^{\beta}$

To sum up the discussion in this section, the incorporation of the distinction between formal and informal credit supplies does not change the basic characterization of the system to be estimated. The observed quantities of credit borrowed from each credit market (including the case of no borrowing) could correspond to situations of excess demand or excess supply. This disequilibrium implies that the observed outputs could be generated by different behavioral rules, depending whether the underlying situation of the household was one of excess demand or excess supply, in the formal, informal, or both credit markets.

The system of output supply equations, input demands and credit supply and demand equations (in both markets) as developed above, is an interlinked system of switching regressions with an endogenous switch conditioned on the outcome in the credit markets. The individual household observations cannot, however, be classifed a priori by whether they are in excess credit supply or demand. Systems of switching regressions with endogenous switch and a known classification have been dealt with in the literature (see review in Maddala, 1983, pp. 223-228). The case of unknown classification has not been developed, but estimation is possible utilizing a maximum likelihood procedure. We have already developed in collaboration with Professor Lau a preliminary approach for estimation which seems feasible.

D. Investment

The analysis of rural households' investments on the basis of cross-sectional data is bound to be less rigorous than the analysis of short-term production decisions. This is because many agricultural investments are implemented over time (e.g. land improvement, construction), and because decisions are influenced by factors which are not related to the current period only. In addition, the occurence of agricultural investments at any given point in time may be "thin" (e.g. the acquisition of machinery or additional draft animals). It is typically preferred to consider changes in the capital stock over a longer period. The problem in the latter case is that data on credit transactions in one cross-section will not allow conclusions about the role of credit

availability in constraining investment. Our intention is to collect data on current investments (say, within the last year), current capital stocks, and initial capital at some common starting point, say 1983 (through farmer recall). Aside from descriptive information on the composition of current investments and capital stocks, and qualitative information on the manner by which they were financed, an effort will be made to relate current investments to current credit transactions, in a manner analogous to that which will be applied to the output supply and input demand relations. That is, it will be recognized that current investments may, or may not, be constrained by credit supply from formal and informal credit markets. In addition, a longer-term notion of capital formation will be analyzed (changes in capital stocks between 1983 levels and present). In this case, present credit transactions are less relevant, and a recall of the total amount of credit utilized during the period (from formal and informal sources, separately) will be required. Such recall data are obviously less accurate than current data, but in the absence of suitable samples, this approach has some merit.

III. ORGANIZATION

A. Collaborative Arrangements

The study is a collaborative undertaking by the Research Center for Rural Development (RCRD) under the State Council of the People's Republic of China, and the World Banks i.e., the Agriculture and Rural Development Department and China Department. The RCRD is a prominent policy-oriented research institution dealing with rural development issues. It has collaborated with the Bank on two previous analytical tasks, and is considered one of the most qualified research groups on issues of agricultural development in China. RCRD is closely linked to senior Chinese policy-makers.

The collaborative arrangements were discussed in detail with an RCRD team during a preparatory mission in March 1987. The research team for this study will include senior researchers from RCRD and World Bank staff, supplemented by consultants. In addition, Dr. Justin Lin of Beijing University will participate in the study under an arrangement between his university and RCRD. The collaborators will contribute to all tasks of the research, namely, detailed design, field work, analysis, report writing and dissemination. The major research outputs are therefore expected to be a joint product of Chinese and Bank collaborators.

Given the collaborative nature of the study, there will be no consulting fees to RCRD staff or overhead charges for utilization of RCRD facilities. It is expected that the collaboration will require working visits by RCRD staff to Washington (six visits are planned) and working visits by Bank staff and consultants to China (six visits are planned).

Professor Lawrence J. Lau of the Department of Economics, Stanford University will participate in the study as a consultant. Professor Lau is a leading economist/econometrician, with an established record of analytical and empirical work on farm productivity issues. He is fluent in Chinese and has experience of work on China's economy.

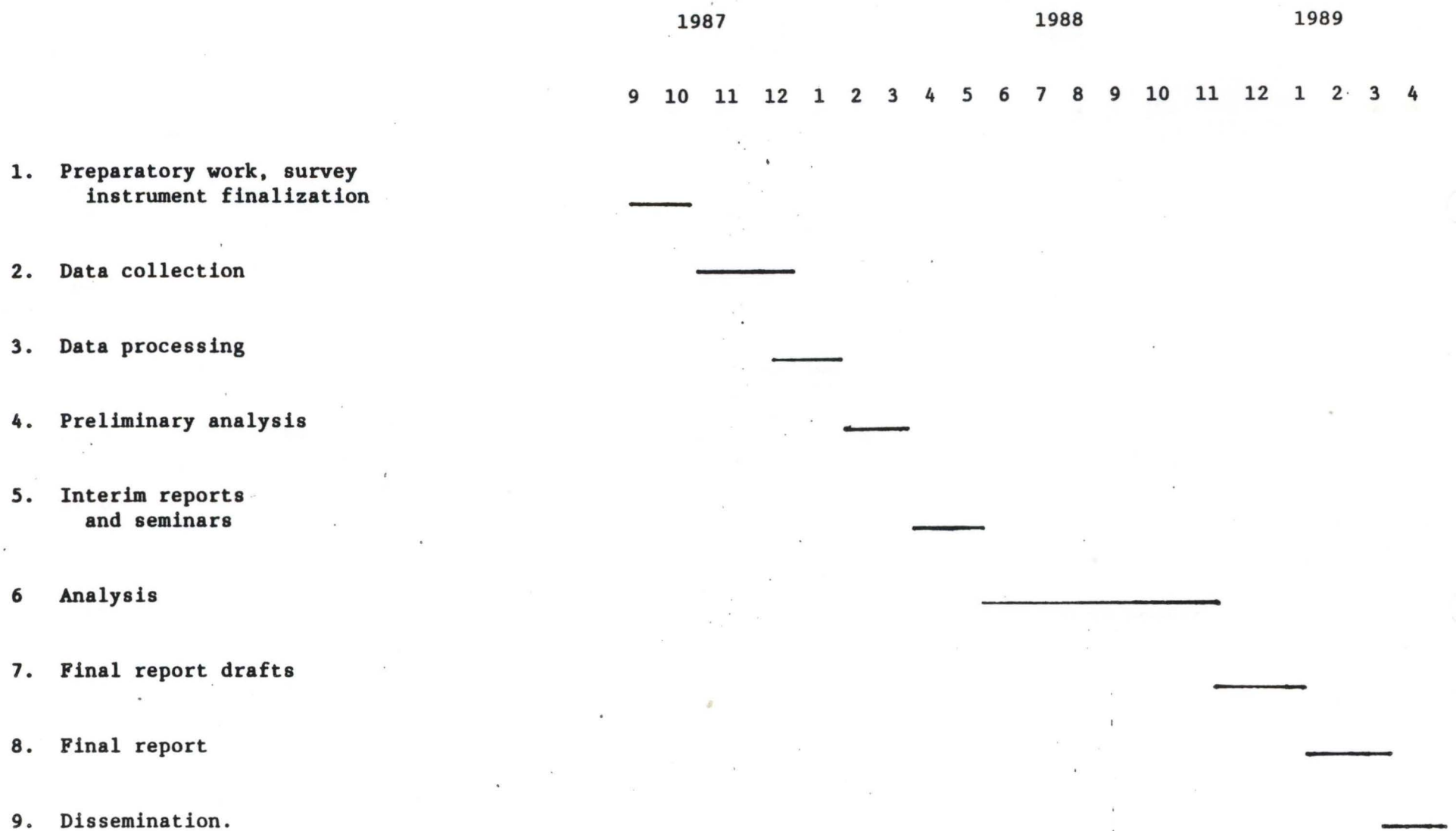
B. The Work Program

The work program consists of the following tasks which are listed in sequential order:

1) Finalizing the conceptual framework and survey instruments field testing, revision;
2) Data collection via farmer surveys and interviews of lending officers and local officials;
3) Data processing and validation;
4) Descriptive and preliminary analysis, integration with existing literature, interim reports;
5) Analysis;
6) Final reports; and
7) Dissemination.

The research is expected to last twenty months. The detailed time table is presented in Table 2 assuming the study commences in September 1987. This sequence provides an opportunity for progress review, and a reassessment of the original analytical approach about 7 months after study initiation, when the descriptive and preliminary analysis is completed and interim reports are prepared.

Table 2: **STUDY OF RURAL FINANCIAL MARKETS, INVESTMENT AND FARM PRODUCTIVITY IN CHINA**
TIME TABLE



IV. RESOURCE REQUIREMENTS

A. Manpower

i) Staff Contribution

Bank staff will be involved in all stages of the research, including conceptualization of the analytical framework, design of data collection, supervision of field work and data processing, analysis and report writing. Most of the staff input will be provided by the Agriculture and Rural Development Department (Mr. Gershon Feder) and the China Department (Messrs. Anthony Ody and Ramesh Deshpande). In addition, comments and advice at various stages of the study are expected from staff of the Resident Mission in Beijing.

The total staff input is expected to reach 70 man-weeks over the course of the study. The input is needed, inter alia, to capitalize on the relevant experience of Bank staff with related studies in South and Southeast Asia and to ensure the operational relevance of the study.

ii) Collaborator Contribution

The collaborating institution, RCRD, will assign two senior researchers (Messrs. Chen Xiwen and Luo Xiaopeng) full-time for the duration of the study. Two other senior researchers will participate on a part-time basis. In addition, three research assistants and two programmers/analysts will be allocated to the study at half-time. Based on cost parameters from a similar Bank-funded study in Thailand with participation of local consultants, the value of RCRD staff time allocated to this study is costed at about US $90,000.

B. **Cash Costs**

The cash cost of the study is estimated at $169,600 (including contingencies of about $15,000). Of this total, the data collection cost is about $33,000 (20%). There is no cash cost assumed in respect of the time input by Chinese collaborators or research assistants, nor is there a charge for overheads, as the study is a collaborative undertaking. A detailed budget for the study is enclosed.

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Shiri Alon	April 19, 2017

ANNEX I

Review of Evidence on Rural Financial Markets in China

Most of the documented information on China's rural credit markets refers to the institutional credit sector, and it is mostly aggregative and descriptive in nature. This is not surprising, as the informal credit market has not had the sanction of government for many years, and there are no standard statistical reports where information could be recorded.

The main institutions lending to rural households and enterprises in China are the Agricultural Bank of China (ABC) and the Rural Credit Cooperatives (RCCs).[1] The rapid growth in rural incomes and savings has increased the role of ABC and RCCs as mobilizers of rural resources. Prior to the introduction of the production responsibility system, a major share of agricultural investment was financed from commune (collective) savings, supplemented by budgetary allocations and modest private savings. The role of collective savings as a source of financing agriculture is however declining, as the control over resources shifts from collectives to households.

A. The Agricultural Bank of China (ABC)

ABC was reestablished in 1979 after several previous phases of operation and dissolution. It has a nationwide system of branches, with lending offices at the county level and savings mobilization offices in many townships.[2] ABC is primarily responsible for unified management of

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1/ The discussion below draws heavily on a draft report "Rural Financial Institutions," June 1986, by Ramesh Deshpande, World Bank.

2/ The administrative structure in China contains (in descending order) provinces, prefectures, districts, counties and townships.

state funds allocated through the banking system for agriculture, mobilization of rural savings and providing loans for agriculture and rural development. It is also responsible for providing leadership to RCCs; financial guidance to collectives and other rural organizations; and supervising state and township enterprises' cash and working capital management.

At the end of 1985, ABC had assets and liabilities of Y199 billion, of which about half were deposits. Rural credit cooperatives contributed about 43% of the deposits, and individuals and households contributed 17%. Thus 60% of ABC's deposits came directly or indirectly from rural households.

The total of outstanding loans of ABC as of end 1985 was Y170 billion. About two-thirds of this was allocated to commercial enterprises, and only 3% (Y5 billion) to rural households. Loans to RCCs amounted to Y3 billion.

Between 1982 and 1985, ABC's deposits, at current prices, have grown at an annual average rate of 20%; deposits of industrial and rural enterprises increased six-fold, and those of individuals nearly tripled (Table A1). It is apparent that the ABC acts as a net conveyor of funds from rural households (directly, or indirectly through the RCCs) to other economic agents, as the total deposits from households are Y55 billion, while loans to households are only Y7 billion.

Credit extended by ABC grew by 58% in 1984, but following the credit squeeze applied in 1985 to reduce liquidity in the economy, the growth of credit declined to 16% in 1985, as demonstrated in Table A2.

While it is evident that ABC loans to individuals remain only a minor part of its activities, there was a marked increase in such transactions between 1982-1986. Most of ABC's loans are short-term (less than one year maturity), and less than 3% of its loans are medium and long term. These longer term loans are extended mostly to township and village enterprises. Typically, ABC loans are backed by goods or inventory, and lending is regulated by a plan approved by the Central Bank (People's Bank of China). Interest rates at present are fixed by state regulation for different types of deposits and loans.

Currently, ABC's provincial and lower level branches consult with local officials in the preparation of their credit plans, and the latter influence ABC's lending priorities considerably. This interaction is expected to continue in the future, especially on development strategies and ABC's role in financing local investments. ABC would however have powers to refuse a loan it if is not consistent with its appraisal standards. This was not the case in the past, when ABC could not refuse a loan once recommended by a local government authority.

ABC has recently defined the loan approval powers of its branches. Loans up to Y200,000 are approved by a county sub-branch, loans above Y200,000 but below Y500,000 are approved by a prefecture-level branch and loans above Y500,000 are approved by a provincial branch. Decisions on loans of Y1000 and above to individuals, of Y10,000 to collectives and of Y50,000 and above to village and township enterprises and on loans for larger agro-industry plants would be taken jointly by a branch manager, in charge of a branch's credit department, and senior staff drawn from accounting and credit departments.

A borrowing enterprise or a household provides ABC with its annual credit plan along with a loan application showing the purpose and amount of the loan needed, the amount of self-raised funds, the period for which the loan is needed, and expected returns from the activity financed. It is ABC's policy to require borrowing enterprises to contribute from their own resources a certain amount toward investment or working capital needs funded by the ABC. By current policy, such contributions should be at least equal to 30% of the relevant investment cost or working capital.

B. Rural Credit Cooperatives (RCCs)

Rural credit cooperatives are the main contact point between agricultural households and the institutional credit system. Peasant associations and credit unions have long existed in China for providing mutual financial assistance. Since 1950, the Government has actively encouraged the establishment of rural credit cooperatives, initially to support the process of collectivization in agriculture and rural industry, and by 1955 almost every township (formerly commune) had a credit cooperative. A township typically covers an area of approximately 6-7 sq.km. and about 20,000 households. In 1985, there were about 59,000 RCCs, with over 32,000 branch offices and about 360,000 deposit and credit delivery stations at village level. Most RCCs have also established agency arrangements with local leaders, who collect household deposits in return for the payment of a small fee. About 80% of rural households are members of credit cooperatives. ABC and the RCCs overlap at the township level but this overlap is limited mainly to deposit-taking, as the ABC is an infrequent lender to households.

RCC membership is voluntary and open to all households. A member purchases at least one share (Y2 to Y5). One does not have to be a member

to deposit with or borrow from an RCC, but members enjoy priority in receiving loans and pay interest at a rate slightly lower than that charged to non-members. There are no minimum membership or capital requirements for RCCs. Unlike some other developing countries, in China the government avoids contributing to RCCs' share capital, so as to safeguard their character as organizations owned by the people. RCC members elect group leaders (generally two per village) to constitute a cooperative congress, the basic representative organization in the management structure of an RCC. The cooperative congress elects from its members a board of directors (comprising of 5-7 persons) for day-to-day management; a board of supervisors for overseeing RCC operations; and a cooperative council to represent the RCC in legal matters.

Grass-root (township) RCCs establish an association or federation at the county-level to liaise with ABC and other credit cooperatives in the county. A county association's office operates from the ABC's sub-branch and usually an ABC staff member coordinates its activities. Most other office holders of a county association are elected representatives of the cooperatives' township councils. County associations provide clearing services to RCCs, extend subsidies to cooperatives making losses from funds contributed by profit-making cooperatives, manage staff retirement funds, organize training for cooperative staff, and oversee RCC compliance with government and ABC regulations. Although the RCC management structure is designed to be democratic, in practice ABC at present wields considerable influence over RCCs' financial policies and operations.

RCCs accept savings and time deposits from individuals, rural enterprises and collectives at the township and village level. At the township headquarters, members have a choice to place their deposits either

with the ABC sub-branch or with an RCC. RCCs extend loans to individuals, households and collectives. By regulations, an RCC is generally obligated to redeposit about 30% of its total deposits with ABC, but this ratio has since been reduced to 20% for cooperatives in less-developed counties and to 25-28% for other areas, to increase RCCs' loanable funds. RCCs have been net providers of resources to the ABC. In 1984, RCCs' net contribution to ABC's total deposits was about 43% and to the deposits of the entire banking system, about 10%. The redeposit requirement serves a dual purpose: first, as a liquidity reserve against RCC deposit liabilities and second, to supplement ABC resources.

Following a nearly threefold increase in rural incomes, per capita savings deposits are estimated to have increased from Y22 in 1978 to Y118 in 1984. The increase in rural savings potential was reflected in RCC deposit levels, which in nominal terms increased at an annual average rate of about 40%, from Y21.5 billion in 1979 to Y72.5 billion in 1985 (Table A3).

Concurrently with growth in deposits, there have been significant structural shifts in RCCs' deposit portfolio: first, between 1978 and 1985, the share of deposits of agricultural collectives in total deposits declined from 45% to 9% while that of individual farm families' deposits increased from 36% to 78%; second, the share of time deposits in total deposits increased from an estimated 20% to 66%, providing a larger core of longer-term funds to the system. The first change reflected in large part the widespread adoption of the production responsibility system, which led to a decline in the share of rural income derived from collective operations from 66% in 1978 to 10% in 1984, while the share of income derived from household production increased from 27% to 81%. The second

change, i.e. the shift in deposit maturities, was facilitated by the introduction of longer-term deposits (up to eight years as against one year in 1978). Interest rates increases during the period probably also contributed to the overall growth in deposits (as well as to the growth in longer-term deposits).

RCCs in less-developed provinces have a relatively smaller deposit base due to lower per capita incomes and savings rates in these provinces. RCCs' institutional and financial problems resulting from poor turnover and profitability are therefore more common in less-developed areas. These RCCs generally receive subsidies from ABC and other cooperatives to cover their overheads.

RCCs place their surplus funds with ABC while those that have demand in excess of loanable funds borrow from ABC, subject to limits set by annual credit plans approved by ABC. ABC has announced that during the next five years, it intends to provide about Y500 million annually (0.7% of total RCC deposits) to RCCs in less developed areas, which must mobilize more savings to meet increasing loan demand.

Although RCC deposits have recorded a rapid growth in recent years, there are still constraints to greater deposit mobilization. These relate to the following factors:

(i) Low Interest Rates on Deposits. Since 1978, interest rates on deposits have been increased several times. However, current rates (particularly on deposits for one year and above) tend to be low and not sufficiently conducive to deposit mobilization. During 1985, interest rates on deposits were negative in real terms. In recent years, rural households and enterprises have established several modes of informal savings and loan associations in response to severe gaps in banking services provided by the RCCs and the ABC (see discussion below). These

associations currently offer interest rates for one-year deposits, ranging between 14-15% as against 8% offered by RCCs. Even the ABC and other banks recently issued one-year bonds at 15%, which induced a substantial increase in loanable funds, mostly from households.

(ii) Interest Rates on Loans. In relation to prevailing interest rates on deposits, interest rates on loans are also low. Besides generating excess loan demand, the rates provide a narrow spread (about 1%) which is insufficient in most RCCs to meet overheads and undertake institutional development. In less developed areas, where both the level of deposits and turnover are relatively low, RCCs tend to lose money. In 1984, 25% of RCCs (about 15,000) were in loss.

(iii) Farmers' Preference for Cash. While households which have taken to diversified agriculture and sideline activities seem to face an acute shortage of working capital, other households tend to keep their financial savings in cash for different reasons. Many households are unwilling to disclose their newly acquired wealth because of doubts about the longer term sustainability of present policies. Time and assurances from Chinese leaders are beginning to dispel these doubts, but inevitably the process of building people's confidence is gradual. It is also reported that farm households occasionally face difficulties in withdrawing their deposits when they need because of liquidity constraints within the RCCs and therefore they prefer to hold on to cash rather than depositing with ABC or cooperatives. A survey made by Zhongxiang County Party Committee office in Hubei province showed that, during 1984-85, 35 out of 80 RCCs in the county were unable to repay deposits on time due to problems in collecting loan repayments. Such episodes damage RCC credibility.

(iv) Impact of Credit Rationing. RCC loans are regulated by a credit plan approved by ABC. Credit plans are designed to ration credit for priority purposes and within limits set by ABC as a part of the national credit plan for itself and RCCs, as approved by the Central Bank. When credit is rationed, experience in many countries suggests that there is a danger that less influential farmers and enterprises may be excluded from credit programs.

(v) Absence of Horizontal Flows. RCCs are not permitted to transfer surplus funds to other RCCs or to banks except through ABC. Consequently, although some RCCs experiences unmet demand for investible resources in rural areas, the RCC system as a whole has remained a net provider of funds to ABC. Restrictions on horizontal transfers of funds have reduced the RCC system's flexibility in credit planning and management, and opportunities for profitable deployment of resources, and have in turn reduced incentives for greater deposit mobilization.

RCCs' loans have increased from about Y5 billion (or 22% of RCC deposits) in 1979 to Y35 billion (or 56% of the total deposits) in 1985. There has also been a structural change in the composition of the loan portfolio: loans to individual farmers and township enterprises have increased severalfold while loans to collectives have remained at about the same level (Table A4).

ABC loans to households were Y6 billion in 1985, while RCCs lent Y19 billion in the same period. It is thus evident that three quarters of households' institutional credit was provided by RCCs. About 97% of RCCs' loans have been extended for short-term production purposes. Until the initiation of economic reforms in 1979, RCCs extended only short-term (one year) working capital loans, while development funds for fixed capital and

equipment were provided by rural collectives (communes) or the government. Long-term lending by financial institutions was prohibited until 1979. With the introduction of the production responsibility system, government allowed all banks (including RCCs) to extend loans of up to three years to individual households for fixed capital or equipment. Such loans now account for about 3% of RCC loans. Disbursement of new medium-term loans was however substantially reduced in early 1985 as part of a credit policy seeking to reduce excess liquidity in the economy.

RCCs provide loans for all types of agricultural, industrial and commercial activities at the village level, including crop production, animal husbandry, forestry, fishery, handicrafts and service enterprises. Consumption loans generally receive low priority. Current policy prescribes that borrowers provide at least 30% of investment costs from their own resources while the balance is provided by an RCC as a loan. Loan purposes are determined by RCCs in relation to national priorities and local needs, and are reflected in an annual credit plan which requires approval of the ABC's county and provincial level offices. The credit plan is based on RCCs' available loanable funds (net of redeposits with ABC) including deposits and funds to be borrowed from ABC. Individual loan applications are approved by the RCC boards of directors. Loan approvals for larger amounts (Y100,000 and above) are reported to ABC but its prior approval is not required. In preparing a credit plan, RCC congress and board of directors play an important role. It is at this point that local leaders can influence the RCC lending program to suit local priorities. Individual loan applications are required to be recommended by group leaders in the cooperative congress, who are responsible for loan supervision and collection. Loan repayments are required to be guaranteed

by another member of the cooperative, but it is not clear to what extent this requirement is in fact enforced.

C. Informal Credit Markets

The dimension and characteristics of informal credit markets in China are only scantily covered in the literature. This is understandable, as such transactions were illegal in the past, cash requirements of households were small, and there were few households with significant surpluses of cash which could be lent. Nonetheless, there is evidence that "private credit" was being utilized even by collective organizations before 1979, because the institutional credit system was unable to satisfy credit demands at the fixed, low interest rate [Sun (1981), Zhao (1985)]. The interest rates for such private credit were reportedly very high. For instance, data from Cancheng county, Henan province, indicate that the rates charged on private credit to production teams (communal unit) were in the range of 3%-30% per month, with a mean of 10% (Sun, 1981). In another area, Miluo county, Hunan province, the rate was lower, between 2-5% per month (Zhang, 1980). Most of the lenders were members of the production team. Private (or informal) transactions between households were apparently rare before the economic reform was introduced. A survey in Xingmin county, Liaoning province, in early 1980 revealed that 93.7% of private transactions were between production teams and households, and only 1.7% were between households.

With the reestablishment of the household as a production unit, there is evidence of a significant volume of credit transactions between households. In addition, anecdotal evidence indicates the emergence of groups of households and rural enterprises which mobilize savings and extend loans to households and other enterprises (i.e. non-bank financial

entities). The few scattered surveys which address credit in the non-institutional sector indicate that the volume of informal transactions is substantial. A small sample (20 households) in Wuchang county, Heilongjiang province, in 1985 found that of the total credit used, more than two-thirds was provided by the informal market (Zhang, 1985). A survey of 60 rural households in Feng Jie county, Sichuan province (of which about 60% engaged in agriculture and animal husbandry) found that 80% of the respondents borrowed from non-institutional sources. Within this sample, informal credit provided a third of the credit utilized. A larger sample, (136 households) in Anh Yue county, Sichuan province (Du Li, 1986), of which approximately half borrowed from informal sources, suggests that the volume of <u>institutional</u> credit was only one-third of total credit. A study of Jiangxi province (Mei, 1985) suggests similar magnitudes. Zhao (1985) asserts, on the basis of observations in twelve counties in seven provinces (sample sizes not reported) that the volume of informal credit is roughly equal to that of institutional credit. Jiang (1984) argues that in many areas of China the volume of informal credit has equaled or surpassed that of the institutional market. While the selection criteria of the samples cited above are not clear, it is apparent that the informal credit market is significant in the areas studied.

As in many other LDCs, the main sources of informal credit cited in the studies reviewed above are relatives and friends (95% in the Anh Yue sample, and the majority in the other samples). However, both Zhang (1985) and the Feng Jie study note the recent emergence of middlemen linking lenders and borrowers who are not from the same village, and who are not closely related. Most loans obtained from relatives and friends carried no interest, or were charged the same low interest as institutional credit.

However, Zhang (1985) reports interest rates among relatives of 3% per month, and 5% per month from other lenders. Mei (1985) reports interest rates of up to 10-15% per month. The Feng Jie study reports interest rates of 10-31% per month on middlemen-arranged loans and Zhao (1985) reports informal interest rates reaching 15-20% per month, although typically the rate is 2-3% per month. The latter loans specify strict maturity dates (unlike loans from relatives and friends).

While interest rates of 5% per month are common in the informal sectors of LDCs, rates as high as 10-30% per month are rare. The Feng Jie study suggests the following reasons for the extremely high rates of interest (although no analysis is provided to support the arguments): the riskiness of agricultural investment and production, the low level of agricultural technology, the distance from markets (which could also contribute to monopoly power), and the lack of collateral assets. The latter reason is not necessarily a problem for informal lenders in countries where society and the legal system sanction the status of a lender. Evidence from other countries suggests that informal lenders are less inclined to require collaterals, as compared to institutional lenders (Feder et al, 1987). In China, however, the socialist doctrine and written law do not protect lenders. Collaterals would therefore be useful to reduce lenders' perceived risks, if there were mechanisms to enforce collaterals. However, land, which is typically the most suitable collateral asset in rural economies (Binswanger and Rosenzweig, 1986), is not privately owned in China. Since lease contracts on land are sometimes in practice tradeable among households, there is a theoretical possibility for lease contracts to be used as collateral. There is, however, no documented evidence of the use of lease contracts for collateral purposes.

The reason may be the absence of enforcement mechanisms, as lenders are not formally sanctioned by law. Other assets which could be used as collateral are equipment, animals, product stores, etc., but they are less suitable. Agricultural products are typically a security in transactions between marketing boards and institutional lenders in China, but in that case the circumstances are more appropriate, as the entity owning the commodities is official, and it is easy for the lender (typically ABC) to enforce a lien. Enforcement of a lien on a moveable collateral is much more complicated and costly when the borrower is an individual household.

The Feng Jie study provides anecdotal evidence of the use of houses (which are privately owned) as collateral, and indicates that in such cases the interest rate tends to be lower. However, the author questions whether such a contract is legally valid and whether it could be enforced with official sanction.

Several of the sources cited above claim that in their study areas many households face a binding constraint on the availability of institutional credit, and report farmers' complaints that quantities are small or that occasionally credit is not available at all. Yet at the aggregate level, the deposits of rural households are much larger than loans from formal institutions. This may be due to regional imbalances and the lack of horizontal transferability of funds. In any case, it would be operationally useful to assess in a rigorous fashion the extent of institutional credit shortage in different agro-climatic areas of China.

There is anecdotal evidence of financial enterprises involving more than a single household, which pool resources and provide credit at interest rates higher than those of the ABC. Such enterprises may even have received funds from local public entities and may enjoy full sanction of local authorities. The activities of these enterprises have not yet been properly documented or investigated.

Table A.1: Sources of ABC Deposits As of December 31 (Y Billion)

Source	1982	1983	1984	1985	Annual Growth 1982/85
Deposits of rural credit cooperatives	30	39	32	40	10.1%
Deposits of industrial & commercial enterprises	5	11	25	32	85.7%
Deposits of individuals	5	7	10	15	44.2%
Others	13	6	5	5	-27.3%
Total	53	63	72	92	20.2%

Source: Data provided by the Agricultural Bank of China.

Table A.2: ABC Loans, 1979-1985
Outstanding Balances as of December 31
(Y Billion)

	1980	1982	1983	1984	1985
Loans to					
Rural industrial & commercial enterprises	14	40	48	101	118
Rural collectives	14	17	16	14	14
Township enterprises	-	-	-	-	-
State-owned agri. enterprises	1	2	4	5	6
Rural credit cooperatives	1	1	3	3	3
Individuals/ households	-	1	2	5	6
Crop advances	1	1	1	1	1
Other loans	-	-	-	-	3
Total ABC Loans	48	62	72	146	170
Loans on behalf of other organizations	18	15	55	-	-
Total	76	77	127	146	170

Source: Data provided by the Agricultural Bank of China.

Table A.3: Deposits of Rural Cooperatives
(Y Billion)

	1979	1982	1985	(1985/79) % increase
Deposits from				
Agricultural collectives	9.8	12.1	7.2	-26
Township/ Village enterprises	2.2	3.4	7.2	227
Individual Peasants	7.8	22.8	56.5	624
Others	1.7	0.7	1.6	5
Total	21.5	39.0	72.5	237

Source: Statistical Yearbook of China and data provided by the Government.

Table A.4: Rural Credit Cooperative Loans
(End of the Year)
(Y billion, at current prices)

Borrowers	1979	1980	1981	1982	1983	1984	1985
Individual Farmers & households	1.09	1.60	2.52	4.41	7.54	18.11	19.2
Township Enterprises	1.42	3.11	3.55	4.23	6.01	13.50	16.5
Collectives	2.25	3.45	3.57	3.48	2.82	3.84	4.3
Total	4.76	8.16	9.64	12.12	16.37	35.45	40.0

Source: Statistical Yearbook, 1985 and data provided by Government.

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