PUBLIC INVESTMENT AND CHINA'S GRAIN PRODUCTION COMPETITIVENESS UNDER WTO

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ABSTRACT

China's accession to the WTO poses great challenges to the Chinese agricultural sector, especially to the grain producers. Compared with major grain exporters in the world, most grain crops in China are high in production cost and weak in market competitiveness. This can be partly attributed to the fact that Chinese farmers are facing with poorer agricultural production infrastructures and inadequate public investment in agricultural research and extension, which leads to the lower efficiency in private inputs and thus higher private cost per unit of product. After China joining the WTO, protective and administrative measures conflicted with the URAA cannot be utilized as before. Alternative measures should be explored to provide help to farmers to improve competitiveness of their product. Public investment in agricultural research and other production infrastructures should be considered with high priority as one of the policy alternatives. This paper examines the effects of public investment in agricultural research on the reduction of production cost of major grain crops in China by using crop-specific data for the past 20 year. It is concluded that, increasing public investment in agricultural research, which is well within the "green box" policy framework and allowed by the WTO rules, is a plausible and effective measure to reduce grain producer's private input and to enhance the competitiveness of grain products. It is also of great significance to sustained food security in China.

JEL Classification: H540, Q170, Q180
Key words: public investment, agricultural research, grain production, China, WTO

INTRODUCTION

The challenges that China's WTO accession brings to its agricultural sector has been widely discussed and studied. One of the common understandings is that some sectors in Chinese agricultural such as vegetables and animal husbandry may benefit from the accession, but grain production sector will be negatively affected. Although an appropriate portion of grain import is necessary and beneficial to the country's economy as a whole, an excessive large amount of grain imports will sharply reduce income of farmers in China, who accounts for 70 percent of its total population and will not be able to move out of agriculture within quite a certain period of time. Moreover, the disincentive of grain production domestically will undermine the nation's grain production capability in the future. As the most populous nation and a fast growing economy in the world, China's future food demand will inevitably increase at a steady pace. It would be important for the long-term food security of China as well as of the world, that the country maintain a solid capacity of grain production and provide some basic proportion of its fast growing food needs[1].

Various measures have been proposed to protect grain producers and support grain production in face of foreign competition. This paper attempts to analyze that, in stead of border measures, direct production support or other forms of protection, alternative approaches, such as public investment in agricultural research and etc, which provide little twisting of market, could effectively improve the competitiveness of grain production in China through reduction of farmers production costs, and should be considered as a plausible policy intervention.

[1] The author is not advocating self-sufficiency, however, which is equally, if not more, harmful to the nation's food security in the long run.

The paper is organized as follows: next section begins with a discussion of the challenges WTO rules posed to the Chinese grain sector and policy alternatives of the government. Section 3 presents empirical studies on the contribution of public investment in agricultural R&D and irrigation to the grain production in China in the past twenty years and the estimation of potential improvement in competitiveness of these crops through the increased investment in agricultural research. Policy implications are presented in Section 4 and conclusion remarks in the last section.

Challenges and policy alternatives for Chinese grain sector under WTO

China's accession to the WTO demonstrates its commitment to the rest of the world to open its markets and adhere to international, market-based rules in the world trading system. However, studies have shown that grain production in China as a whole has lost its comparative advantage in most major crops (Li, 1998; Peng and Cheng, 1999 and Huang, 2000). It has been wild worried that imports from world competitors would significantly reduce grain producers' income, which not only poses threat to social instability as the number is so large, but also lead to disincentive of grain production, and hinder the nation's long term food security.

Before WTO accession, measures such as price support, restriction of trade in the form of tariff and non-tariff barriers had been widely utilized to protect domestic production. Some of These measures could not be continued after accession to the WTO, others could only be continued at a declining extent. The rules and regulations of the URAA poses great challenges to the policy and institution in the Chinese agricultural sector.

The URAA differentiates domestic support policies to "Amber box" policies and "Green box" policies according to their effects on production and trade. The former directly subsidize production and influence the decision to produce, and are included in the calculation of the AMS which is subject to reductions, while the latter are exempted from any expenditure limits. The current AMS in China is estimated at about 2 percent, much less than the 8.5 percent set in the agreement, it is possible that China increase its AMS in grain production to provide some protection to grain producers.

However, alternative measures other than the above could also be considered. Not only because that "Amber box" measures cause trade distortions, but that it is extremely difficult, even impossible for the government to transfer income from minority to majority of the population in any meaningful way, and such transfer may not contribute to improvement in food security in long term. Therefore, one of the most desirable policy tools is likely to be increasing investment in "Green Box" measure, such as public expenditure in agricultural R&D, irrigation, rural infrastructure, and etc.

As a bulk agricultural produce, the competition of grain in international market is basically a competition of price, the core of which is the production cost at the farmers' level. In China, there has been a rising trend of production cost in the past years, which resulted in an increasing price higher than that in the world market. (Li, 1998; Peng and Cheng, 1999 and Huang, 2000). However, more detailed research showed that some crops still hold comparative advantage in certain regions in the country, but the advantage is declining with the rising production cost (Zhong, 2001). It indicates that Chinese farmers still has potential to compete, if necessary measures have been taken to stop the rising trend of production cost, or even to bring the production cost down to a lower level. Given the present situation China is, these measures should be both in conformity with the WTO rules and cost effective.

The growth of Chinese agriculture production in the past could be attributed to several types of sources: 1) private physical inputs such as land, labor, fertilizer, machinery, seeds and other necessary production materials; 2) institutional reforms, and 3) public inputs such as improvement in technology, education and rural infrastructure.

Institutional reform may well have been a one-time effect and might not be counted as a reliable policy alternative measure to achieve sustainable improvement. The increased use of material inputs, however, will further add to the farmer's private cost. Studies have shown that, public investment in agricultural research, irrigation, education and other rural infrastructures has been a major driving force to the growth of agricultural production in China (Fan, 1997; 2000). For example, Fan and Pardey claimed that more than 20% of production growth in Chinese agriculture from 1965 to 1993 came from increased agricultural research investment. Fan later estimated that the internal rates of returns (IRR) to Chinese agricultural research range from 35% to 90%. In fact, compared with most developed, even developing countries, the lack of sufficient public investment in agricultural sector is one of the major reasons for the low efficiency and high cost of agricultural production in China. As a policy alternative, public investment in agricultural research, etc, is well within the "green box" criteria according to the URAA regulations. Furthermore, it does not go to the cost formation of the producers while improving their production condition and increase the efficiency of their private inputs. Being a cost-effective, "green box" policy measure, public investment in agricultural research, etc, deserves focused attention.

The objective of this study is to use the provincial level data for the last two decades to analyze crop-specific contribution of agricultural R&D investment to the yield increase for three major grain[2] crops and to analyze how the government can use agricultural research investment as a policy tool to reduce the farmers' production cost, therefore increase their competitiveness in the international market.

MODEL, DATA AND EMPIRICAL RESULTS

Land is the scarcest resource in Chinese agriculture; almost all growth in the sector has been realized by increases in yield per unit of land. In our study, the yield of each grain crop is expressed as a function of these two categories of inputs:

$$Y=f\left(\sum X_i, \sum Z_k\right);$$

where Y stands for the yield of the crop;
X_i stands for all types of private physical inputs; and
Z_k stands for different forms of public investments.

To grain producers, it is the private inputs, X_i, that constitute their production cost and farm gate price. A high rate of increase in these physical inputs for the sake of higher yields, as has been the case in China for the past decades, will result in diminishing return of these inputs and thus higher cost per unit of output for the producers. The increase in public investment, Z_k, on the other hand, will improve the production infrastructure for the producers, and lead to a higher level of output with the same physical inputs or, to a reduced private investment level needed, if keeping the same output level. In both cases, the producer's cost for per unit of output will be reduced, and the competitiveness of the product thus improves.

The empirical study in this section, therefore, consists of above two analyses. Part 1 focuses on the estimation of effects that an increased public investment may exert on the reduction of unit private cost through increased output, and Part 2 on the cost reduction through input substitution if output kept constant.

Increase in yield and reduction in unit private cost

Model and data

The double-log, or Cobb-Douglas, functional form is used to estimate the production functions of the three major crops of grain—wheat, corn and rice. The production function for each crop is then expressed as follows:

$$\ln Y_{jt} = \alpha_0 + \beta \ln x_{it} + \gamma \ln Z_{jt} + \sum_{g=2}^{6}\sum_{k=1}^{2} \gamma_{gk} \ln Z_{kg} D_g + \sum_{j=2}^{j} D_j + \varepsilon_{jt}$$

where Y is the yield of a given crop, such as wheat, corn or rice;
X stands for the total physical inputs for the production per *mu*;
Z stands for public inputs in agricultural research and irrigation denoted by k;
D is regional dummy;
j is the province; and
t is year.

By dividing China into six agro-ecological regions based on their characteristics of natural endowments and resulted cropping systems, the difference in the efficiency and investment behavior in pubic sector inputs are captured by setting up interaction variables $Z_{kg}D_g$, g=2, 3,…6, between regional dummies and public

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[2] Grain is defined as wheat, corn and paddy rice in this study.

investment in agricultural research and irrigation. Also included are a set of provincial dummy variables, D_j, j=2, 3,...j, depending on the applicable number of provinces for each crop, to represent the time-persistent, provincially different social, economic and natural endowments in each province which have not been accounted for by variables in the equation.

The private physical inputs are expressed as the total material cost per *mu* (1/15 ha) for each crop under investigation. This approach is different from most previous research but is a more desirable variable with this data sample to estimate the "true" relationship between physical inputs and output.

There are many forms of public investment, such as agricultural research and development (R&D), irrigation, rural education and infrastructure (including road, electricity, telecommunication) that contribute to agricultural production growth. In this research we choose agricultural research and irrigation as the proxy to estimate the effects of public investment on the yield growth of the three crops in China.

The irrigation variable is expressed as the ratio of irrigated area to total arable land. It is not included in the production function for rice, as virtually all paddy rice fields in China are irrigated. The agricultural R&D variable is measured in a form of "stock" defined as a function of past government expenditures on agricultural R&D. This stock variable is calculated using the lag structure estimated by Fan, Zhang, and Zhang (2000) for Chinese agriculture. They use a two-step approach. First they use econometric technique to determine the length of lag by including past government expenditures in the production function. They found that China's agricultural research lag is between years 7 and 17, i.e., research will begin to affect production from the year 7, and will last until year 17. Second, once the length of lag is determined, they use the second polynomial distribution to calculate the coefficient of each year's expenditure in the production function.

Pooled time-series and cross-province data are used in the estimation of each function, from 1979 to 1997 and at provincial level. Yield and material cost data used are from agricultural production cost survey conducted under the State Development and Planning Commission. The research stock variable is constructed from annual research expenditures which are taken from Fan, 2000, and Fan, Zhang, and Zhang, 2000. Irrigated area data are taken from China Statistical Yearbook.

Empirical Results

Estimates of each production function - wheat, corn and rice are reported in Table 1. Results of provincial dummies are not reported here for simplicity.

The results of estimated yield function show that the physical inputs have positive and significant coefficients as expected, ranging from 0.20-0.31 for the three crops. The agricultural R&D stock variable also exhibits significant and positive coefficients for most of the six regions for all three cops. In contrast, the coefficients for the ratio of irrigated area are insignificant in all regions for either wheat or corn[3].

Table 1. Coefficients of estimated wheat, corn and rice yield, 1979-97.

Explanatory Variable	Dependant Variable		
	Wheat	Corn	Rice
Constant	4.2874	4.6495	4.9564
	(6.38)*	(7.41)*	(9.89)*
Total material cost	0.3115	0.1968	0.2627
	(4.64)*	(4.34)*	(5.91)*
R&D stock, Region 1	0.106	0.138	0.064
	(6.99)*	(2.81)*	(1.06)
R&D stock, Region 2	0.120	0.097	0.052
	(6.57)*	(5.09)*	(3.24)*

[3] The insignificance of irrigation variable could be explained by several factors. Firstly, the variable is taken as the share of irrigated area in the total, which does not reflect the quality of irrigation. Secondly, most cost survey is usually conducted in irrigated areas so the irrigation variable shows little impact on yields.

Table 1. continued

R&D stock, Region 3	0.119	0.072	0.058
	(5.97)*	(0.97)	(0.36)
R&D stock, Region 4	0.038	0.066	0.075
	(1.66)*	(3.37)*	(4.48)*
R&D stock, Region 5	0.012		0.011
	(0.80)		(1.55)
R&D stock, Region 6	0.076	0.036	0.066
	(2.61)*	(0.82)*	(1.35)
Irrigation, Region 1	0.0836	0.0980	
	(0.60)	(0.71)	
Irrigation, Region 2	-0.0677	0.0415	
	(-0.51)	(0.30)	
Irrigation, Region 3	0.0808	-0.3313	
	(0.22)	(-0.89)	
Irrigation, Region 4	-0.1275	-0.5526	
	(-0.41)	(-1.44)	
Irrigation, Region 5	0.2129		
	(0.49)		
Irrigation, Region 6	-0.0289	0.2094	
	(-0.10)	(0.81)	
Provincial dummy			
Degree of freedom	360	318	353
Adjusted R^2	0.84	0.65	0.74

Note: numbers in parentheses are *t*-values. Coefficients for dummies are not presented.
Region I, Pastoral: Inner Mongolia, Ningxia, Gansu, Qinghai, Xinjiang, Xizan;
Region II, Spring Wheat: Heilongjiang, Jilin, Liaoning;
Region III, Winter Wheat: Beijing, Tianjin, Hebei, Henan, shandong, shanxi, shaanxi;
Region IV, Wheat-Rice: Jiangsu, Anhui, Hubei;
Region V, Double Rice: Zhejiang, Shanghai, Fujian, Jiangxi, Hunan, Guangdong, Guangxi;
Region VI, Southwest Rice: Sichuan, Yunnan, Guizhou (See Carter, C. and F. Zhong, China's Grain Production and Trade, 1988, page 67-70).

Public investment in agricultural R&D, which is expressed in our model as a stock of knowledge of 17 years, has shown a significant and positive contribution to the growth of yields for wheat, corn and rice in most regions.

Based on the estimation of yield functions, two scenarios are simulated to estimate the effect of increased public investment (in agricultural research, as a proxy in this study) on the cost reduction. It is assumed that public investment in agricultural research increases at an annual rate of 5% and 10% respectively in Scenario I and Scenario II for the following years, with all private inputs remain at the same level as in 1997 for wheat, corn and rice. The total sown area in the future remains unchanged at the current level. Table 2 presented the results calculated from Scenario I and Scenario II, showing the percentage of physical cost reduction with yield increasing over the years through 5% and 10% annual growth in research investment.
It could be seen from the table that, at the same time of increasing output, a 5% annual growth of research investment helps to brings down the unit output cost in terms of private input by 8.2%, 4.2% and 2.9% for wheat, corn and rice respectively by the year 2020, compared with that of 1998, and that a 10% annual increase in research expenditure will help the farmer to reduce the average cost of unit output by 15%, 8.9% and 6.5% for these three crops.

Table 2. Improvement in Competitiveness
Reduction of Average cost through output increase (compared with year 1998).

	Scenario I			Scenario II		
	wheat	corn	Rice	wheat	corn	Rice
1999	0.09%	0.15%	0.01%	0.13%	0.16%	0.04%
2000	0.22%	0.27%	-0.01%	0.34%	0.32%	0.07%
2001	0.42%	0.30%	0.05%	0.67%	0.40%	0.21%
2002	0.71%	0.23%	0.17%	1.13%	0.41%	0.44%
2003	1.02%	0.17%	0.33%	1.65%	0.44%	0.73%
2004	1.36%	0.18%	0.50%	2.24%	0.56%	1.04%
2005	1.69%	0.25%	0.62%	2.84%	0.75%	1.34%
2006	2.11%	0.30%	0.79%	3.58%	0.96%	1.69%
2007	2.53%	0.42%	0.89%	4.34%	1.27%	2.00%
2008	2.91%	0.64%	0.92%	5.09%	1.68%	2.23%
2009	3.29%	0.85%	0.95%	5.87%	2.11%	2.49%
2010	3.72%	0.99%	1.04%	6.70%	2.49%	2.80%
2011	4.16%	1.15%	1.14%	7.55%	2.93%	3.12%
2012	4.61%	1.41%	1.44%	8.42%	3.47%	3.64%
2013	5.02%	1.67%	1.59%	9.25%	4.04%	4.00%
2014	5.50%	1.94%	1.78%	10.13%	4.64%	4.38%
2015	5.94%	2.33%	1.96%	10.96%	5.37%	4.74%
2016	6.39%	2.70%	2.15%	11.78%	6.09%	5.09%
2017	6.82%	3.08%	2.33%	12.59%	6.80%	5.44%
2018	7.26%	3.46%	2.51%	13.40%	7.51%	5.79%
2019	7.70%	3.83%	2.70%	14.20%	8.21%	6.14%
2020	8.13%	4.22%	2.88%	15.00%	8.93%	6.49%

Note: Scenario I and II assumes agricultural research expenditure grows at 5% and 10% annually respectively, other factors remain unchanged after year 1997.

Inputs substitution and cost reduction

Model Specification
As stated above, in the production function of our study above, inputs have been aggregated into the category of private physical inputs and public sector inputs, expressed in the production as $Y = F(C, R)$, with Y the yield per unit of land, C the private cost, and R the research stock. Specified by the production function, the two inputs are substitutable, and there exists trade-off between the two inputs if the output is to be kept constant. If we increase the amount of public expenditures on agricultural research, the quantity of research stock will increase accordingly which may enable the producers to reduce their private inputs and keep the production stay on the same output isoquant. In another word, for the same amount of output, private cost could be reduced due to the increasing investment in public inputs, which, by improving the production condition and infrastructure, improves productivity and the investment return of private inputs. As it is mainly the private inputs that constitute the farm gate price, this improvement in efficiency and investment return to private inputs will lead to a reduced farm-gate price and improve the competitiveness of the product in the world market.

The Marginal Rate of Technical Substitution *(MRTS*), which measures the rate at which one input have to be substituted for another in order to keep output constant, could be expressed as:

$$MRTS_{cr} = MP_r/MP_c,$$
where MP_r and MP_c are marginal products of the research stock and private cost, respectively.

$MRTS_{cr}$ indicates how much private cost can be saved by increasing one unit of the research stock, both the private cost and the research stock variables are in absolute volume terms. The marginal rate of technical substitution can also be measured in percentage terms, derived from above equation, and is expressed as

$$MRTS_{cr}^{*} = E_r/E_c$$

where E_r and E_c stand for output elasticity of research stock and private cost. It measures that, if the research stock increases by one percent, how much percentage of private cost could be saved without reducing the output.

The values of E_r and E_c have been estimated in Section 3.1. $MRTS^*_{cr}$ could be used to calculate, with a certain percentage of increase in research expenditure as assumed in Scenario I and Scenario II, how much cost, in percentage terms, could be reduced in terms of per unit of land, or per unit of output, keeping total output at the levels.

Empirical Results
The $MRTS^*_{cr}$ for each crop in each region is calculated with E_r and E_c estimated in Section 3.1, and is listed in Table 3. A national $MRTS^*_{cr}$ is also calculated as a weighted average (weighted by output in each region), which is used in the following simulations for each crop for simplicity.

It can be found out from Table 3, that for each percent increase in research stock, the private cost can be reduced by 0.37 percent, 0.40 percent, and 0.14 percent, for wheat, corn, and rice, respectively; if the output is to be kept constant. In another word, keeping the same output, 1% increase in public investment in research could help to reduce farmer's production cost, and therefore, the price of wheat by 0.37%, corn by 0.40% and rice by 0.14%. Taking the data of 1997, 5% increase in research expenditure will reduce the private input for wheat, corn and rice by 3.48 Yuan, 3.27 yuan and 1.50 Yuan per *mu*. If 1 additional Yuan per *mu* is to be invested in research for these crops as a whole, the private cost for wheat, corn and rice would be reduced by 5.50, 3.66 and 2.54 Yuan per *mu* respectively (see Table 4), a marginal reduction of cost of 11.70 Yuan for one additional Yuan investment.

Table 3. Modified Technique Rate of Substitution.

Region	I	II	III	IV	V	VI	**National**
Wheat	0.40	0.46	0.45	0.14	0.05	0.29	0.37
Corn	0.70	0.49	0.37	0.34	-	0.18	0.40
Rice	0.24	0.20	0.22	0.28	0.04	0.25	0.14

Source: Calculated in this study.

Table 4. cost reduction through increase in agricultural research (yuan/mu).

5% increase in ag.expenditure			1 yuan increase of ag. Research per mu		
Wheat	Corn	Rice	wheat	Corn	Rice
3.48	3.27	1.50	5.50	3.66	2.54

Source: Calculated in this study.

It should be born in mind, as research stock increases every year, one percent increase 20 years later will be far greater than that this year or next year. It should also be born in mind that the above estimation is made on the assumption of constant output and constant TRS. Further research would be desirable if future situation requires study of other scenarios.

POLICY IMPLICATIONS

Compared with most developed, and even many developing countries, the investment intensity in agricultural research and other agricultural production infrastructure in China is at the lower end. However, in the past several decades, agricultural research has been one of the major driving forces to the improvement of grain production in China. With China entering WTO and grain producers facing strong pressure of low-price imports, an increased investment in rural public domain such as agricultural research is urgently needed to further improve agricultural technology and provide grain producers with better production conditions that is comparable with their foreign competitors. With increased productivity either in terms of higher yield or lower private inputs, farmer's production cost could be brought down and their products more competitive.

While the unit cost of grain production being reduced through higher output, as is the case in the first part of analysis of section 3, its improved competitiveness would be partly offset by the higher level of grain supply. It is more desirable, under the present circumstances where domestic supply exceeds demand and prices exceed most major crops in the international market (except rice), that the output being kept for the time being and that the improved productivity from increased public investment all translated into cost reduction, as the case of input substitution in the second part of empirical study in section 3.

If future competition requires a certain level of cost reduction of grain production from the producers' side, further study could be carried out to estimate the necessary growth rate of public investment in agricultural research. In the recent years, the domestic cereal market prices in China are already at a level higher than those in the international market (except for rice). For example, the domestic market price for corn and wheat in year 2001 were approximately 7-8% higher compared with border prices of imports. From the baseline projection of IFPRI's IMPACT model, the world market price would be $123 per metric ton for wheat and $102 for corn at the year 2020. It means that the domestic prices for wheat and corn need to be reduced by some 10-15% to be competitive with foreign products. Assuming that the reduction of private production cost is in proportion with the reduction of price, based on the empirical results from this section, 1% increase in public investment in research could help to reduce the private production cost, and therefore, the price of wheat by 0.37%, corn by 0.40%, holding the output constant. If the investment in agricultural research increases 5% annually, as in the case of Scenario I, some 5 to 7 years would be needed to bring down the domestic price level to be compatible with the projected world market price, as a rough calculation. However, in reality, this process might be longer, since the increase in stock is different from that in expenditure, at least in the short run. If the government starts to increase current expenditure at a suggested rate, the stock will increase accordingly, but at a lower rate at the beginning. But if the growth pattern continues, the growth rates of the current expenditure and stock will converge and the long run objective reached after the estimated number of years. If the investment in research reached 10% annually as in Scenario II, the time needed could be shortened.

CONCLUSION REMARKS

Food security has always been a fundamental issue in Chinese policy making. Whiling keeping the possible future supply deficiency a fundamental concern in the long run, China's integration into the world economy, as exhibited by its WTO accession, brings the price competitiveness the immediate attention. This paper examines the effects of public investment in agricultural research on the cost reduction of grain production in a crop-specific manner. The research shows that public investment in agricultural research, a measure conformed to WTO framework, is an effective policy alternative to reduce the farmers' production cost and improve the competitiveness of Chinese grain products in the world market.

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Appendix

Data Source and Explanation

The data set covers most provinces in China over the years 1979-97. The three centrally administrated cities, Beijing, Shanghai, and Tianjin are excluded as their share of output in grain is relatively small compared with other crop producing provinces. Tibet is not included because of data unavailability. For the three crops, wheat, corn and rice, the provinces covered in their respective data set may differ, due to the difference of cropping-system and the crops sown to the area.

Yield—yield is measured at 500g per *mu*, from “National Cost-Benefit Survey for Agricultural Produce”, undertaken by the State Development and Planning Commission. Output is calculated in our study as the multiplication of yield and sown area.

Total physical cost—total physical cost for the production of a specific crop is measured as the sum of direct production costs for fertilizers, seedlings, pesticides, machinery, animal power, etc, and indirect costs for depreciation of fixed assets, purchasing and repairing small tools, and etc. It is also taken from the “National Cost-Benefit Survey for Agricultural Produce”. It has been adjusted, in our study, by the price index for agricultural production materials, adopted from China Price Statistics Yearbooks.

Percentage of irrigated areas—measured as the ratio of irrigated area to the total arable land in a province, adopted from China Agricultural Yearbooks.