Economics Division Working Papers

East Asia

Production interactions in China's semi-marketized farming sector

Yiping Huang

93/3

Research School of Pacific Studies ANU

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Yiping Huang is a PhD student with the Australia-Japan Research Centre at the Australian National University. His dissertation topic is *Government intervention and agricultural performance in China.*

abstract

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It is found that Chinese farmers behave rationally and the quantitative evidence suggests that policies which promote grain production will lead to sharp reductions in production of other agricultural products.

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Production interactions in China's semi-marketized farming sector*

Agricultural production is an important issue for China, both from a domestic and an international perspective, because of the country's large population and limited resource endowment (Garnaut and Ma 1992). Over a long period, the agricultural incentive system has been distorted and often used to pursue conflicting ends. A policy of low and stable prices for grain and fibre was implemented before the reform period which began in 1979. The aim of policy makers was to facilitate industrial development (Lin 1990 and 1992; Lin, Cai and Shen 1989) and to stabilize market fluctuations (Chui 1988). At the same time, a package of administrative policies was introduced with the aim of enabling China to achieve grain self-sufficiency. These goals were not successfully achieved and a program of reform was initiated at the end of the 1970s. During the period of economic reform, 1979-90, market mechanisms were introduced into the Chinese agricultural economy and the commune system was replaced by the household responsibility system. Farmers can now freely allocate resources to pursue their households' objectives although they are still subject to many policy restrictions.

As it has in the past, the Chinese government recently declared, in the Eighth Five-Year Plan, that grain self-sufficiency will remain one of the national objectives, at least for the next five years. Many economists have pointed out that pursuing grain self-sufficiency via policies which distort the domestic grain market imposes cost of reduced production in other market (such as fibre) and lower total income in the economy (Anderson and Tyers 1987; Yang and Tyers 1989; Anderson 1990; Gunasekera et al. 1991).

Given China's natural resource endowment and other social and economic conditions, the future of Chinese agriculture depends on farmers' production decisions. It is essential to clarify not only whether or not farmers in China are profit maximizers, but also to investigate quantitatively how they adjust their production structures in response to market or policy changes. The investigation

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of production interactions may shed some light on potential changes in the pattern of agricultural production if the economy is further marketized or if certain self-sufficiency policies are implemented. Only when production interactions are understood can comment be made on the potential impact of these policies on Chinese agriculture.

This study aims at an understanding of production interactions in the Chinese farming sector. In addition, the question of whether or not the above-mentioned policy packages are feasible, what will happen to fibre and other crop production as a result of policy introduction, and how the domestic demand for fibre and other crops can be met if a sharp fall in production results, are considered? The objective of this paper is to provide estimates of the supply elasticities of several products in the Chinese farming sector.

There are several flexible forms of profit or cost function developed for analysis of multiple product and multiple input production issues, such as translog, quadratic and generalized McFadden functions (McKay, Lawrence and Valstuin 1982; Weaver 1983). The advantage of flexible functional forms in empirical studies is that they require no prior restrictions on the parameters. Some elasticities, unlike those estimated by the Cobb-Douglas or CES functions, can vary from observation to observation.

The generalized McFadden profit function is applied in this study. The existence of extensive government intervention in agriculture, however, raises questions about the applicability of this methodology to the Chinese economy. This study also attempts to find a way of applying the usual approach to the Chinese agricultural sector, through appropriate data adjustments.

The process of application first involves data adjustment to eliminate information on activity which did not result from profit maximization behaviour. Having established the quantities of resources and outputs that are freely determined by farmers' objective of profit maximization and prices at the margin, an estimation is carried out using a restricted profit function to gauge the actual production interactions in the Chinese farming sector.

Is the profit maximization framework applicable to China?

The necessary condition for the application of the dual approach is that farmers make their production decisions in accordance with marginal prices. The Chinese economy has experienced more than thirty years of central planning, but it has become semi-marketized during the decade of reform. Farmers' economic decision-making is still more or less conditioned by government policy. This peculiarity implies difficulties for any direct application of the dual approach to the Chinese economy.

On a wide range of products, the Chinese government still intervenes in production through quantity and price restrictions. In the case of grain, a dual price system applies. Farmers have to fulfil State purchase quotas at State determined prices and output surplus to this quota can be sold on the free market. The purchase of cotton is monopolized by State agents. Farmers have no alternative in selling their cotton output other than to accept the State price.

More importantly, since the program of economic reform started at the end of the 1970s, the farm household has become the basic unit managing production and consumption activities. The reform policies implemented have created both necessary and sufficient conditions for farmers' successful pursuit of maximum profit from production. In studies of Chinese agricultural economics, it is accepted as an implicit assumption that farmers are rational profit maximizers (McMillan et al. 1989; Lin 1992).

Schultz has hypothesized that farmers in developing economies are no less rational than their counterparts in industrial economies in terms of seeking maximum profit (Schultz 1964). This Schultz hypothesis has been criticized because inefficiencies are often detected in the agricultural sector in developing economies (Ellis 1988). Many causes were listed to support the irrational behaviour hypothesis, such as the characteristics of small scale production and the lack of certain markets. For instance, it may be argued that for an autarkic farm household, objectives of production primarily concern self-sufficiency instead of profit. This argument can hardly be applied to Chinese farmers as markets are quite well developed and farmers are heavily involved in market exchange.[1] In addition, the validity of the rationality assumption depends solely on the behavioural mechanism. Farmers in China react to exogenous changes in exactly the same way as would farmers from other countries if they were placed in the same situation (Zhou 1992).

Farmers' decision-making in China is influenced by a combination of government policy and market conditions. The former includes a series of requirements and regulations set out in the economic plan, and the second is the normal incentive structure (relative prices at the margin).[2] Farmers always have

[1] For instances, about 36.6 per cent of grain output, 72.4 per cent of edible oil and 90.7 per cent of cotton output were sold to the government or on the free markets in 1990 (China Statistics Yearbook 1991:589). Farmers also buy large amount of consumption goods from markets.

[2] Economic plans have various forms in China. In the medium term, the government has a Five-Year Plan. Plan indicators related to farm households are made more explicit in the annual plan. Economic plans can also be divided into two types, one set by the central government (such as for grain and cotton) and the other set by various local governments (for instance the purchase plan for tobacco announced by some provincial governments each year).

to fulfil policy requirements regardless of the consequences.[3] Having done so, they then try to utilize all remaining resources and market information to maximize their profits. The assumption proposed by this study is that, in a semi-marketized economy like China, farmers' production activities are guided by a dual system. On one hand, farmers have to fulfil the quantity and price requirements set by the government. On the other, they, like any other farmers in the world, respond sensitively to changes in marginal prices. Any inefficiencies should be attributed to inappropriate policy interventions rather than to irrationality on the part of farmers. In this study, an attempt has been made to separate data arising from highly distorted activity from the data set used and to model farmers' decision behaviour by applying the dual approach.

Methodology

In a multiple product framework, supply and demand elasticities, both own and cross, are viewed as good indicators of production interactions. To derive these elasticities for Chinese agriculture, the flexible functional form, the generalized McFadden profit function, is applied (Diewert and Wales 1987; Lawrence and Zeitsch 1989; Albacea and Warr 1991). The McFadden unit profit function has the form[4]

$$R(P,N)/N = \frac{1}{2}\sum_{i=1}^{n-1}\sum_{j=1}^{n-1} b_{ij}(p_i/p_j)(p_j/p_n) + \sum_{i=1}^{n-1} b_i(p_i/p_n) + \sum_{i=1}^{n-1} b_{it}(p_i/p_n)t + \sum_{i=1}^{n-1} b_{it^2}(p_i/p_n)t^2 \qquad (1)$$

where $R(P,N)$ is profit as a function of prices (P) and fixed land input (N), and $p_1,\ldots,p_n$ are prices of outputs and inputs faced by the producer. Relative prices are adopted for the purpose of homogeneity of the unit profit function. Time, t, is usually included as a proxy for technological progress (Albacea and Warr 1991) or productivity (Lawrence and Zeitsch 1989). Since the data used in this study are provincial panel data covering only five years (1986-90), the terms containing the variable t are not included in the model.

[3] Since the government-set quota and State price are compulsory for farmers, they have to fulfil the requirements even if the policy causes them losses. In actual fact, there are some cases in which farmers refuse to fulfil low-price purchase quotas.

[4] This unit profit refers to profit per unit of land.

Because input prices are not available, a unit revenue function similar to (1) is constructed as follows

$$R(P,F,N)/N = \frac{1}{2}\sum_{i=1}^{n-1}\sum_{j=1}^{n-1} b_{ij}(p_i/p_n)(p_j/p_n) + \sum_{i=1}^{n-1} b_i(p_i/p_n) + \frac{1}{2}\sum_{i=1}^{n-1}\sum_{v=1}^{r} b_{iv}(p_i/p_n)Z_v + \sum_{v=1}^{r} b_v Z_v \qquad (1)$$

where F represents the set of inputs (that is, $Z_v \in F$ which includes labour, capital and fertilizer).

By differentiating this revenue function with respect to the relative prices, a set of supply equations is obtained[5].

$$X_i/N = b_i + \sum_{j=1}^{n-1} b_{ij}(p_j/p_n) + \sum_{v=1}^{r} b_{iv}Z_{iv} \qquad (2)$$

In these equations, the X_i's are positive and represent quantities of outputs supplied.

Chinese agricultural data consists of time-series and cross-section data for five years and twenty-eight provinces. The approach used in dealing with regional variation follows that developed by Fuss (1977) and applied by Lawrence and Zeitsch (1989) and Albacea and Warr (1991). The provinces are grouped into six regions in accord with the agricultural natural resource division and economic structure: Northeast, North, Northwest, South, Southwest and Southeast regions. Provinces classified into one region share a common intercept in the model.[6]

Estimates of this multiple product model implicitly assume that production of these products is weakly separable from the rest of the economy. Production decisions are only influenced by relative prices, not the absolute level of prices.

[5] Inputs are included in quantity form in the function and price responses of demand for inputs are not focused in this study.

[6] The Northeast region comprises Liaoning, Jilin and Heilongjiang provinces. The North region covers Beijing, Tianjing, Hebei, Shandong, Henan, Shanxi and Shaanxi provinces. The Northwest region includes Xinjiang, Qinghai, Gansu, Ningxia and Inner Mongolia provinces and regions. The South region comprises Fujian, Guangdong and Guangxi provinces. The Southwest region is comprised of Yunnan, Guizhou and Sichuan provinces, and the Southeast region comprises Hunan, Hubei, Jiangxi, Shanghai, Zhejiang, Jiangsu and Anhui.

The system equations (2) that can be estimated become

$$X_i / N = \sum_{k=1}^{m} c_{ik} D_k + \sum_{j=1}^{n-1} c_{ij} P_j^* + \sum_{v=1}^{r} c_{iv} Z_{iv} \tag{3}$$

$$X_n / N = \sum_{k=1}^{m} c_{ik} D_k + \frac{1}{2} \sum_{i=1}^{n-1} \sum_{j=1}^{n-1} c_{ij} (P_j^* / P_n) + \sum_{v=1}^{r} c_{iv} Z_{iv} \tag{4}$$

where $i, j < n$, $P_j^* = P_j / P_n$ are relative prices and D_k are the regional dummies, k = *NE* (Notheast), *NO* (North), *NW* (Northwest), *SO* (South), *SW* (Southwest) and *SE* (Southeast).

Like other flexible function forms in the dual approach, this profit function (1) and the derived output supply functions ((3) and (4)) provide a second order approximation in prices to an arbitrary function. In estimation, however, this is not regarded as an approximation to an unknown function. Rather, it is assumed to be a true data generating function. To keep the model consistent with the flexible profit function (1), the following symmetry restrictions have to be satisfied in estimating the system equations

$$c_{ij} = c_{ji} \tag{5}$$

One troublesome property of the profit function is the requirement of convexity, as this is often not satisfied in empirical studies. The profit function is globally convex in prices only if the matrix of estimated quadratic terms $C = [c_{ij}]$ (estimated from equations (3)) is positive semi-definite. Applying the Wiley, Schmidt and Bramble (1973) technique of reparameterization yields a generalized McFadden profit function which is globally convex in prices without loss of the function's characteristic flexibility. The technique involves the replacement of C by the product of a lower triangular matrix and its transpose, that is

$$C = AA^T \quad A = [a_{ij}];\ i = j = 1,....n;\ a_{ij} = c_{ij} \text{ for } i \geq j;\ a_{ij} = 0 \text{ for } i < j \tag{6}$$

The elasticities of output supply can be derived from equations (3) and (4) using the following formula (Albacea and Warr 1991)

$$E_{ij} = \partial \ln x_i / \partial \ln p_j = (DP_{ij}) p_j / x_i \text{ for all } i, j \tag{7}$$

where DP_{ij} is the second-order price derivative of the variable profit function and x_i is the estimated unit quantity $(\overline{X}_i / N)$ obtained from the system of equations (3) and (4). In the case of the generalized profit function applied in this

study, the second-order price derivatives are given by (based on equations (3) and (4))

$$DP_{ij} = c_{ij} / p_n \quad for \ i,j = 1,2,...,n-1 \tag{8}$$

$$DP_{in} = -\sum_{j=1}^{n} c_{ij}(p_j / p_n^2) = DP_{ni} \quad for \ i,j = 1,2,....n \tag{9}$$

$$DP_{nn} = \sum_{i=1}^{n-1}\sum_{j=1}^{n-1} c_{ij} p_i p_j / p_n^3 \quad i,j < n \tag{10}$$

The elasticities are then derived at the mean of the exogenous variables.

Data adjustment

A cross-section and time-series data set at the provincial level is chosen for this study, as price information for agricultural output is available from 1986 to 1990. The selected period, 1986-90, has the advantage of fewer structural changes (in terms of the market mechanism after dramatic reform in 1985). Of the thirty provinces in China, Tibet is excluded because of its extraordinary natural and economic structure and Hainan is included in Guangdong province because it was not set up as an independent province until 1988.

The study considers only the farming sub-sector of agriculture. The other sub-sectors are excluded by assuming weak separability which implies that farmers' decisions on farm production are independent of decisions on other production activities. Within the multiple input and multiple output framework, five outputs and three variable inputs are considered. As the interactions of grain and fibre with other farming production are of concern in this study, outputs are classified as rice, wheat, other grain, cotton and other crops. Variable inputs include labour (number of labourers), capital (including both machinery and draft animals) and material inputs (represented by fertilizer utilization). Land (arable land plus pasture) is treated as a fixed factor of production.

As discussed above, government policies place constraints on farmers' decision-making. Government policies are usually thought to be compulsory, so farmers have to fulfil these before they can take any profit-seeking action. When a quota and unique price are set by the State, there are three possibilities for farmers' actual production. At the quota point of production, if the marginal revenue of production exceeds the marginal cost, farmers may choose to produce more to the point where marginal net revenue equals zero. If, at the quota point, marginal revenue equals marginal cost, farmers may voluntarily fix their output at the quota level. These two cases are consistent with the market

case (the only factor that matters is the marginal price) and can be captured by the dual approach. However, if marginal revenue is less than marginal cost at the quota point, farmers still have to produce the quota, even if this level of production involves losses. In this third case, the marginal condition of output determination is violated.

Two data adjustments are applied in this study in order that the generalized McFadden unit profit function can be used. One adjustment is made to price data and the other to quantity data. Application of the generalized McFadden profit function requires data on the prices and quantities of rice, wheat, other grain, cotton, other crops, labour, capital, land and fertilizers. Two severe problems encountered in collecting Chinese data are the lack of price data for inputs, and the commodity-specific input data. To avoid these problems, the generalized McFadden unit profit function is transformed into a generalized McFadden unit revenue function. Thus, factors are treated as fixed quantities, avoiding reliance on the availability of the price data for results.[7] Land area is treated as a fixed production factor. However, the existing data in various statistical sources are not directly suitable for estimation purposes. The crucial requirement of quantity and price data is that prices should be marginal and that quantities should be the result of profit maximizing (or cost minimizing) behaviour.

Price data for cotton are provided by the State Statistics Bureau of China (SSB). These data are a mixed average of purchase prices. During the period under study, cotton purchases were monopolized by State agents and only about 5 per cent of cotton outputs were not purchased by the government. State purchase prices for cotton were therefore the marginal prices for farmers' production decisions.

Prices for other crops and other grain are price indices derived from the prices of a large variety of products within these aggregate groups. These indices were calculated from price and quantity data collected from the SSB publications.[8] Some of the price and quantity data had to be adjusted. Adjustments to grain price and cotton output are presented below as examples of the method used.

[7] Of course, this method also slightly alters the assumption of production. Farmers in reality certainly respond to the changes in input prices. Other than the lack of data, there are two reasons why this method is accepted. One is that fixed factor inputs are not an unrealistic assumption in terms of short-run decision making. The other reason is that the estimated shadow prices for these inputs did not generate convincing estimates.

[8] Sources used include various issues of *China Statistics Yearbook*, *China Price Statistics Yearbook* and *China Agricultural Yearbook*.

The marketing of grain in rural China involves a dual price system. Farmers have to sell a certain amount of grain (quota) to the government at the State determined price. After the fulfilment of the State purchase quota, grain is exchanged in the free market. Usually the market prices are the marginal prices which guide production decisions. The prices (P_a) presented in the price statistical yearbooks (SSB), however, are only mixed averages (of both State (P_s) and market (P_m) prices)

$$P_a = q * P_s + (1-q) * P_m \qquad (11)$$

where q is the share of quota purchase in total outputs. There is no information about P_s and P_m at provincial level. Fortunately, the SSB provides ratios (b) of market prices for grain over the state price

$$b = P_m / P_s \qquad (12)$$

For instance, national b was 1.915 in 1987. Combining equations (11) and (12) and given information on P_a and q, the marginal price of grain in individual provinces and in different years (P_m) can be easily derived.

As cotton transactions were strictly controlled by the government throughout the period under study, forced production, in which case the marginal cost of production is larger than marginal revenue, is likely to occur in the case of this product.[9] Nevertheless, it is extremely difficult to identify this from the existing data. Two approaches were adopted to identify forced production.

First, historical changes in cotton output, particularly those in recent years, were analysed. It is most likely that a province has no comparative advantage in producing cotton if the output and purchase quota decreased continuously.

Second, output and State purchase data were compared. If production is consistently close to the state purchase quota, or even lower than the quota in some years, production is likely to be forced.

When both situations are detected for a province, cotton production in that province is regarded as forced. In this data set, two provinces were detected, Shanghai and Hubei. If forced production is detected, the output quantity of this product is set to zero and the resources used for forced production are deducted from the existing data (according to the cost survey information provided in the agricultural year-book (SSB)). The point which should be kept in mind is that the

[9] To fulfil State procurement quota, some farmers may have to produce a certain amount of output even though losses are involved.

forced production refers to the province as a whole. It does not necessarily imply that the production of all households in the provinces is forced.

Model estimates and policy implications

The model system (3)-(4) is first estimated by ordinary least square (OLS) without any restrictions and constraints, then the symmetry restriction is invoked by applying the seemingly unrelated regression method (SUR), using the SHAZAM program on the UNIX mainframe. All prices in the system are deflated by the price of cotton. As noted above, the curvature of the profit or cost function is usually a problem in empirical studies. Very few studies have satisfied the curvature conditions. In this instance, we adopt the Wiley, Schmidt and Bramble (1973) technique of reparameterization for the restriction of convexity. The results from estimation of the constrained model are presented in Table 1.

Production interactions in China's farming sector are revealed by these elasticities. Rice production exhibits limited responses to price changes, probably because technology and land used for producing rice are relatively product specific. Irrigated rice land cannot be easily shifted to wheat or other crop production in the short-term. Very small increases in rice output can be expected from a rise in rice prices (own-price elasticity being 0.2, Table 2).

Production interactions between wheat, other grain and other crops tend to be significant. Own-price elasticities of wheat and other grain are higher than unity (1.1 and 1.5 respectively, Table 2), while that of other crops is 0.9. Rises in prices for rice or other grain may also reduce wheat output dramatically (cross-price elasticities being -1.1 and -1.2, respectively, Table 2). Output of other grain adjusts sharply in the opposite direction to changes in the prices of wheat (elasticity being -1.2) and other crops (elasticity being -0.88), and in the same direction as changes in the price of rice (elasticity being 1.23).

Positive cross-price elasticities were found between several pairs of products, for instance, between rice and other grain, between wheat and other crops, and between cotton and wheat.

Compared with elasticities used in other studies, the estimates in Table 2 are relatively high. In this study, most products are price elastic with respect to their own and others' prices, with the exception of the elasticities of cotton supply and elasticities associated with cotton price. This, however, partly reflects the heavy intervention by the government and the non-existence of a free market for cotton.

Table 1 The estimated generalized McFadden unit revenue function with symmetry and convexity restrictions

	Regression equations			
Regressors	Rice	Wheat	Other grain	Other crops
Rice price	1.6672	-1.06241	1.3191	-1.5227
	(1.45)	(6.62)	(11.60)	(9.55)
Wheat price	1.0624	0.6835	-0.8476	0.9896
	(1.37)	(0.52)	(1.01)	(2.03)
Other grain price	1.3191	-0.8476	1.1788	-1.2439
	(1.80)	(0.75)	(3.19)	(0.43)
Other crops price	-1.5227	0.9896	-1.2439	1.6525
	(3.10)	(3.17)	(0.91)	(3.28)
Fertilizer	0.8245	0.2140	0.2182	0.0827
	(2.10)	(2.63)	(3.62)	(0.66)
Labour	1.7852	-0.1240	0.0857	0.1961
	(7.15)	(2.47)	(2.38)	(2.52)
Capital	1.5445	-0.0387	-0.0301	1.84
	(2.37)	(0.30)	(0.31)	(9.10)
Northeast	-0.6776	0.4718	0.3552	0.2015
	(0.84)	(2.73)	(3.04)	(0.98)
North	-3.6316	1.3788	0.0128	-0.1640
	(4.18)	(7.83)	(0.10)	(0.73)
Northwest	-1.9538	1.0204	-0.1712	0.22
	(2.72)	(6.99)	(1.62)	(1.25)
South	1.8546	0.4956	-0.4862	0.5895
	(1.53)	(1.95)	(2.66)	(1.80)
Southwest	-2.5479	0.8537	0.0671	0.1818
	(2.48)	(4.13)	(0.43)	(0.64)
Southeast	3.1020	0.7553	-0.3872	-0.1459
	(2.98)	(3.54)	(2.42)	(0.51)
Adjusted R^2	0.920	0.61	0.53	0.69

Note: The numbers underneath the coefficient estimates are the related t-ratios (the signs are omitted for simplicity).

Using equations (9) and (10), the supply elasticities were derived at the means of the exogenous variables (Table 2).

Table 2 Supply elasticities in the Chinese farming sector

	with respect to the price of				
The supply of	Rice	Wheat	Other grain	Other crops	Cotton
Rice	0.1963	-0.1885	0.2138	-0.1366	-0.0850
Wheat	-1.0861	1.0528	-1.1928	0.7709	0.4551
Other Grain	1.2302	-1.1910	1.5134	-0.8840	-0.6685
Other Crop	-1.0825	1.0600	-1.2173	0.8952	0.3445
Cotton	-0.0417	0.0387	-0.0570	0.0213	0.0386

Note: The elasticities are estimated, according to the formula provided in the text, at the means of the exogenous variables and predicted dependent variables.

Price elasticities for grain used in most other studies are significantly lower than the estimates derived in this study. Carter and Zhong (1988) estimated an elasticity of 0.15 in the winter wheat region and 0.27 in the spring wheat region. The elasticities of grain products used in modelling work by Tyers and Anderson (1992), Roningen and Dixit (1989), and Gunasekera et al. (1991) are summarized in Table 3.

In Tyers and Anderson (1992), all the elasticities are tiny (the absolute numbers are less than 0.1). Gunasekera et al. (1991) adopted a set of relatively higher elasticities (the absolute numbers are still less than or equal to 0.5).

There exist several possible reasons for the difference between these elasticities adopted or estimated and the estimates from this study, such as the different data sets used or different functional forms applied (Alston et al. 1990; Huang and Lu 1992). The most important reason that this study focuses on is the data adjustment. Generally speaking, State purchase prices and procurement quotas fluctuate less sharply than market oriented prices and quantities, both in terms of frequency and magnitude.[10] Movements in the data series would be much smaller without adjustment. If a similar functional form (the generalized McFadden unit revenue function) is applied to a data set without adjustment, fluctuations in both price and output series tend to be smoothed. Elasticity

[10] Assuming that total supply consists of state quota and market supply and that the state quotas change less significantly, it is not surprising that movements in total supply must be smaller than those of market supply.

estimates from those studies therefore tend to undervalue the actual responses of production to market signials.[11]

Table 3 Price elasticities of grain supply used by other studies

	Tyers and Anderson[a]			SWOPSIM[b]		Gunasekera et al.[c]	
	Rice	Wheat	Coarse grain	Own price	Cross price	Own price	Cross price
Rice	0.08	-0.01	-0.01	0.15	-0.02	0.20	-0.07
Wheat	-0.01	0.06	-0.01	0.15	-0.05	0.50	-0.17
Coarse grain	-0.01	-0.01	0.08	0.15	-0.01	0.50	-0.39

[a] The elasticities from Tyers and Anderson (1992) are the short-run elasticities of supply with *t* years of time lag. Prices of rice and wheat are lagged one year while the price of coarse grain is lagged by two years.
[b] The SWOPSIM represents the Static World Policy Simulation modelling framework developed in the Economic Research Service of the US Department of Agriculture (Roningen 1986, Roningen and Dixit 1989). The model uses own- and cross-price elasticities.
[c] Gunasekera et al. (1991) applied SWOPSIM, the elasticities are revised by the researchers based on the SWOPSIM's original numbers.

The elasticities derived in this study also have interesting policy implications.[12] China has declared grain self-sufficiency as one of its national policy objectives, at least for the period of 1990-95. Policies target wheat and rice in particular. Currently, China exports rice in exchange for wheat in the international market. Garnaut and Ma (1992) present predictions which indicate that the annual growth of aggregate demand for grain in China will range between 1.9 and 2.7 per cent in the years before the end of this century. Further pursuing grain self-sufficiency will place much greater pressure on domestic grain production. Per capita agricultural resources are very limited in China. This will become an increasingly serious constraint for grain production, not only because of continuous demand increases but also because other production activities compete with grain production for land as income rises.

[11] For grain, there are two prices the state purchase and market prices. If we only look at the average price, the variation would be much smaller than the changes in market price, assuming the state price is kept unchanged or moves in smaller magnitude.
[12] This study, focusing on elasticity estimation, can only provide some partial pictures of the agricultural policy story. An overall assessment involves a general equilibrium framework which is the topic of another related study.

If significant improvements in grain production technology do not occur, there are two ways to secure grain self-sufficiency in China. One is to restore the planning system and force all farmers to produce a sufficient amount of grain to meet national requirements. This, however, is unlikely to happen after ten years of economic reform.[13] The other way is to distort the domestic grain market following the methods adopted by other East Asia economies like Japan, Korea and Taiwan. As has been evidenced in those economies, the cost of price distortion can be extremely high.

This study also provides some partial information on this issue. Given that the domestic rice price in China is already very close to the international market price, with an estimated nominal protection rate of -5 per cent in 1990 (Peng 1992), without significant subsidy it may be very difficult for China to continue to export rice in exchange for wheat. The wheat price in China is already much higher than the world price, with a nominal rate of protection of 30 per cent (Peng 1992). In other words, the opportunities for increasing output through price adjustments are very limited unless the government is willing to adopt a policy of substantial grain production subsidization.

The cost of this, however, goes beyond a burden on the State budget. The rising grain price would also tend to distort the domestic economic structure. If a subsidy on rice production is adopted in order to maintain grain self-sufficiency, rice production might be encouraged (own elasticity 0.20, Table 2) and wheat and other crops production would be discouraged by much larger margins (cross-price elasticities being -1.09 for wheat and -1.08 for other crops, Table 2). Thus, not only is grain self-sufficiency a particularly unachievable goal, but the economy might end up importing some agricultural crops that it previously exported.

[13] Even if the government chooses to do so, the planning system is unlikely to work as effectively as in the past.

Some concluding remarks

Considering the failure of many attempts to apply a dual approach to the Chinese, economy, assumptions are made about farmers behaviour in China. Farmers' decision-making is influenced by a mixture of policy requirements and the market incentive structure. This implicitly suggests that farmers are rational profit maximizers conditional on the fulfilment of government requirements.

To render the existing Chinese agricultural data consistent with the assumptions of conventional economic analysis, such as profit maximization and competitive market assumptions, the data set is adjusted to remove the distorted price information and data on forced production. The data set applied in this study consists of time-series and cross-section data covering the five year period (1986-90) and twenty-eight provinces. Using this data set, a set of supply elasticities, derived from the generalized McFadden revenue function, is estimated. The estimates of this study are found to be higher than those of other studies. One possible reason for this is that the other studies did not adjust the Chinese data therefore the fluctuations in price and quantity tend to be smoothed.

The elasticities shed some light on the future of Chinese agriculture and the potential impact of various policies. If the government pursues grain self-sufficiency as it has declared, it will distort the domestic grain market as have other East Asian economies. This strategy imposes very expensive costs on the whole economy, which can can be predicted from the cross-price elasticities and evidence from Japan, Korea and Taiwan. If prices of grain products are to be subsidized, outputs of cotton and other crops will drop sharply. Not only is domestic comparative advantage distorted, which obviously results in a welfare loss, but the Chinese economy will also be more dependent on international markets compared with the situation of non-distortion.

References

Albacea, Z.V., and Warr, P., 1991. 'Agricultural parameter estimates for the APEX CGE model of the Philippines economy', Paper presented to the Workshop on General Equilibrium Modelling for Agricultural Policy Analysis, Pattaya, Thailand, 21-25 May, 1991.

Alston, J.M., Carter, C.A., Green, R. and Pick, D., 1990. 'Whither Armington trade models?', *American Journal of Agricultural Economics*, 72(2):455-67.

Anderson, K., 1990. *Changing Comparative Advantages in China: effects on food, feed and fibre markets*, OECD, Paris.

Anderson, K. and Tyers, R., 1987. 'Economic growth and market liberalization in China: implications for agricultural trade', *The Developing Economies*, XXV-2:124-51.

Carter, C. and Zhong, F., 1988. *China's Grain Production and Trade*, Westview Press, Boulder.

Chui, X., 1988. 'China's state procurement policy and industrial accumulation', *Development Research Report* (Fazhan Yanjiu Baogao), 5, The Development Institute, Research Centre for Rural Development of the State Council, China.

Diewert, W. and Wales, T., 1987. 'Flexible functional forms and global curvature conditions', *Econometrica*, 55(1):43-68.

Ellis, F., 1988. *Peasant Economics: farm households and agrarian development*, Cambridge University Press, Cambridge.

Fuss, M., 1977. 'The demand for energy in Canadian manufacturing: an example of the estimation of production structure with many inputs', *Journal of Econometrics*, 5:89-116.

Garnaut, R. and Ma, G., 1992. *Grain in China*, Australian Government Publishing Service, Canberra.

Gunasekera, H., Don B.H., Andrews, N.P., Haszler, H.C., Chapman, J. N., Tian Weiming and Zhao Zhao, 1991. 'Agricultural policy reform in China', *Discussion Paper 91.4*, Project 6131.104, Australian Bureau of Agricultural and Resource Economics, Canberra.

Huang, Y. and Lu, W., 1992. 'China's import demand for wool by source: functional forms and elasticites', Paper presented to the Annual Conference of Chinese Economic Asociation (Australia), Adelaide University, 12-14 November 1992.

Lau, L.J., 1978. 'Testing and imposing monotonicity, convexity and quasiconvexity constraints', in M. Fuss and D. McFadden (eds) *Production Economics: a dual approach to theory and applications*, Vol. 1, North-Holland, Amsterdam.

Lawrence, D. and Zeitsch, J., 1989. 'Production flexibility revisited', Contributed Paper to the Thirty-third Conference of the Australian Agricultural Economics Society, Christchurch, New Zealand, 7-9 February (unpublished paper).

Lin, J.Y., 1990. 'Collectivization and China's agricultural crisis in 1959-61', *Journal of Political Economy*, 98:1228-252.

Lin, J.Y., 1992. 'Rural reforms and agricultural growth in China', *American Economic Review*, 82(1):34-51.

Lin, J.Y., Cai Fang and Shen Minggao, 1989. 'On economic reform and the choice of development strategy', *Jingji Yanjiu* (Economic Research, Monthly), No. 3.

McKay, L., Lawrence, D. and Valstuin, C., 1982. 'Production flexibility and technical change in Australia's wheat-sheep zone', *Review of Marketing and Agricultural Economics*, 50(1):9-24.

McMillan, J., Whalley, J. and Li J.Z., 1989. 'The impact of China's economic reform on agricultural productivity growth', *Journal of Political Economy*, 97(4).

Peng, Z., 1992. 'Trade reforms and internationalizing prices in the Chinese economy', Draft paper, Energy Economics Branch, Australian Bureau of Agricultural and Resource Economics, Canberra.

Roningen, V.O., 1986. 'A static world policy simulation (SWOPSIM) framework', *Economic Research Service Staff Report AGES860625*, US Department of Agriculture, Washington DC.

Roningen, V.O. and Dixit, P.M., 1989. 'How level is the playing field? An economic analysis of agricultural policy reforms in industrial market economies', *Foreign Agricultural Economic Report No. 239*, US Department of Agriculture, Washington DC.

Schultz, T.W., 1964. *Transforming Traditional Agriculture*, Yale University Press, New Haven.

Sicular, T., 1988. 'Plan and market in China's agricultural commerce', *Journal of Political Economy*, 96(2):283-307.

SSB, 1987-1991. *China Statistics Yearbook*, annual, China Statistics Publishing House, Beijing

SSB, 1987-1991. *China Price Statistics Yearbook*, annual, China Statistics Publishing House, Beijing

SSB, 1987-1991. *China Agricultural Yearbook*, annual, China Statistics Publishing House, Beijing

Tyers, R. and Anderson, K., 1992. *Disarray in World Food Markets: a quantitative assessment*, Cambridge University Press, Cambridge.

Weaver, R.D., 1983. 'Multiple input, multiple output production choices and technology in the U.S. wheat region', *American Journal of Agricultural Economics*, 65:45-56.

Wiley, D., Schmidt, W. and Bramble, W., 1973. 'Studies of a class of covariance structure models', *Journal of American Statistical Association*, 68:317-23.

Yang, Y.Z. and Tyers, R., 1989. 'The economic costs of food self-sufficiency in China', *World Development*, 17(2).

Zhou, Zhangyue, 1992. 'Grain producers' responsiveness to economic incentives in China', Paper presented at the Annual Conference of Chinese Economic Association (Australia), Adelaide, November 12-13.

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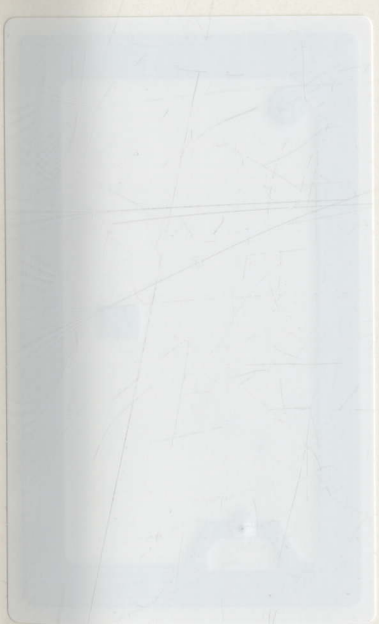

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