THE POLITICAL ECONOMY OF CHINA'S GRAIN POLICY REFORM

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

This thesis develops a coherent theoretical framework to analyse the formulation of grain procurement policy for the entire history of the PRC. An optimization model is constructed to capture Chinese policy makers' preferences regarding the competing objectives of sectoral income distribution and food security, as well as the factors governing the trade-off between these two objectives and the choice of policy instruments. The model examines how the formulation of China's grain policy responses to the changes in policy makers' preferences regarding the welfare of grain producers and grain users as well as the size of the procurement quota, and the changes in the tightness of the fiscal constraint and the costs of grain production. Many of the results appear to be consistent with the observed evolution of China's grain policy. In particular, the model predicts that, when policy makers prefer a larger procurement quota, grain procurement price will always be set at its minimum level that is required to induce quota fulfilment, whether government subsidies are available or not.

The model also analyses the impacts of China's accession to WTO on its grain sector and produces results different from the common wisdom. Depending on the pre-trade welfare distribution and the amount of grain imports, WTO accession may not hurt grain farmers at all if it is accompanied by a complete liberalisation of the domestic grain distribution system. Another conclusion is that the Chinese government's attempt to safeguard grain producers' welfare from the influx of imports need not drain fiscal resources.

To explain the numerous failures of China's grain policy, this thesis studies the problems arising from policy formulation and implementation. The first type of problems stems from the lack of information that is required to set the 'right' procurement quotas or prices to achieve the policy objectives without jeopardizing allocative efficiency. The second type of problems arises from the implementation of the stipulated policies. The failure to overcome these problems is illustrated with a variety of defiant behaviour of the notoriously inefficient state grain enterprises.

DECLAMATION

This work contains no materials which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

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CHAPTER 1
INTRODUCTION

The food and agricultural policy of the People's Republic of China (hereafter PRC or China) has attracted a great deal of attention from researchers within and outside of the country. At the core of agriculture, grain has always been under the spotlight. While there have been numerous studies on China's grain sector ranging from production to trade, policy formulation as well as implementation, there does not yet appear to be a coherent theoretical framework for the analysis of the policy formulation that is applicable to the entire history of China's grain procurement and marketing system. It is the purpose of this thesis to fill this gap in the literature.

Using an optimization model that captures China's institutional characteristics and the policy makers' ideological considerations, this thesis derives some decision rules regarding the formulation of the grain procurement and sales policy (hereafter grain procurement policy) in the context of a closed economy. The model generates results that are consistent with a significant number of policy changes in the history of the PRC. Extending the model to allow for trade, especially imports of grain, this thesis also examines the welfare impacts on grain farmers and grain users of the likely changes associated with China's accession to WTO.

The next section gives a brief account of the importance of China's grain policy to its national economy and to the world market. It also identifies the two most important objectives guiding the policy decision. Based on a review of the literature on China's grain policy and the political economy of policy making of other economies, Section 1.2 presents the approach in this thesis to the study of China's grain policy formulation. Section 1.3 outlines the structure of the thesis.

TABLE 1.1 SHARE OF AGRICULTURE IN THE CHINESE ECONOMY, 1950-2001

Year	Agricultural Population as % of total Population[a]	Agricultural Labour as % of total Labour Force[a]	Agricultural Value-added as % of GDP[b]	Agricultural Taxes as % of Fiscal Revenue[c]
1950	83.4			29.3
1951	84.6			16.3
1952	85.6	83.5	50.5	14.7
1953	85.2	83.1	45.9	12.2
1954	84.7	83.1	45.6	12.5
1955	84.8	83.3	46.3	11.2
1956	84.1	80.6	43.2	10.3
1957	83.6	81.2	40.3	9.6
1958	81.5	58.2	34.1	8.4
1959	79.8	62.2	26.7	6.8
1960	79.3	65.8	23.4	4.9
1961	81.1	77.2	36.2	6.1
1962	83.3	82.1	39.4	7.3
1963	83.3	82.5	40.3	7.0
1964	83.4	82.2	38.4	6.5
1965	83.3	81.6	37.9	5.4
1966	83.4	81.5	37.6	5.3
1967	83.5	81.7	40.3	6.9
1968	84.0	81.7	42.2	8.3
1969	84.6	81.6	38.0	5.6
1970	84.7	80.8	35.2	4.8
1971	84.3	79.7	34.1	4.1
1972	84.4	78.9	32.9	3.7
1973	84.3	78.7	33.4	3.8
1974	84:5	78.2	33.9	3.8
1975	84.6	77.2	32.4	3.6
1976	84.5	75.8	32.8	3.8
1977	84.5	74.5	29.4	3.4
1978	84.2	73.8	28.1	2.5
1979	83.4	72.5	31.2	2.7
1980	83.0	72.1	30.1	2.6
1981	82.6	72.0	31.8	2.6
1982	82.4	71.6	33.3	2.6
1983	82.1	70.7	33.0	2.6
1984	81.0	68.4	32.0	2.3
1985	79.9	62.5	28.4	2.3
1986	79.1	61.1	27.1	2.0
1987	78.4	60.0	26.8	2.2
1988	75.4	59.5	25.7	2.8
1989	77.9	60.1	25.0	2.9
1990	78.4	60.2	27.0	2.7
1991	78.2	60.0	24.5	2.5
1992	77.8	58.6	21.8	2.9
1993	77.1	56.4	19.9	2.5
1994	76.4	54.3	20.2	4.4
1995	75.7	52.2	20.5	4.4
1996	75.1	50.5	20.4	5.0
1997	74.0	49.9	18.3	4.6
1998	73.7	49.8	18.0	4.0
1999	73.2	50.1	17.6	2.9
2000	73.3	50.0	16.4	3.5
2001	73.2	50.0	15.2	1.7

Notes:

[a] Data up to 1985 are from MoA (1989). Data after 1985 are from *Agricultural Development Report '97 and 2002*.

[b] Agricultural outputs include those of agriculture, forestry, animal husbandry and fishery.

[c] Agricultural taxes include agricultural tax, animal husbandry taxes, tax on the use of cultivated land, taxes on special agricultural and forest products, and contract taxes.

Sources: MoA (1989); NBS (1997); Lou (2000); *Agricultural Development Report '97 and 2002*; *Rural Statistical Yearbook of China 2002*

1.1 Background to the issue

On 10 August 1960, the Chinese central government issued "A decree to mobilise the whole Party to develop agriculture and the grain sector to the fullest extent (*guanyu quandang dongshou, daban nongye, daban liangshi de zhishi*)". It read: "Agriculture is the foundation of the national economy whereas grain is its core.[1] Strengthening agriculture is the long-term priority of the Party. Every sector and industry should regard the support of agriculture as the most important task and refrain from doing anything to jeopardize agricultural and grain production." Despite the decline in its contribution to the national GDP from about 50 percent in 1952 to 15 percent in 2001 (Table 1.1), the importance of agriculture on the policy agenda has always been underlined.[2] In the *Report on the Implementation of the Central and Local Budgets for 2001*, China's Finance Minister, Xiang Huaicheng, referred once again to the position of agriculture as the foundation of the economy (Xiang, 2002). The 2003 Draft Budget further indicates the central government's continuous commitment to an increase in funding for agricultural and rural economic and social development in its attempt to maintain a sustainable, rapid and sound development of the national

[1] According to Chinese government's definition, grain includes wheat, rice, corn, soybeans, barley, oats, millet, sorghum, potatoes (converted from raw to dry weight at a ratio of 5 to 1), pulses (dry peas and beans), and other miscellaneous grains.

[2] It should be noted that the share of agricultural taxes in fiscal revenue as listed in Table 1.1 has understated substantially the contribution of agriculture to the nation's fiscal resources because the formal agricultural taxes do not include the informal rural levies imposed by local governments or the implicit taxes on farmers who deliver grains to the state at below-market procurement prices.

economy and to ensure long-term stability of the country (*People's Daily Online*, 6 March 2003).

Being the staple food and the wage good, grain played the leading role in China's development policy during the central planning era when communist leaders adopted a Soviet-style heavy industrialization strategy. Grain was not only the necessary diet to sustain a productive labour force, but also an important source of economic surplus to support industrialisation. Securing a sufficient supply of grain for the urban industrial population at the lowest possible cost was one of the top priorities for the Chinese leaders' agenda. To extract resources from agriculture and make them available for the development of heavy industries, policy makers installed a quantity based procurement system to redistribute economic surpluses from grain, as well as other primary production, to the industrial sector. The drawing up of procurement plans required co-ordination with the policy goals of other sectors. The formulation of China's grain policy in the central planning era was therefore closely intertwined with other aspects of the national development strategy. At the same time, the achievement of the targets set for other sectors, especially the industrial sector, hinged on the successful implementation of the grain procurement policy.

While its central position in the national economy of the PRC has never waivered, the role of agriculture in general and grain in particular has nonetheless evolved over time. As the Chinese economy develops along a new path during more than two decades of economic reforms and open-door policy, the role of grain as a source of investible surplus has diminished greatly. But it remains at the centre stage due to China's adherence to a policy objective of grain self-sufficiency. As noted by Crook (1999b), China is distinguished by the length and strength of its commitment to self-sufficiency in grain production. This policy is a logical outgrowth of the recurrent

crop failures and food shortages over the past 2,500 years. The tight grip on grain imports, in contrast to the trade liberalisation in other commodities since the 1990s, reflects the political leaders' resistance against an increasing reliance on grain imports as an alternative means to food security. Chinese leaders behave in a way that is similar to those authoritarian leaders. Perkins and Yusuf (1984, p.88) described vividly their characteristics: "a deep suspicion of foreigners,... combined with a fierce national pride, which made it imperative to 'walk on two legs'." The pursuit of heavy industry-oriented development strategy and grain self-sufficiency is apparently an outcome of such a mindset. And the Chinese government has been proud of being able to feed 22 percent of the world's population on 7 percent of the world's cultivated land (IOSC, 1996).[3]

TABLE 1.2 CHINA'S PRODUCTION AND TRADE IN WHEAT, RICE, AND CORN, 2000

	Wheat	Rice	Corn
Sown area (1,000 hectare)	26.65	29.96	23.05
Output (1,000 ton)[a]	99,640	187,900	106,000
Average annual output as % of world output	16.8	33.5	17.8
Rank as producer in the world	1st	1st	2nd
Exports (1,000 ton)[b]	2.5	2,950	10,470
Imports (1,000 ton)[b]	870	240	0

Notes:

[a] Output is of raw grain. Ton is metric ton.

[b] Trade volume is of commercial grain (*maoyi liang*).

Source: MoA Soft Science Committee Project Team (2002, Chapter 2)

China is the largest producer and consumer of food grain in the world. As shown in Table 1.2, its production of wheat and rice ranks first in the world while its corn output ranks second only after the US. China's exports of rice and corn in 2000

[3] Based on the updated data collected in the 2000 Census, the estimated Chinese shares in the world total of population and cultivated land have been revised to 21 percent and 9 percent respectively.

accounted for 12.6% and 12.7% respectively of the world total export volumes. Between 1980 and the mid-1990s, China's imports of wheat accounted for around 10% of the world total traded volume (MoA Soft Science Committee Project Team, 2002, p.43). Significant changes in its grain policy would have great impacts on the world grain market and prices. In particular, a loosening of the grain self-sufficiency policy stance would bring a handsome windfall to the grain-exporting countries while driving up food expenditures of those importing countries. The significant influence explains why Brown's (1995) controversial wake-up call drew so much attention among academics and policy makers.[4]

There is yet another channel through which China's grain policy will make an impact on the world economy. Since grain production still occupies a large proportion of China's rural resources,[5] any policy change regarding the level of self-sufficiency will have significant implications for resource allocation and income distribution in the rural sector and the whole economy. Reallocation of resources from grain to other production in line with comparative advantages also will have tremendous impacts on international trade pattern. For instance, if Chinese policy makers lower the grain self-sufficiency rate, more resources will become available for the exportable labour-intensive agricultural and industrial products, which may depress the prices of these products in the international market.

Given the impacts of significant changes in China's grain policy on its domestic economy as well as the world market, it is important to have a thorough understanding

[4] In his book *Who Will Feed China? Wake-up Call for a Small Planet*, Lester Brown argued that, constrained by the limited and decreasing arable land, China would have to turn to foreign suppliers for the increasing demand for food and feed grain that domestic production could not satisfy. The subsequent increase in world demand would drive up the grain prices and jeopardize the welfare of those poor importing countries.

[5] Despite the decline in arable land sown to grain due to the falling market prices, grain stilled occupied 69 percent of the total area of cultivated land in 2000, of which cereal occupied 55 percent (*Almanac of China's Agriculture 2001*, p.251).

of the crucial elements that determine Chinese policy making and its outcome. As noted by Ahmed and Mellor (1988), agricultural price policy has profound implications for the distribution of income between farm and non-farm households, among geographical regions, and among income classes, which in turn have an important bearing on the distribution of political power. Policy makers in the Chinese government make it their task to adjust the pricing and procurement policy in response to changes in economic circumstances, political configurations, and national goals.

Due to China's comparative disadvantage in the production of land-intensive agricultural products, it is widely predicted that the adherence to grain self-sufficiency will necessitate increasing price support to grain farmers and an ever-heavier burden on the government budget. China's policy makers have to ascertain whether this prediction is likely to be realized. If so, then they have to decide if it is worthwhile and feasible to provide price subsidies to grain farmers, or if there are better alternatives. To China's trade partners, a related question has aroused a great deal of interest. They are eager to find out how China's recent accession to WTO is going to influence its policy stance on grain self-sufficiency. To answer these questions, one needs a systematic analysis of how decisions have been made within the Chinese government. Among other things, crucial elements would include the policy makers' objective function and the constraints on their choice of policy instruments.

A scrutiny of China's grain policy evolution reveals that the grain procurement system has played a central role in the government's pursuit of its food security and income distribution targets. Other policy instruments, including trade restrictions and direct government interventions in resource allocation, have been playing a secondary and supporting role. While trade interventions have been crucial to the maintenance of China's grain self-sufficiency, the persistent tightness of these restrictions has made the

grain trade volume relatively small, at least up till now. And the government's direct interventions in resource allocation, especially the restrictions on land and labour uses in the central planning era, as well as its investments in agriculture, have largely been guided by the procurement targets. To construct the simplest possible model which captures the essence of the problem at hand, this thesis focuses on the grain procurement and marketing system and treats other grain-related policies as exogenous. In particular, the theoretical analysis is devoted to the examination of how policy makers set the procurement prices and quotas.

In the central planning era, the redistribution policy guided by the heavy industrialisation strategy and the grain self-sufficiency policy stemming from the food security objective had contradictory implications for pricing policy under the grain procurement system. To extract more surpluses from the grain sector, the government needed to lower grain prices. To maintain high self-sufficiency, however, the government had to raise procurement prices to improve farmers' incentives to produce grain. How to reconcile the conflict between the distribution role and allocative role of grain prices presented the greatest of challenges to policy makers in China. The incompatibility between the two roles had become more acute in the reform period when price liberalisation in other sectors raised the opportunity costs of grain production substantially. Prior to the mid-1990s, it had been a daunting task for policy makers to set the 'right' prices subject to the trade-off between these two objectives. The enormous upward adjustments in procurement prices, coupled with unchanged state-set rationed sales prices until 1991 due to political considerations, had led to mounting fiscal deficits. The two-track grain procurement system established in 1985, which allowed farmers to sell surplus grain on the market after they had delivered their quota to the government, further aggravated the deficit problem. The price wedge between the market track and the plan track offered rent-seeking opportunities to the

state grain enterprises. Coupled with their inefficient operations, this self-serving behaviour created a heavy burden on the government budget. Many of the policy changes in the history of the PRC were a result of the government's attempts to reconcile the conflicts among the two objectives and the fiscal constraint.

The incompatibility between the objectives of grain self-sufficiency and income distribution has gradually diminished over time in China. As the market economy develops and industry outgrows agriculture, the redistribution policy has gradually become less unfavourable or more favourable to the farming sector. This development is consistent with the trend identified in the political-economy literature on the food and agricultural policy, which documents that countries without comparative advantage in agricultural production will sooner or later switch from taxing to protecting their farming sector in the course of economic development (Anderson and Hayami, 1986; Lindert, 1991). Arguably such a switch appears to take place in China in 1997 when the government enforced the procurement of grain at protective prices to safeguard farmers' income against falling market prices.[6] The divergence between the allocative role and distribution role of grain prices has disappeared since the adoption of this price support policy. To maintain grain self-sufficiency, it is necessary to safeguard farmers' incentives, which increase with the net incomes they can derive from producing grain.

Against a background of consecutive years of good harvests and slumping market prices, returns to grain production lag far behind the national trend of income growth. It becomes imperative to raise grain prices, unless there are other means of raising farmers' incomes. This upward trend of assistance to grain farmers would only be contained by two factors, namely, the fiscal outlays that the government can afford and the constraints imposed by WTO on China's domestic grain marketing and trade

policies. An accurate assessment of the influence of these two factors will help Chinese leaders make appropriate policy adjustments. For China's trade partners, making the right move also requires an accurate assessment of the evolution in Chinese leaders' preferences, especially regarding grain self-sufficiency.

1.2 Objectives and significance of the thesis

Due to the paramount importance of the grain sector to the Chinese economy, researchers from within and outside the country have conducted numerous studies on the issue of grain policy. While many of these studies have made valuable contribution to the understanding of the problems involved and provided suggestions to the Chinese policy makers about the direction for reforms as well as fine tuning, there is a lack of rigour in many of these largely descriptive analyses. Among those theoretical studies that employ a rigorous approach, there are four areas of focus. The first type of such studies examines individual events or policy changes such as the household responsibility system (HRS) using empirical data (Lin, 1988; McMillan et al., 1989). Regarding HRS, Lin concludes that the drastically reduced supervision cost under the new institution led to a labour-augmentation innovation, which raised production efficiency and agricultural output. McMillan et al. estimate the relative contribution of the institutional reform compared to other policy changes such as the upward adjustments in procurement prices to the impressive growth in agriculture in the early reform period. They conclude that HRS was by far the most important source of growth.

The second type of rigorous studies focuses on policy implementation. One notable example is Rozelle and Boisvert's (1993) study of the local implementation of

[6] Protective procurement prices, also known as 'guaranteed prices' (see Watson and Findlay, 1999), were first stipulated in 1993. But they had not played the role of a safeguard measure until 1997 when market prices actually fell below them (WTO, 2001a, p.25).

grain policy in 1983-1988. Using a dynamic control model of Chinese village leaders' behaviour, their study evaluates the outcomes of different policies including the upward adjustments in procurement prices and quota, as well as rural industrial loan policies, which are all taken as given in their study. Based on some simulation results, they draw the conclusion that curbing the loans available for rural industrialization was the only effective means of raising grain yield. While these two types of research shed light on the relative effectiveness of different policies, they do not help us understand why certain policy has been chosen in the first place.

The third focus of those rigorous studies is on the efficiency impact of the two-track procurement system implemented in the post-reform China. Assuming legal resale of goods between the plan track and the market track, both Sicular (1988) and Lau et al. (2000) arrive at the same conclusion that efficient resource allocation can be achieved under the two-track system. One important conclusion of Sicular's study is that the state-set procurement price is not the marginal price and hence only affects the lump-sum transfer extracted from farmers but not the quantity of the commodity supplied. Again, in both of their analyses no account has been taken of the policy formulation process.

The fourth type of theoretical studies focuses on the response of grain supply to the procurement price under the two-track system. Contrary to Sicular's conclusion, Cheng et al. (1993), Lin (2000a, pp.126-46), and Wang and Huang (2001) propose alternative hypotheses that this state-set price does affect the output level of grain. Based on a theoretical model, Cheng et al. conclude that if farmers have the option not to fulfil their procurement quota, but quota fulfilment is a pre-condition for selling surplus grain at the market price, then grain output will respond to both the fixed procurement price and the market price. Lin establishes with an empirical study that if

the procurement quota is an endogenous variable that increases with the level of grain output, then the procurement price will have a positive impact on grain output. Based on an empirical study of three rice-producing provinces in 1980-1997, Wang and Huang conclude that the procurement price and quota have significant positive impact on the output of rice.

Although all these studies enhance our understanding of the crucial elements that determine the outcome of China's grain policy, none of them directly addresses the issue of policy formulation. By contrast, Huang Y. (1998) applies a co-operative game approach to analyse the setting of state procurement prices as an interactive process between the government and farmers. Despite the absence of any formal bargaining framework, Huang's empirical results provide some interesting estimates of the bargaining power of farmers as opposed to the government. For the period between 1979 and 1990, the estimated power coefficients are 0.3 for farmers and 0.7 for the government suggesting relatively weak bargaining power of farmers. His findings suggest that farmers' relative strength is negatively correlated with the proportion of labour in agriculture but positively correlated with average per capita income. While his study may provide empirical support for the likely strengthening of farmers' bargaining power over time, it is not a satisfactory framework for the analysis of China's grain policy formulation due to the absence of a formal decision making mechanism.

In the existing literature, there does not yet appear to be a coherent theoretical framework for the analysis of the policy formulation that is applicable to the entire history of China's grain procurement and marketing system. In this thesis, I set out to fill the gap. As noted by Rodrik (1995) and Sah and Stiglitz (1992), to understand why a certain policy has been adopted by a government, it is important to analyse the

political economy of the situation, especially when the policy choice appears to be contrary to economic intuition. Baldwin (1996) points out further that generalization about government policies should be made with explicit reference to institutions and ideologies. Lin (2000b, p.77) also notes that understanding the prevailing institutions of a country can narrow down the feasible set of the country's policy choices. Therefore I adopt the approach commended by Rodrik (1995, 1996) – to construct a rigorous model to derive behavioural rules from solving an optimization problem with a well-defined objective function that captures the institutional characteristics and ideological considerations of China's policy makers. To construct such a model, I draw on the political-economy literature on agricultural and trade policies of other economies.

The political support function approach

Rodrik (1995) classifies the political-economy models of income redistribution policies into four categories, namely, the tariff-formation function approach (Feenstra and Bhagwati, 1982; Findlay and Wellisz, 1995; Magee, 2002), the political support function approach (Stigler, 1971; Peltzman, 1976; Hillman, 1989; Long and Vousden, 1991), the median-voter approach (Mayer, 1984), and the campaign contribution approach (Magee et al., 1989; Grossman and Helpman, 1994). Developed mainly to analyse trade intervention, all these models adopt the economic self-interest framework. Policy makers or politicians are viewed as "maximizing agents who pursue their own selfish interests rather than as benevolent agents seeking to maximize aggregate welfare (Grossman and Helpman, 1994, p.848)." Policies are made by political decision makers who seek to maximize their political support by balancing the marginal gain in political support from those who benefit from domestic or international regulatory measures against the marginal loss in support from those who lose (Baldwin, 1996, p.148).

Political-economy models addressing the policy making mechanisms in a democratic society, especially the median-voter approach and the campaign contribution approach that make special reference to the voting system and political campaign contribution, are inapplicable to the case of China due to its different political setting. The tariff-formation function approach is also inappropriate for our purpose as this type of model focuses only on the determination of trade barriers, and sometimes also incorporates campaign contribution in the analysis (e.g. Magee, 2002). The remaining political support function approach is more appropriate for the analysis of China's grain policy formulation. As noted by Rodrik (1995), the advantage of this approach is that it makes the policy objective function explicit, which enables us to derive the behavioural rule of China's policy makers. On the other hand, its weakness of leaving obscure the actions taken by interest groups to influence policy making, as identified by Rodrik, is not detrimental to the study of China where explicit lobbying by interest groups to extract favourable behaviour from policy makers is still rare.[7]

Nevertheless, there are some limitations of the self-interest model in general and the political support function approach in particular that warrant our attention. One limitation of the self-interest model identified by North (1984) is that people often do things that are not in their pure economic interest. For example, ideological belief may override their self-interest. Another related criticism made by political scientists of the political support function approach is its comparative neglect of the role of institutions and ideology in the formulation of economic polices (Baldwin, 1996, p.152). This thesis attempts to address these weaknesses by incorporating the ideological considerations and institutional setting in the specification of the objective function and constraints of the optimization model.

[7] Baldwin (1996, p.162) explains that "leaders of authoritarian governments generally view privately organized economic lobbying groups as threats to their political power and tend to discourage

In this thesis, I hypothesize that the policy making process is not fundamentally different from that of other non-socialist countries. China's policy makers are assumed to be rational decision makers who formulate grain policies in such a way as to maximize their payoffs subject to certain constraints. If there were any significant differences in the policy choices, it would be due to the differences in their objective function or in the constraints that govern the choice of policy instruments. Adopting the political support function approach, I specify an objective function that captures the Chinese characteristics. Producer surplus of grain farmers and 'consumer surplus' of grain users are the first two arguments in the objective function. They reflect the policy makers' preferences regarding sectoral income distribution. The third argument in the objective function is the size of the procurement quota, which captures the grain self-sufficiency objective.

As reflected in the historical development of China's grain policy, the availability of fiscal resources has been the most important constraint governing policy making. China's commitment under its WTO Protocol of Accession is a new and important constraint on domestic marketing and trade policies. These and other crucial factors that govern the setting of grain prices and quota are explicitly considered in my theoretical model. All policy choices are derived in the model as an outcome of constrained maximization. Unlike many other studies that employ different analytical frameworks to investigate different scenarios in different periods of time, in this thesis the same model is applied to pre- and post-1978, and to shortage as well as surplus situations. In this sense, my model is more general and more coherent than what has been available in this area of research. And it generates results that are consistent with a significant number of policy changes in the history of the PRC.

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or, at least, control such organizations". This is an accurate description of the situation in China.

I only consider the grain sector in the optimization model, leaving other sectors of the Chinese economy as exogenous. The use of partial equilibrium analysis in this study is justified by Sicular's (1988, p.293) observation that the reform process in China portrays 'adaptive or partial optimization' of a government that does not optimize globally but adjusts preexisting state prices and quotas from time to time to meet specific goals or when visible problems arise. Despite the limitations of such an approach, my model offers a more comprehensive and rigorous analysis than existing political-economy studies of China's grain policy.

1.3 Structure of the thesis

The thesis is structured as follows. Chapter 2 gives an overview of the major changes in China's grain policy together with some background information about why those changes took place and what the outcomes turned out to be. It paints an overall picture showing how the grain procurement policy relates to other aspects of the grain sector and to the economy as a whole. Chapter 3 constructs the optimization model by specifying the policy makers' preference function and the efficient trade-off between the objectives of sectoral income distribution and food security in a closed economy. The trade-off captures the dilemma between the allocative role and the income distributional role of grain prices. It is the boundary separating those combinations of procurement price and quota that can achieve allocative efficiency from those that cannot. In this chapter, the setting of the procurement price and quota is analysed assuming the absence of price subsidies. Chapter 4 allows a diversion between the procurement price and the sales price and considers the case in which the government has to provide a consumer price subsidy. It also studies the policy adjustments to changes in policy makers' preferences regarding food security, the tightness of the fiscal constraint as well as the costs of grain production. Chapter 5 analyses the change

in the Chinese policy makers' preference regarding sectoral income distribution based on the political-economy literature on agricultural and trade policies. It then studies the adjustment in the procurement price and quota in response to such a change in their preferences. The optimization model of a closed economy is modified in Chapter 6 to allow for trade, especially imports of grain, which is essential to reflect the changes associated with China's accession to WTO. Treating the volume of grain trade as exogenous, I examine the welfare impacts on grain farmers and grain users of the increase in grain imports and draw some policy implications. Chapter 7 looks at some actual problems that China's policy makers have encountered in the process of policy formulation and implementation. Their failure to overcome these problems is illustrated with a variety of defiant behaviour of the notoriously inefficient state grain enterprises. Chapter 8 draws some conclusions and identifies areas for further research.

CHAPTER 2

THE EVOLUTION OF CHINA'S GRAIN POLICY

The evolution of China's grain policy can best be understood in the context of economic and political goals that the government pursues and the problems that it has to tackle in different stages of development. This chapter gives an overview of the major changes in China's grain policy along with some analysis of the causes and effects of those changes. It serves to locate the position of the grain sector in the national economy of the PRC and paint a dynamic picture showing how the grain-related policies have evolved over time against a changing background. Based on the historical account of the policy changes, I seek to identify the most crucial determinants of China's grain procurement policy, namely the objectives and constraints that govern the policy formulation. And these elements will be the focus of the theoretical analysis in the next few chapters.

The grain-related policies under review are divided into three periods in which the economic circumstances and political configurations exhibited some drastic changes resulting in significant adjustments in the priorities of the national goals as well as the policy instruments. For each period under study, the policy review covers three areas, namely domestic grain distribution, trade intervention, and other government interventions in resource allocation. The major focus is on domestic grain distribution vis-à-vis the quota procurement system.

Section 2.1 examines the central planning era between the early 1950s and the late 1970s. It reveals the two over-riding objectives of China's grain policy: heavy industrialization and grain self-sufficiency. The two most prominent policy changes in this period were the quantity-oriented planning that deprived prices of their allocative

role and the collective system that aimed to overcome the lack of price incentives. Sections 2.2 and 2.3 study the post-reform period that began in late 1978, with 1997 representing a watershed when the Chinese government adopted protective prices for grain procurement. In Section 2.2, we look at how the Chinese policy makers struggled to reconcile the conflicting roles of grain procurement prices between redistributing economic surplus from farming to industry and improving farmers' production incentives. This section also examines the problems that emerged within the grain procurement system and caused by the reforms in other sectors. Section 2.3 covers the policy changes in recent years since 1997. This period distinguishes itself from the previous two in that the conflicts between the redistribution role and the allocative role of grain prices have disappeared. The adjustments in China's grain policy in this period are largely guided by the government's attempt to safeguard grain farmers' production incentives against falling domestic market prices and the expected influx of imports after WTO accession. Constrained by its commitments to the WTO Agreements, China must rectify the inefficient operations of the deficit-ridden state grain enterprises. Section 2.4 concludes the chapter with a list of the key objectives and constraints that govern China's grain policy formulation to date.

2.1 The central planning era, 1949-1978

Agriculture makes crucial contributions to the early development of any developing countries. Its contributions can be summarised by Kuznets' (1965, pp.244-50) 'factor contribution' and 'market contribution' that refer to its roles as the source of supply of inputs and as a market for the outputs of the industrial sector. In the central planning era, apart from providing food to the industrial workers, the grain sector was also the most important source of investible surpluses available to the Chinese government. Hence the formulation of grain policy in the early years of PRC's history

cannot be well understood without reference to the heavy industry-oriented development strategy.

China's grain policy to facilitate heavy industrialization

The PRC started off in 1949 as a backward economy with a very small industrial sector, which accounted for only about 10 percent of the national economy (Lin et al, 1995, p.22; Maddison, 1998, Table 3.2). The need to industrialize became more urgent for the new government after the trade embargo imposed on China by the United Nations following the Korean War in the early 1950s. Envisaging the vulnerable position one would be in if one had to rely on other nations for the supplies of strategic goods, the Chinese government was prompted to adopt a development strategy to quickly set up a self-contained industrial sector. And the establishment of heavy industries was believed to be the crucial step towards this goal. Unfortunately, the development of capital-intensive heavy industries was severely constrained by the capital shortages in China. To overcome this barrier, the government had to make every effort to mobilize all available resources and to lower the costs of industrialization.

Beginning in 1953 with the first five-year plan (FYP), the Chinese government took some drastic actions in an attempt to accomplish the seemingly impossible task to quickly develop heavy industries within a short period of time. As the market mechanism would certainly reflect the scarcity of resources and drive up their prices, the Chinese government had to replace it with an alternative allocation system. The quantity-oriented central planning system was installed in 1953 to acquire resources for the development of heavy industries. In particular, to secure sufficient investible surpluses in a capital-scarce economy, the market mechanism had to be replaced by administrative measures to effect forced saving in the society. Prior to the first FYP, the state had already put the banking system and the currency under its control at the

beginning of the 1950s. By suppressing the interest rate and over-valuing domestic currency, it could reduce substantially the costs of capital and imported machinery that were necessary for the pursuit of heavy industrialization. At the same time, private industry had virtually vanished by 1956 while the industrial enterprises were either state-run or operated as joint state-private ventures (Lin et al, 1995, p.46). If the state could lower the cost of industrial production, then it could have more economic surpluses available for the accumulation of capital to facilitate the development of heavy industries.

Apart from interest rate and exchange rate, the costs of the remaining inputs, namely labour and primary products, hinged on the agricultural sector. Being the staple food and the wage goods, grain became the most important source of extractable surpluses. By suppressing grain prices and thereby reducing the urban costs of living, the government could maintain a low urban wage bill and increase the investible surpluses for industrialization. Hence the Chinese government needed to establish a distribution system that could procure a sufficient amount of grain at the lowest possible cost to supply to the urban industrial workers. In a nutshell, in the central planning era, China's grain policy was an integral part of the heavy industry-oriented development strategy.

The unified grain procurement and sales system (*tonggou tongxiao*)

Under the central planning system, the major roles of prices were for accounting and distribution. Resource allocation was to be guided primarily by quantity-oriented state plans rather than pricing policy.[8] Direct government

[8] Whether the state-set procurement prices played any allocative role in the central planning period depended on, among other things, the enforcement of the quantity-oriented procurement plans. In the case of grain, as noted by Perkins (1966, p.50), the high procurement quotas had largely exhausted all marketed grain of farmers. The state-set quota prices, which were lower than the market-clearing prices, could hardly play any significant role in grain marketing if farmers fulfilled their quota delivery.

interventions in the production and consumption of grain were regarded as necessary not only to overcome the acute shortage of grain in the early years of the PRC, but also to tackle the price volatility resulting from the speculative behaviour of grain traders. To secure the necessary supply of food for industrial workers at the lowest possible cost, a compulsory planned procurement and supply system was instituted in 1953 for grain and edible oil to facilitate the procurement and distribution of these products at suppressed prices. In 1955, this nationwide system of unified grain procurement and sales was further refined requiring each village to specify the amounts of grain to be produced, procured and sold for each farm household in each year (Contemporary China Editorial Committee, 1988, p.85).[9]

As part of the policy adjustment, a rationing system was installed to control the consumption of grain. Grain coupons (*liang piao*) or grain ration books (*kou liang ben*) were issued to households and individuals classified as urban non-agricultural residents under the household registration (*hukou*) system. These eligible consumers could purchase a fixed quantity of commercial grain, which varied according to their age, gender, occupation, etc., from state-run grain stores at state-set rationed sales prices, which were sometimes even lower than the procurement prices. Industrial and commercial enterprises such as food and feed processing plants that used grain as their inputs were allocated specific amounts of grain according to their production plans (State Grain Administration or SGA, 1999).[10]

However, when under-fulfilment of quotas was a prevailing phenomenon, the quota procurement prices would have some significant impact on resource allocation, which will be discussed in the next chapter.

[9] Walker (1984) gives an excellent discussion of China's grain policies in the 1950s and 1960s substantiated with detailed statistics. Oi (1989, Chapter 3) gives a detailed description of different types of grain procurement and how the procurement quotas were set at various levels of the administrative hierarchy in the central planning period.

[10] Eligible consumers of rationed grain also included military, government officials and university students. There was another type of grain coupons that enabled specialized non-grain producers in the rural areas to buy grain either at rationed sales prices or at quota procurement prices (Carter and Zhong, 1988, p.47). When needed, grain coupons were also distributed to rural households for disaster relief (Hebei Sheng Liangshizhi Editorial Committee, 1994, p.90).

According to the stipulation of the unified procurement system, after delivering the quota, farm households could keep the surplus grain for self-consumption or stock, or even sell it on the state-established markets. Following a spread of black markets in grain, however, the government faced extreme difficulties in controlling grain supplies during summer 1957 (Ash, 1998, p.87). The resultant reduction in grain procurement and grain tax revenues prompted the government to prohibit private grain marketing. Since August 1957, the state-owned and managed Grain Bureau had monopolized grain distribution in China (Lardy, 1983, p.39; Carter and Zhong, 1988, p.51).

Under the unified grain procurement and sales system, quantity planning replaced price mechanism to be the means of resource allocation and output distribution. By means of the 'price scissors', which administratively suppressed agricultural prices relative to industrial prices, the government reduced the role of prices to sectoral income distribution only.[11] The *hukou* system played two crucial roles to facilitate the quantity planning system in the pursuit of heavy industrialization. First, it restricted undesirable rural-to-urban migration that would otherwise reduce agricultural outputs and make it necessary for the government to raise urban wages to accommodate the higher prices of wage goods (Wu, 1993, pp.57-58). Second, it excluded rural agricultural households from the supply of cheap grain as well as edible oil and cotton to ensure that the extracted economic surpluses from agriculture would only be made available to the industrial sector.

[11] Lardy (1983, p.41) alleged that it was not until the Great Leap Forward in 1958-60 that the Chinese government abandoned the use of prices and markets as an instrument to allocate resources in agriculture.

The institution of the People's Communes to secure resources for grain production

The change in allocation mechanism from market to plan could not transform the incentive-oriented human nature. The suppressed procurement prices had an inevitable adverse effect on farmers' incentives to produce and deliver agricultural produce to the state. To secure the necessary amount of grain and raw materials for industrialization, the Chinese government found it imperative to institute agricultural collectivization (Lin et al., 1995, p.42; Liew, 1997, p.31). Collectivization of farm households began in late 1955 with the formation of cooperatives and was completed in autumn 1958 through the creation of the 'people's communes'.[12] Under the collective system, all members of a village joined a cooperative, or later a production team, where all means of production were collectivized. Directed by the state plans, the communes assigned production plans and procurement targets to production brigades and production teams. It was believed that by collectivizing labour and other farm inputs, the commune system could realize the state's production plans by means of administrative measures.

However, collectivization failed to solve the disincentive problem of suppressed procurement prices. To make matter worse, the high monitoring costs of agricultural production in a collective system further exerted disincentive effects in two ways. First, the difficulty in measuring farmers' performance in the commune system reduced their production incentives (Lin, 1988). Efficiency and productivity diminished as a result of shirking. Second, coupled with ideological consideration, the difficulty in supervising agricultural work gave rise to the egalitarian income distribution scheme. The

[12] Detailed accounts of the development of China's collective system are available in Ash (1998).

deprivation of farmers' rights to residual incomes under such a compensation scheme further jeopardized their incentives (Ash, 1998, p.91).

Another reason for the failure of the collective system to boost agricultural outputs was that it could not rectify the misallocation of resources under the central planning system. Without a market-oriented price mechanism that could reflect the economic costs and values, it was prohibitively costly to collect information for setting the 'right' output targets for individual localities and grain varieties. Guided by political considerations that led to the emphasis on regional grain self-sufficiency,[13] administrative measures to allocate resources irrespective of local conditions exerted negative impacts on agricultural productivity. For example, the imposition of common production methods such as cropping patterns on all regions reduced allocative efficiency as well as farmers' incomes (Lardy, 1983, p.43). And the massive reallocation of labour to coal mining and backyard steel production during the 1958-60 Great Leap Forward severely exacerbated the grain shortage problem (Liew, 1997, p.43). The resultant increase in industrial population that depended on the state for grain supply and the over-reporting of grain output by lower-level cadres prompted the state to raise the procurement targets substantially unaware of the contracting productive capacity of the rural sector. This excessive procurement was the major reason for the devastating famine erupted in 1960 when an estimate of 30 million people, mainly in the rural area, perished due to starvation and malnutrition (Lin, 1990). The incompatible policies inflicted on the farm households, especially during the Great Leap Forward, seriously impaired their faith in the collective system and further diminished their production incentives (Liew, 1997, p.45). They expressed their

[13] The policy stance of local self-sufficiency in grain production was first put forward in 1958 with the phrase 'take grain as the key link (*yi liang wei gang*)' (Lardy, 1983, p.41).

dissatisfaction with the suppressed procurement prices by reducing their grain supply, which in turn forced the government to raise prices (Yuan, 1994, p.6).

In the early 1960s, China's policy makers had to reconcile with the irreplaceable role of price incentives as well as other material incentives in resource allocation. They stipulated three new policies to tackle the disincentive problem. First, they introduced the above-quota procurement price. In 1960, the state offered a 10% price premium to production teams for their grain delivery in excess of the basic procurement quota. The policy was abolished after one year but reinstated in 1965 in some low-yield regions. In 1972, the state offered a 30% price premium for above-quota grain delivery and it remained until 1978 (Carter and Zhong, 1988, p.40; Han et al., 1992, p.96). Second, Chinese policy makers instituted a material reward system. Starting in 1961, the state offered a small amount of consumption goods such as cotton cloth and rubber shoes to the production brigades as additional rewards for their grain delivery.[14] Another version of material rewards was also provided to individual farmers in November 1963. The state offered industrial products such as cloth and chemical fertilizer in exchange for their above-quota surplus grain (SGA, 1999). Third, negotiated procurement and sales was introduced in 1962 in grain markets at prices higher than the fixed quota prices. After market transactions in grain had been prohibited since 1957, they were legalized again. Nevertheless, participation by private traders was still forbidden. The negotiated transactions were first conducted by the Supply and Marketing Cooperatives for profits in the large and median cities but had since 1963 been taken over by the Grain Bureau (Han et al., 1992, p.103).

[14] When the material reward system was first introduced in September 1961, each production brigade could get 5 meters of cotton cloth, 3 *tiao* (1 *tiao* = 10 packs) of cigarettes, and one pair of rubber shoes for every 1500 catties (750 kg) of commercial grain delivered to the state. The rewards were revised in 1962 and 1963 (SGA, 1999).

TABLE 2.1a GRAIN PRICES IN CHINA, 1952-1992

Year	Average Grain Prices			Price Index (previous year = 100)		
	Procurement (yuan/ton)	Retail Sales (yuan/ton)	Ratio of Retail Price to Procurement Price	Grain Procurement	Grain Retail	Rural Retail Price Index of Industrial Products
1952	138.4	197.8	1.43			99.5
1953	157.2	201.6	1.28	113.6	101.9	98.6
1954	157.0	205.0	1.31	99.9	101.7	101.9
1955	157.0	212.6	1.35	100.0	103.7	101.5
1956	160.2	212.6	1.33	102.0	100.0	99.0
1957	162.0	220.0	1.36	101.1	103.5	101.2
1958	168.0	220.0	1.31	103.7	100.0	99.4
1959	164.0	220.0	1.34	97.6	100.0	100.9
1960	170.0	227.2	1.34	103.7	103.3	102.8
1961	213.0	231.0	1.08	125.3	101.7	104.9
1962	214.0	229.4	1.07	100.5	99.3	104.5
1963	229.2	230.0	1.00	107.1	100.3	99.0
1964	229.2	230.0	1.00	100.0	100.0	98.1
1965	229.2	237.4	1.04	100.0	103.2	96.3
1966	236.2	245.6	1.04	103.1	103.5	97.1
1967	243.2	257.2	1.06	103.0	104.7	99.2
1968	241.2	260.0	1.08	99.2	101.1	99.7
1969	240.8	260.0	1.08	99.8	100.0	98.5
1970	241.2	260.0	1.08	100.2	100.0	99.8
1971	252.2	260.0	1.03	104.6	100.0	98.5
1972	256.0	277.6	1.08	101.5	106.8	99.5
1973	253.8	277.6	1.09	99.1	100.0	100.0
1974	252.0	287.2	1.14	99.3	103.5	100.0
1975	254.4	288.0	1.13	101.0	100.3	100.0
1976	255.6	288.2	1.13	100.5	100.1	100.1
1977	256.6	292.0	1.14	100.4	101.3	100.1
1978	263.4	294.8	1.12	102.7	101.0	100.0
1979	330.7	298.6	0.90	125.6	101.3	100.1
1980	360.6	307.5	0.85	109.0	103.0	100.8
1981	381.7	337.1	0.88	105.9	109.6	101.0
1982	392.2	340.3	0.87	102.8	100.9	101.6
1983	392.6	351.4	0.90	100.1	103.3	101.0
1984	395.1	358.5	0.91	100.6	102.0	103.1
1985	416.1	383.3	0.92	105.3	106.9	103.2
1986	465.9	413.5	0.89	112.0	107.9	103.2
1987	508.5	442.0	0.87	109.1	106.9	104.8
1988	563.7	489.4	0.87	110.9	110.7	115.2
1989	750.0	557.0	0.74	133.0	113.8	118.7
1990	716.0	528.1	0.74	95.5	94.8	104.6
1991	677.3	631.6	0.93	94.6	119.6	103.0
1992	706.0	837.5	1.19	104.2	132.6	103.1

Note:
The prices are of commercial grain. Procurement prices prior to 1985 include fixed and above-quota prices whereas procurement prices were contract prices thereafter. Average retail price (of state-set, negotiated, and market prices) is derived from the total retail value divided by the retail quantity.
Sources: *China Statistical Yearbook* and *Price Yearbook of China*, various issues

TABLE 2.1b PROCUREMENT PRICES IN CHINA BY GRAIN TYPE, 1950-1998

Year	Procurement Price (yuan/50kg)[a]			Price Index (1978 = 100)			
	Wheat	Rice[b]	Corn	Wheat	Rice	Corn	Overall Retail (All items)
1950	7.42	5.37	4.55	54.5	56.4	51.7	67.6
1951	8.10	5.37	4.37	59.5	56.4	49.7	82.6
1952	8.15	5.67	4.72	59.9	59.6	53.6	82.2
1953	9.41	6.05	5.34	69.1	63.6	60.7	85.0
1954	9.02	6.03	5.31	66.3	63.3	60.3	87.0
1955	8.94	6.03	5.42	65.7	63.3	61.6	87.8
1956	8.90	6.13	5.52	65.4	64.4	62.7	87.8
1957	8.93	6.18	5.58	65.6	64.9	63.4	89.2
1958	8.98	6.35	5.91	66.0	66.7	67.2	89.3
1959	9.03	6.36	5.93	66.3	66.8	67.4	90.1
1960	9.17	6.58	6.07	67.4	69.1	69.0	92.9
1961	11.47	8.25	7.53	84.3	86.7	85.6	108.0
1962	11.47	8.25	7.53	84.3	86.7	85.6	112.1
1963	11.47	8.25	7.53	84.3	86.7	85.6	105.5
1964	11.47	8.25	7.53	84.3	86.7	85.6	101.6
1965	11.06	8.47	7.58	81.3	89.0	86.1	98.8
1966	13.43	9.81	9.09	98.7	103.0	103.3	98.5
1967	13.43	9.81	9.09	98.7	103.0	103.3	97.9
1968	13.43	9.81	9.09	98.7	103.0	103.3	98.0
1969	13.43	9.81	9.09	98.7	103.0	103.3	96.9
1970	13.43	9.81	9.09	98.7	103.0	103.3	96.7
1971	13.43	9.81	9.09	98.7	103.0	103.3	96.0
1972	13.43	9.81	9.09	98.7	103.0	103.3	95.8
1973	13.43	9.81	9.09	98.7	103.0	103.3	96.4
1974	13.43	9.81	9.09	98.7	103.0	103.3	96.9
1975	13.43	9.81	9.09	98.7	103.0	103.3	97.1
1976	13.43	9.81	9.09	98.7	103.0	103.3	97.4
1977	13.43	9.81	9.09	98.7	103.0	103.3	99.3
1978	13.61	12.46	8.80	100.0	100.0	100.0	100.0
1979	19.40	14.10	12.60	142.5	113.2	143.2	102.0
1980	19.70	14.50	13.00	144.7	116.4	147.7	108.1
1981	20.10	14.70	13.40	147.7	118.0	152.3	110.7
1982	20.10	14.90	13.60	147.7	119.6	154.5	112.8
1983	21.70	15.90	14.30	159.4	127.6	162.5	114.5
1984	22.20	16.50	14.80	163.1	132.4	168.2	117.7
1985	22.10	15.70	14.70	162.4	126.0	167.0	128.1
1986	22.10	16.60	15.20	162.4	133.2	172.7	135.8
1987	22.10	18.10	15.00	162.4	145.3	170.5	145.7
1988	23.80	18.30	16.10	174.9	146.9	183.0	172.6
1989	25.50	23.40	17.20	187.4	187.8	195.5	203.3
1990	25.50	23.40	17.10	187.4	187.8	194.3	207.6
1991	25.10	23.40	17.10	184.4	187.8	194.3	213.6
1992	31.50	27.80	20.30	231.4	223.1	230.7	225.2
1993	31.50	27.80	20.30	231.4	223.1	230.7	254.9
1994	52.00	50.40	40.00	382.1	404.5	454.5	310.2
1995	52.00	50.40	40.00	382.1	404.5	454.5	356.1
1996	74.00	72.00	56.00	543.7	577.8	636.4	377.8
1997	74.00	72.00	56.00	543.7	577.8	636.4	380.9
1998	72.82	71.43	56.38	535.0	573.3	640.7	371.0

Notes:

[a] All prices were quota procurement prices for mid-quality grain listed by state grain enterprises.

[b] Price of rice prior to 1978 was for indica rice. In 1978 the prices of indica rice and japonica rice were 9.52 yuan and 12.46 yuan per 50kg respectively. Price from 1978 was for japonica rice. The price index has been computed accordingly.

Sources: Cheng (1998) and *Price Yearbook of China*, various issues

TABLE 2.1c PROCUREMENT, NEGOTIATED, AND RETAIL PRICES OF DIFFERENT GRAIN TYPES IN CHINA, 1985-2001

		Procurement Price [a]		Negotiated Price		Retail Price	
	Year	(yuan/kg)	Index (previous year = 100)	(yuan/kg)	Index (previous year = 100)	(yuan/kg)	Index (previous year = 100)
						(Flour)	
Wheat	1985	0.43		0.43			
	1986	0.44	102.3	0.51	119.6		
	1987	0.44	101.5	0.55	106.6		
	1988	0.47	105.6	0.63	115.3		
	1989	0.51	108.2	0.89	141.6		
	1990	0.51	100.6	0.85	95.0		
	1991	0.51	100.9	0.77	91.2	0.72	
	1992	0.59	116.0	0.73	95.1	0.90	124.8
	1993	0.66	110.9	0.75	102.1	1.11	123.1
	1994	0.89	135.7	1.04	139.4	1.82	164.6
	1995	1.08	121.3	1.53	147.1	2.43	133.5
	1996	1.31	121.5	1.65	107.8	2.64	108.6
	1997	1.46	111.5	1.43	86.7	2.67	101.0
	1998	1.44	98.6	1.30	90.9	2.51	94.0
	1999	1.31	91.0	1.22	93.8	2.45	97.9
	2000	1.14	87.0			2.22	90.6
	2001	1.09	95.7			2.10	94.4
Rice	1985	0.35		0.36			
	1986	0.36	101.3	0.44	122.0		
	1987	0.38	107.3	0.51	115.3		
	1988	0.40	105.3	0.61	120.4		
	1989	0.48	119.9	0.87	142.0		
	1990	0.51	106.2	0.82	93.8		
	1991	0.51	99.9	0.73	89.1	0.83	
	1992	0.55	108.6	0.65	89.0	0.99	119.0
	1993	0.62	111.2	0.74	114.3	1.23	124.6
	1994	0.89	144.8	1.14	153.3	2.10	170.5
	1995	1.09	122.5	1.72	150.9	2.90	138.1
	1996	1.33	122.0	1.71	99.4	2.92	100.8
	1997	1.48	111.3	1.45	84.8	2.48	84.9
	1998	1.46	98.6	1.34	92.4	2.47	99.7
	1999	1.33	91.1	1.23	91.8	2.44	98.6
	2000	1.13	85.0			2.10	86.2
	2001	1.11	98.2			2.20	104.5

	1985	0.31		0.33		0.37	
	1986	0.32	101.6	0.40	123.0	0.45	121.7
	1987	0.33	104.9	0.44	110.5	0.50	111.1
	1988	0.34	103.4	0.47	105.9	0.57	113.4
	1989	0.37	107.9	0.64	136.3	0.78	137.0
	1990	0.38	101.6	0.63	97.4	0.69	88.3
	1991	0.38	99.7	0.55	87.2	0.60	86.4
	1992	0.42	110.8	0.55	100.3	0.63	105.4
Corn	1993	0.46	110.4	0.64	117.6	0.73	116.3
	1994	0.69	150.0	0.90	140.4	1.01	138.1
	1995	0.86	124.6	1.38	153.3	1.58	156.4
	1996	1.06	123.0	1.39	100.7	1.49	94.3
	1997	1.23	116.0	1.10	79.1	1.39	93.6
	1998	1.23	99.7	1.17	106.4	1.54	110.2
	1999	1.14	92.7	1.05	89.7	1.32	86.2
	2000	0.96	84.2			1.08	81.6
	2001	0.94	97.9			1.30	120.0

Notes:

[a] Here the procurement prices are contract prices.

Source: *China's Agricultural Development Report '96* and *2001*

In addition to these new policies, the quota procurement prices were raised by an average of 25.3% and 17.1% in 1961 and 1966 respectively (SGA, 1999; also see Tables 2.1a and 2.1b). Despite all these incentives, the collective system largely discounted the benefits that farm households could derive. Without institutional changes that would channel the gains from higher procurement prices and material rewards directly to farmers, the incentive effects of these measures would be minimal. After the upward adjustment in 1966, the quota procurement prices of wheat, rice, and corn remained unchanged for 12 years since the eruption of the Cultural Revolution. Negotiated procurement also virtually came to a standstill in the 10 years of turmoil following 1966. The only price incentive offered in this period was the 30% price premium for above-quota grain delivery introduced in 1972. While the total amount of grain procured exceeded grain sales by 3.8 million metric tons (m.m.t.) for the period 1966-1970, total procurement fell short of total sales by more than 10 m.m.t. between

1971 and 1976. The deficits had to be filled by grain reserves and imports (SGA, 1999).

Productivity-enhancing policies

Perhaps the most important driving force for agricultural growth in this period was the improvement in production technology. Having most surpluses extracted via the 'price scissors', the agricultural sector could hardly accumulate capital for reinvestment.[15] The communes played an important role overcoming this resource constraint by mobilizing a massive amount of rural labour to take part in labour-intensive infrastructural projects such as irrigation, flood control, and land reclamation (Perkins and Yusuf, 1984; Lin, 1997). At the same time, land-saving technological change such as the adoption of chemical fertilizers and fertilizer-responsive high-yield crop varieties in the 1960s and 1970s also helped raise the output levels. The most notable examples include the widespread adoption of dwarf varieties of rice and wheat by the end of 1970 and the replacement of dwarf varieties of rice with hybrid rice in 1976 (Lin, 1997, p.204). Nevertheless, the performance of China's agriculture had remained poor until the production incentives were given a boost by the institutional changes in the late 1978 economic reforms (Table 2.2b).[16]

[15] According to a project jointly conducted by China's Ministry of Agriculture and the World Bank, the state extracted a total amount of economic surpluses estimated at 510 billion yuan from the agricultural sector between 1953 and 1978, amounting to one-third of the net value of agricultural output. The fiscal transfers to agriculture in the same period added up only to 157 billion yuan (Guo, 1995, p.18).

[16] Yet per capita grain output increased from 288 kg in 1952 to 319 kg in 1978 (Table 2.2a).

TABLE 2.2a GRAIN OUTPUT AND TRADE OF CHINA, 1949-2001

Year	Output[a] (1000 ton)	Annual Growth (%)	Per Capita Output[b] (kg)	Import (1000 ton)	Export (1000 ton)	Net Import (1000 ton)	Net Import as % of Output
1949	113,180		209				
1950	132,125	16.7		67	1,226	-1,159	-0.9
1951	143,685	8.7		0	1,971	-1,971	-1.4
1952	163,915	14.1	288	0	1,529	-1,529	-0.9
1953	166,830	1.8		15	1,826	-1,812	-1.1
1954	169,515	1.6		30	1,711	-1,681	-1.0
1955	183,935	8.5		182	2,233	-2,051	-1.1
1956	192,745	4.8		149	2,651	-2,502	-1.3
1957	195,045	1.2	306	167	2,093	-1,926	-1.0
1958	200,000	2.5		224	2,883	-2,660	-1.3
1959	170,000	-15.0		2	4,158	-4,156	-2.4
1960	143,500	-15.6		66	2,720	-2,654	-1.8
1961	147,500	2.8		5,810	1,355	4,455	3.0
1962	160,000	8.5	240	4,923	1,031	3,892	2.4
1963	170,000	6.3		5,952	1,490	4,462	2.6
1964	187,500	10.3		6,570	1,821	4,749	2.5
1965	194,525	3.7	272	6,405	2,417	3,989	2.1
1966	214,000	10.0		6,438	2,885	3,553	1.7
1967	217,820	1.8		4,702	2,994	1,708	0.8
1968	209,055	-4.0		4,596	2,601	1,995	1.0
1969	210,970	0.9		3,786	2,238	1,549	0.7
1970	239,955	13.7	293	5,360	2,119	3,241	1.4
1971	250,140	4.2		3,173	2,618	556	0.2
1972	240,480	-3.9		4,756	2,926	1,831	0.8
1973	264,935	10.2		8,128	3,893	4,235	1.6
1974	275,270	3.9		8,121	3,644	4,477	1.6
1975	284,515	3.4	311	3,735	2,806	929	0.3
1976	286,305	0.6		2,367	1,765	602	0.2
1977	282,725	-1.3		7,345	1,657	5,688	2.0
1978	304,765	7.8	319	8,833	1,877	6,955	2.3
1979	332,115	9.0	343	12,355	1,651	10,705	3.2
1980	320,555	-3.5	327	13,429	1,618	11,811	3.7
1981	325,020	1.4	327	14,812	1,261	13,551	4.2
1982	354,500	9.1	352	16,117	1,251	14,866	4.2
1983	387,275	9.2	379	13,435	1,963	11,472	3.0
1984	407,305	5.2	393	10,645	3,326	7,319	1.8
1985	379,108	-6.9	361	6,171	8,880	-2,709	-0.7
1986	391,512	3.3	367	7,282	9,094	-1,812	-0.5
1987	404,733	3.4	372	16,278	7,187	9,092	2.2
1988	394,080	-2.6	358	14,788	6,542	8,246	2.1
1989	407,550	3.4	364	16,403	6,221	10,182	2.5
1990	446,240	9.5	393	13,564	5,437	8,127	1.8
1991	435,290	-2.5	378	13,983	10,660	3,323	0.8
1992	442,658	1.7	380	11,620	14,451	-2,831	-0.6
1993	456,488	3.1	387	7,330	16,119	-8,789	-1.9
1994	445,101	-2.5	374	9,188	15,620	-6,432	-1.4
1995	466,618	4.8	378	20,800	2,700	18,101	3.9
1996	504,535	8.1	414	12,000	1,440	10,560	2.1
1997	494,171	-2.1	402	7,050	8,590	-1,540	-0.3
1998	512,295	3.7	412	7,080	9,060	-1,980	-0.4
1999	508,386	-0.8	406	7,710	7,580	130	0.0
2000	462,175	-9.1	366	13,570	14,000	-430	-0.1
2001	452,637	-2.1	356	17,380	9,030	8,350	1.8

TABLE 2.2b GRAIN OUTPUT GROWTH IN CHINA, 1952-2001

Year	Average Annual Output Growth (%)	
	Total	Per Capita
1952-1978	2.4	0.4
1978-1984	5.0	3.5
1984-1989	0.0	-1.5
1989-1996	3.1	1.8
1978-2001	1.7	0.5

Notes:

[a] Output is of raw grain.

[b] Per capita grain output is based on annual average population.

Sources: NBS (1980); NBS (2002); *China's Agricultural Development Report 2002*; *China Foreign Economic Statistical Yearbook*, various issues

Supplementary trade policies to support heavy industrialization

In collaboration with domestic pricing and marketing policies, trade interventions had played a crucial role in China's pursuit of heavy industrialization. By granting monopoly power to a small number of foreign trade corporations (or state trading enterprises, STEs), China maintained tight control over the trade in major farm products including grain, edible oil, cotton, etc. and was able to reserve the scarce foreign exchanges for industrial development (Lardy, 1992; Lin, 1997; Wu, 1998).[17] Through the monopoly of the foreign trade corporations, the Chinese government also created an 'airlock' to insulate its economy from the 'harmful irrationalities' of the world market (World Bank, 1988). China National Cereals Oils and Foodstuff Import and Export Corporation (COFCO) is the state-owned foreign trade corporation that had enjoyed a monopoly power in the trading of wheat, rice, and corn prior to China's accession to WTO.[18] As noted by Martin (2001a), conventional trade policy instruments such as tariffs, quotas and licences were of limited importance in China's central planning era. Instead, quantitative plans for foreign trade were made by the

[17] Lardy (1992) gives a detailed analysis of the evolution of China's trade practices from the central planning era to the post-reform period up to the beginning of the 1990s.

State Council using material balance sheets that coordinated the flow of raw materials and intermediate goods. On the basis of the recommendations of the State Planning Commission (later the State Planning and Development Commission), planned import volumes of selected commodities, mainly machinery, equipment and industrial inputs, were determined by the projected shortfall of domestic supply whereas export levels of other commodities, mostly agricultural and primary products, were decided such that sufficient foreign exchange could be generated to pay for the imports (Lardy, 1992; Martin, 2001a). In particular, to realize the objective to "exchange food for machinery" (Ke, 1995, p.70), China was a net grain exporter in the 1950s with average net grain exports over 2 m.m.t. per year for the decade (see Table 2.2a). Rice and soybean were the major grain exports to generate foreign exchange earnings in the central planning period. Grain imports, usually of wheat, would be allowed only because there was no alternative means to meet domestic shortages. Between 1961 and 1964, however, China was forced to import a large tonnage of grain to balance the output deficiency and replenish the grain stocks after the famine in 1960 (Carter and Zhong, 1991). Since then, China had remained as a net grain importer in most of the next three decades (Table 2.2a).[19]

Apart from trade restrictions, exchange rate policy was one of the most notable 'indirect' policies to redistribute income. It is well documented that many developing countries overvalued their currencies for this purpose (Krueger et al., 1988 & 1991; Krueger, 1993). Such a policy had the same effect as a tax on agricultural exports, generating additional revenues for the government to subsidize the importing industrial

[18] Since 1999 Jilin Grain Group Import & Export Co. Ltd. has become a second state trading enterprise that participates in the exports (only) of rice, corn, and soybeans.

[19] According to the State Grain Administration (1999), although the quantity of grain imports exceeded that of exports in the first half of the 1970s, the government did not incur any deficit in grain trade. Due to the higher prices commanded by the exported rice and beans coupled with lower prices paid for imported wheat and corn, grain trade in 1971-1976 brought in some foreign exchange earnings.

sector. The overvaluation of yuan had also played an important role in China's pursuit of heavy industrialization (Wu, 1998). Together with the direct price interventions that resulted in the 'price scissors', the over-valued yuan exerted a negative impact on the relative prices of the exported farm products. All these direct and indirect trade interventions served the purpose of inter-sectoral income redistribution that disfavored grain and other primary production but supported the industrial sector. The quantity-oriented trade restrictions also facilitated China's pursuit of grain self-sufficiency.

2.2 The post-reform period between 1979 and 1996

At the beginning of the economic reforms, the most urgent task facing the Chinese policy makers was to secure output growth of grain and to overcome domestic shortages. The problems emerged in the central planning era made them realize the irreplaceable role of prices in resource allocation. This change in perspective led them to search for the 'right' prices that could maintain high self-sufficiency in grain production without compromising the strategy of heavy industrialization. Prior to the mid-1990s, however, the conflicting roles of grain prices in redistributing income from agriculture to industry and in providing incentives for farmers to produce more grain could never be satisfactorily reconciled. When political considerations excluded the option of recovering the higher procurement prices from urban consumers, it became necessary for the state to provide food subsidies.[20] After several substantial upward adjustments in the procurement prices in this period, the inevitable consequence was mounting fiscal deficits, which were in themselves undesirable to the government. Between late 1978 and 1996, the formulation of China's grain policy evolved around

[20] Based on their study of a number of developing countries during the 1970s, Byerlee and Sain (1986) claim that explicit government fiscal subsidies have in most cases played a much larger role than low producer prices in urban cheap food policies and that food subsidies have reduced investment in the agricultural sector. Their allegation appears to be consistent with what happened in China in the 1980s and early 1990s.

the struggles to meet the conflicting objectives of industrialization and grain self-sufficiency as well as to contain the deficits.

The conflicts between the two objectives of grain policy have gradually diminished over time. As the Chinese economy develops and industry outgrows agriculture, the latter is no longer a necessary source of investable surplus for the former. More importantly, since the second half of the 1990s, the Chinese leaders have become increasingly concerned about the lagging incomes of farmers, which have jeopardized their production incentives.[21] It is reported that the ratio of rural incomes to urban incomes has declined from 1:1.82 in 1983 to 1:3.11 in 2002 (*Zhongguo Xinxi Bao (China Information News)*, 23 April 2003). Against this background, safeguarding farmers' incomes against rising opportunity costs of grain production has become the necessary means of maintaining grain self-sufficiency. The stipulation of protective prices for grain procurement in late 1996 signifies the disappearance of the conflict between the two objectives regarding income distribution and grain self-sufficiency as well as the convergence of the allocative role and the distribution role of grain prices. I will discuss the grain policies after 1996 in Section 2.3.

Grain procurement and sales under the Household Responsibility System

Acknowledging the failure of the collective system to overcome the disincentive effect of suppressed procurement prices and secure output growth, the new political leaders who came into power in 1978 had no alternative but to experiment with some sweeping reforms of the rural economy. These changes began with a spontaneous reform initiated by poor farmers in Anhui that introduced various forms of

[21] Although the phenomenon of discouraged grain farmers leaving their farmland idle due to low returns has emerged since the mid-1980s, the problem has become more serious since late 1990s. According to a survey conducted by the State Planning and Development Commission in 2001, the after-tax net return to grain production declined from 156 yuan per *mu* (15 *mu* = 1 hectare) in 1996 to 111 yuan in 1998, and further to 57 yuan in 1999 and 50 yuan in 2000 (MoA Information Centre, 10 October

contract system between the production team and individual farm households (Kueh, 1985; Wu, 1997; Ash, 1998).[22] Seeing the positive results for crop yields, other poor production teams in Sichuan, Guizhou, Gansu, Inner Mongolia and Henan also adopted the system even though it was prohibited officially (Lin, 1988; Ash, 1998, p.231). After considerable hesitation and having to overcome some opposition, the government endorsed this spontaneous reform in 1980 (*Almanac of China's Agriculture 1981*, pp.409-11). By the end of 1983, over 95 percent of all the rural households had already adopted the new system (*Almanac of China's Agriculture 1985*, p.46).

Under the reformed system, of which the household responsibility system (HRS) was the boldest form, farm households contracted certain plots of land from their production team and agreed to deliver a fixed quantity of output to fulfil state and collective obligations. Upon quota fulfilment, they would be free to retain any surplus produce for self-consumption or market sales. By making farm households the residual claimants to their outputs, this institutional change reinforced the incentive effects of the upward adjustments in fixed-quota procurement prices and above-quota prices in 1979 by an average of 20 and 33 percent respectively (*Almanac of China's Agriculture 1980*; Lin, 1997). And the substantial price adjustments indicated that China's policy makers had come to terms with the allocative function of prices. It should be noted that market sales of surplus grain were not allowed until 1985. Before then, the state offered to procure all surplus grain at the above-quota procurement prices, which were 50 percent higher than the fixed procurement prices after the adjustments in 1979. This implicit price guarantee set at such an attractive level boosted farmers' production incentives substantially (Sicular, 1992, p.36; Johnson, 1994, pp.2-3).

2001). It is reported that the problem of abandoned farmland has extended to some commercial grain base areas that have comparative advantage in grain production (ibid.).

[22] See Kueh (1985) for an illuminating account of the various forms of responsibility system.

HRS had improved both production and allocative efficiency in the early reform period. On the one hand, the incentive effect of the rights to residual income motivated farmers to realize their potential output. On the other hand, the reduction in production planning and procurement quotas increased farmers' freedom to decide what 'surplus crops' to produce for self-consumption or for sale on the market, which improved the efficiency in resource allocation. The impressive effect can be reflected by an annual growth of grain output at an average rate of 5 percent per year in 1978-84 compared to 2.4 percent in 1952-78 (Table 2.2b). One must note that the improvement in productivity growth was accompanied by a 6.4-percent decline in the area sown to grain from 120.6 million hectares in 1978 to 112.9 million hectares in 1984 (*Rural Statistical Yearbook of China 1998*). Various studies on China's post-reform performance of agriculture identify HRS as the most important source of growth while the contribution of technological progress and price adjustments has also been acknowledged (McMillan et al., 1989; Fan, 1991; Lin, 1992).[23]

While the combination of price incentives and decollectivization had successfully boosted the growth in grain output, the lopsided price adjustments that raised the procurement prices substantially but left sales prices unchanged created the undesirable phenomenon of 'price reversal'. After the price adjustments in 1979, the fixed procurement prices and the above-quota procurement prices were 20 percent and 80 percent above the rationed sales prices making it necessary for the government to provide subsidies to fill the price wedge (Ke, 1995, p.52). The adherence to the policy of low urban food prices had costed the government dearly. The outlay of food

[23] Contrary to these earlier findings, Huang and Rozelle (1996) identify technological progress as the most important determinant of rice yield growth in 1978-84, whose contribution surpassed that of institutional change in that period. However, it should be noted that while there is no doubt about the contribution of technological progress to productivity growth, in the presence of technical and allocative inefficiency, the estimation of its contribution will be inaccurate. In particular, it is extremely difficult to separate the effects of efficiency improvement and technological progress in the early reform period when institutional changes led to substantial improvement in efficiency (Wu and Shea, 2002).

subsidies (grain and oil) offered to urban residents surged from 3.6 billion yuan in 1978 to 20.5 billion yuan in 1984, occupying 12 percent of the total government expenditure in that year (Table 2.3).

It should be noted that the excessive upward adjustment in the above-quota prices had unduly exacerbated the deficit problem. Apart from the intended effects on grain production and delivery, it also induced some opportunistic behaviour on the part of farmers. Instead of growing the crops with relatively large quotas assigned to them, some farmers switched to planting crops with small or no quotas to take advantage of the sizable price premiums (Sicular, 1988, p.289). As a result of such behaviour and the surge in grain output between 1979 and 1984, above-quota procurement conducted at a 50-percent price premium accounted for about 70 percent of the total amount of grain procured by the government in 1984 creating an excessive burden on the state budget (Sicular, 1992, p.37; Gao and Xian, 1992). Curbing the mounting fiscal deficits then became the most urgent task facing the policy makers.

The contract procurement system to curb fiscal deficits

Seeing the impressive output growth in the first few years of the agricultural reforms, China's policy makers became very optimistic about the nation's ability to produce sufficient grain to meet its domestic demand. They shifted their attention to the more pressing problem at the time – the mounting fiscal outlays incurred in grain distribution, especially the payments made to above-quota procurement, as well as the high storage costs of maintaining the stockpiles during those good years in 1983 and 1984. For fear of social and political instability, the state adhered to the policy of low food prices and hence excluded the possibility of recovering the fiscal outlays from urban grain consumers. Against this background, the state replaced the mandatory procurement system with the newly introduced 'contract procurement system' in 1985

to reduce its commitment to grain procurement and evade the implicit price guarantee (Johnson, 1994, pp.2-3).

Under the new system, farmers entered into 'voluntary' contractual agreement with the local governments at the newly established '(proportional) contract price' that was equal to 30% times fixed-quota price plus 70% times above-quota price.[24] After fulfilling their contracted delivery, farmers would be free to sell surplus grain on the market. Hence the two-track system was also established for grain distribution in 1985. The state withdrew from the previous commitment to purchasing surplus grain from farmers at above-quota prices but promised to buy as much as they wished to sell at the old fixed quota prices if the market prices fell below them (*Almanac of China's Agriculture 1986*). The nationwide target for state procurement was reduced from the fixed quota of 79 m.m.t. in 1984 to the contract quota of 75 m.m.t. in 1985 (*Almanac of China's Agriculture 1990*; Sicular, 1993).

To the policy makers' surprise, the revised procurement prices under the contract procurement system exerted a disincentive effect on farmers. Although the proportional price was supposed to leave farmers' income the same as under the mandatory procurement system, it ended up to be 10 percent below the above-quota price. The adverse effect on farmers' production incentives of the lower procurement price at the margin, coupled with a poor harvest in 1985, resulted in a 6.9-percent drop in grain output (Table 2.2a) and a 10-percent rise in market prices (Lin, 1997, p.207). Contract fulfilment became a problem as a result.

[24] The 30-70 weighting of the contract price was set according to the prevailing proportions of within-quota and above-quota procurement at the time in order to maintain farmers' income.

TABLE 2.3 SHARE OF AGRICULTURE IN GOVERNMENT EXPENDITURE AND INFRASTRUCTURAL INVESTMENT IN CHINA, 1950-2000

Year	Agricultural Expenditure (mil. yuan)	As % in Total Government Expenditure	Selective Items of Agricultural Expenditure (mil. yuan)			Investment in Agricultural Infra-structure[b] (mil. yuan)	As % in Total Infra-structural Investment
			Science & Technology	Total Subsidies Grain & Oil[a]	Price Subsidies Grain, Oil & Cotton		
1950	274	4.0	0	0	0		
1955	1,701	6.5	0	0	0	618	6.2
1960	9,052	14.1	0	0	0	4,515	11.6
1961	5,479	15.4	0	1,908	882	1,699	13.3
1962	3,682	12.5	0	2,889	589	1,439	20.2
1963	5,498	16.6	81	2,381	771	2,261	23.0
1964	6,698	17.0	100	2,399	998	2,688	18.7
1965	5,502	12.0	105	2,050	736	2,497	13.9
1966	5,414	10.1	128	2,097	1,297	n.a.	n.a.
1967	4,564	10.4	30	2,382	880	n.a.	n.a.
1968	3,324	9.3	0	2,488	795	n.a.	n.a.
1969	4,803	9.1	0	2,717	667	n.a.	n.a.
1970	4,940	7.6	0	3,040	830	n.a.	n.a.
1971	6,075	8.3	5	2,441	114	n.a.	n.a.
1972	6,513	8.5	7	2,965	432	n.a.	n.a.
1973	8,517	10.5	8	2,946	604	n.a.	n.a.
1974	9,121	11.5	13	3,298	641	n.a.	n.a.
1975	9,896	12.1	10	4,181	890	3,840	9.4
1976	11,049	13.7	78	4,990	1,035	4,104	10.9
1977	10,812	12.8	93	4,943	1,277	4,175	10.9
1978	15,066	13.4	106	3,631	1,114	5,334	10.7
1979	17,433	13.6	152	7,328	5,485	5,792	11.1
1980	14,995	12.2	131	10,801	10,280	5,203	9.3
1981	11,021	9.7	118	13,477	14,222	2,921	6.6
1982	12,049	9.8	113	14,721	15,619	3,412	6.1
1983	13,287	9.4	181	18,276	18,213	3,545	6.0
1984	14,129	8.3	218	20,500	20,167	3,712	5.0
1985	15,362	7.7	195	20,180	19,866	3,591	3.4
1986	18,420	8.4	270	20,798	16,937	3,506	3.0
1987	19,572	8.7	228	17,223	19,543	4,211	3.1
1988	21,407	8.6	239	17,782	20,403	4,746	3.0
1989	26,594	9.4	248	23,325	26,252	5,065	3.3
1990	30,784	10.0	311	24,412	26,761	6,722	4.0
1991	34,757	10.3	293	23,114	26,703	8,500	4.0
1992	37,602	10.0	300	n.a.	22,435	11,100	3.7
1993	44,045	9.5	300	n.a.	22,475	12,777	2.8
1994	53,298	9.2	300	n.a.	20,203	15,494	2.4
1995	57,493	8.4	300	n.a.	22,891	21,909	3.1
1996	70,043	8.8	494	n.a.	31,139	31,790	3.7
1997	76,639	8.3	548	n.a.	41,367	41,270	4.2
1998	115,476	10.7	914	n.a.	56,504	63,710	5.4
1999	108,576	8.2	913	n.a.	49,229	83,550	6.7
2000	123,154	7.8	978	n.a.	75,874	94,000	7.0

Notes:

[a] The subsidies include the operating deficits of the state enterprises (NBS, 1986, p.36), part of which were financed by policy loans from the Agricultural Bank of China. Thus the amount could exceed the total agricultural expenditure.

[b] Investments in agricultural infrastructure up to 1986 include also water conservancy, forestry, and meteorology (MoA, 1989).

Sources: NBS (1986); MoA (1989 & 1997); ZJXZ (1992); *Statistical Yearbook* 1993 & 2002; NBS (2002).

Remedial measures to tackle contract fulfilment problems

The Chinese government took three remedial measures to overcome the difficulties in enforcing procurement contracts. First, the state made the contract a 'responsibility' in 1986, rendering grain procurement mandatory again. In 1990 the term of 'contract procurement system' was changed officially to 'state procurement system' to reflect its mandatory nature (*Almanac of China's Commerce 1991*, IV-3). Second, the state raised the contract prices four times in a row between 1986 and 1989 to boost farmers' incentives for grain delivery (see Table 2.1a). Third, to further enhance farmers' incentives, the state re-introduced material rewards in 1987 in the form of tied sales of chemical fertilizer and diesel fuel at subsidized prices, plus the provision of 20-percent cash advances to farmers for their grain delivery (*Almanac of China's Agriculture 1988*).[25] All these measures could be described as 'policy reversal'. After its introduction in 1961, the system of material rewards was abolished in 1985 to improve the profitability of the manufacturers of agricultural inputs. Farmers were then required to buy from the market channels under the two-track system (Han et al., 1992). But now the government had to reinstate the input subsidies. Apparently, both the upward adjustments in procurement prices and the provision of

[25] After its re-introduction in 1987, these rewards were increased in 1989 to further enhance the incentive effects. The tied sales policy was modified in 1993. Instead of providing subsidized chemical fertilizer and diesel fuel, farmers would get cash subsidies in lieu of the inputs. The national directive for the subsidies was: 4.2 yuan/50kg (2.85 yuan from the state and 1.35 yuan from local government) for wheat and corn; 5.2 yuan/50kg (3.175 from the state and 2.025 from local government) for rice; and 5.5 yuan/5kg (3.475 and 2.025 from the state and local government respectively) for soybean (*Almanac of China's Commerce 1993*, IV-2).

input subsidies implied larger outlays, which ran directly counter to the efforts to curb the mounting fiscal deficits.

One may wonder why the Chinese government chose to provide input subsidies instead of further raising the procurement price. Among the alternative explanations proposed in related studies, two are most relevant to China's grain policy.[26] The first one is a widely acknowledged political-economy justification for the provision of input subsidies. Input subsidies may be preferred to output price increase in a centrally planned economy because the excess demand resulting from low-price inputs, especially fertilizer, enables the government to practice discriminating allocation of these resources to selective sectors or uses. Watson and Findlay (1999, p.24) provide a second explanation for the use of a variety of instruments in China's grain policy. They attribute it to policy makers' uncertainty about the impact of a particular instrument and the rising marginal costs associated with the increasing use of an instrument. While these explanations are all valid, one must not leave out financial consideration as one of the important factors leading to the reintroduction of input price subsidies. It was an attempt of the central government to shed some of the fiscal burden onto local governments. While the central government had to bear all the costs of upward adjustments in state-set procurement prices, the costs of tied sales were shared equally between central and local governments (*Almanac of China's Commerce 1992*, IV-2).

[26] There is one more explanation for the offer of input subsidies. Barker and Hayami (1976) performed a study comparing the effects of the output price and input price policies on the rice production in the Philippines. Their findings show that fertilizer price subsidy is a less costly method to achieve self-sufficiency in rice production. However, it remains an empirical question whether their conclusion also applies to China.

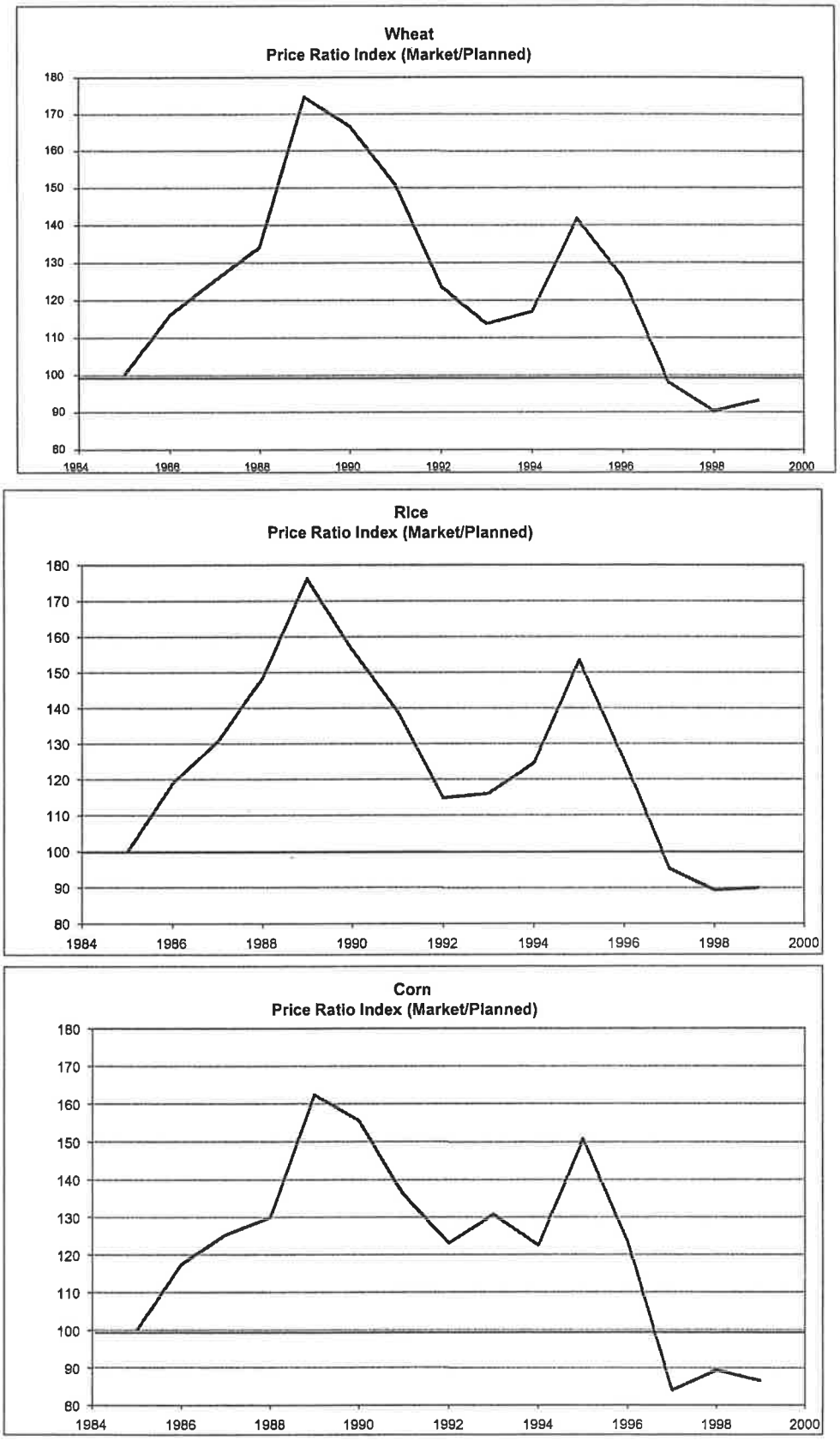

FIGURE 2.1 PRICE RATIO INDEX (MARKET VERSUS PLANNED, 1985=100)[27]

[27] Here the market prices are approximated by the negotiated prices because of the lack of comparable data (see Table 2.1c). In particular, there is no market price for wheat but only for flour.

Failure of the remedial measures

Due to developments outside the grain sector, the above remedial measures failed to produce the intended results. As part of the price reform program that began in the mid-1980s, the Chinese government gradually decontrolled the prices of non-staple food items and industrial products. The subsequent increases in these prices raised the opportunity costs of grain production, which included the higher incomes that grain farmers could otherwise derive from growing non-grain crops, as well as the higher prices that they had to pay for materials and equipment. The alternative employment opportunities provided by the booming township and village enterprises also added to the opportunity costs of grain production. These rising costs reduced the supply of marketed grain and drove up their market prices. The annual rate of increase in grain retail prices ranged from 6 percent to 14 percent between 1985 and 1989 (see Table 2.1a). Farmers' production incentives would be maintained only if the state could make timely and sufficient adjustments in the procurement prices to compensate the higher costs. In reality, however, upward adjustments in the procurement prices always lagged behind the market prices limiting the incentive effect on contract fulfilment (see Figure 2.1).

There was another important factor contributing to the policy failure in this period. It was the non-compliance of the policy implementers, namely, the grain bureaus and the local governments. Their deviation from the stipulated procurement policies was partly a result of insufficient financial resources provided by the centra government. It was also due to their rent-seeking behaviour under the two-track system. The grain bureaus play two roles under the two-track system. As government agents, their first role is to implement grain policies, which include procuring and selling grains at state-set prices and managing the strategic grain stock. As profit-seeking

commercial units, their second role is to conduct market-oriented transactions at negotiated prices. In their first capacity, they have access to government subsidies and concession loans from the Agricultural Bank of China (ABC) and later the Agricultural Development Bank of China (ADBC) to finance the 'grain bureau policy losses' incurred in the provision of price subsidies and the management of the grain stock for the state. To capture economic rents, these state grain enterprises, usually in collaboration with the local governments, have been abusing their dual role at the expense of farmers' welfare. One example of such behaviour was the misappropriation of the funds designated for cash advances to farmers. Instead of delivering the promised material rewards, the local governments issued IOUs to farmers instead (Oi, 1996, p.182; Yuan, 1994, p.38). Chapter 7 will give a more detailed analysis of the defiant behaviour of these policy implementers.

Implementation problems such as the issuance of IOUs to farmers in lieu of actual payments discounted the incentive effects of the policy adjustments, which then failed to prevent farmers from diverting their resources to more profitable activities such as cash crop farming and rural industrial production. Grain output stagnated and did not return to the 1984 level until 1989 (Table 2.2a). Apart from jeopardizing grain farmers' welfare, the rent-seeking behaviour of policy implementers has also created heavy financial burden for the government and remained to be a major problem of the state grain system until now.

The adoption of the contract procurement system appeared to have some immediate effect on tackling the implicit price guarantee problem. The price subsidies for grain and oil dropped from the peak of 15.9 billion yuan in 1984 to 14.1 billion yuan in 1986 (ZJXZ, 1992). However, an undesirable consequence was the re-emergence of grain shortages due to the reasons discussed earlier. The shortfalls in

grain supply, which were also due partly to the unexpected poor harvest in 1985,[28] discouraged the pro-market leaders from pushing further to liberalize the grain distribution system. Instead, the government reduced the annual contract procurement quota from 75 to 50 m.m.t. between 1985 and 1989 but increased the quota for negotiated procurement to 40 m.m.t. Such adjustments were to enhance farmers' incentives by allowing them to sell more grain at the higher market or negotiated prices without compromising the state's control over grain distribution (*Almanac of China's Agriculture 1988*, p.72).

Although the state allowed market-oriented grain transactions to play an increasing role (Table 2.4), it would take administrative measures to restrict the free operations of markets whenever their activities interfered with the fulfilment of the state plans. For example, the state monopolized the procurement of rice and agricultural inputs in 1988 and 1989 respectively when surging market prices of grain as well as agricultural inputs (see Table 2.1a) were disrupting the government's pricing strategy to encourage grain delivery (Sicular, 1993). Policy changes in the second half of the 1980s can be characterized by such swings between liberalizing and tightening state control. When the State Council changed the 'contract procurement' to 'state procurement' in the autumn procurement season in 1990, grain delivery to the government became once again an obligation that farmers had to fulfil. The fixed quota remained at 50 m.m.t. (*Almanac of China's Commerce 1991*).

[28] Erratic weather fluctuations have been a major factor leading to or aggravating some of the demand and supply imbalances in China. Using disaggregate data to capture the diverse weather fluctuations in different regions in China, Zhang and Carter (1997) find that weather conditions have contributed significantly to the output growth of grain. In particular, they estimate that weather effects account for 7.7 percent of the overall growth in grain output in the period between 1980 and 1985. They point out that the exclusion of this factor from earlier studies (such as McMillan et al. (1989) and Lin (1992)) may have led to overestimated contribution of HRS to productivity gain.

TABLE 2.4 SHARES OF GRAIN TRANSACTIONS IN CHINA, 1952-1998

Year	Output[a] (1,000 ton)	Quantity Transacted[a] (1,000 ton)	As % of Output[b]	Share of Grain Transactions (%)[c]		
				Government Quota[d]	Government Negotiated	Free Market
1952	163,915	33,270	20.3			
1953	166,830	47,260	28.3	100	0	0
1954	169,515	51,810	30.6	100	0	0
1955	183,935	50,745	27.6	100	0	0
1956	192,745	45,440	23.6	100	0	0
1957	195,045	48,040	24.6	100	0	0
1958	200,000	58,760	29.4	100	0	0
1959	170,000	67,405	39.7	100	0	0
1960	143,500	51,050	35.6	100	0	0
1961	147,500	40,470	27.4	100	0	0
1962	160,000	38,145	23.8	100	0	0
1963	170,000	43,965	25.9	92	4	4
1964	187,500	47,425	25.3	92	4	4
1965	194,525	48,685	25.0	89	6	6
1966	214,000	51,580	24.1	93	4	4
1967	217,820	49,355	22.7	97	1	1
1968	209,055	48,695	23.3	99	1	1
1969	210,970	46,675	22.1	99	0	0
1970	239,955	54,435	22.7	99	0	0
1971	250,140	53,020	21.2	98	1	1
1972	240,480	48,295	20.1	98	1	1
1973	264,935	56,120	21.2	98	1	1
1974	275,270	58,070	21.1	98	1	1
1975	284,515	60,860	21.4	99	1	1
1976	286,305	58,250	20.3	99	0	0
1977	282,725	56,615	20.0	99	0	0
1978	304,765	61,740	20.3	91	0	9
1979	332,115	71,985	21.7	84	8	7
1980	320,555	72,995	22.8	78	13	8
1981	325,020	78,505	24.2	76	16	8
1982	354,500	91,860	25.9	71	22	7
1983	387,275	119,855	30.9	87	7	6
1984	407,305	141,690	34.8	86	8	6
1985	379,108	115,640	30.5	70	23	7
1986	391,512	115,162	29.4	61	32	8
1987	404,733	120,920	29.9	53	39	8
1988	394,080	119,953	30.4	47	43	10
1989	407,550	121,381	29.8	44	46	10
1990	446,240	139,952	31.4	42	36	22
1991	435,290	136,355	31.3	39	43	18
1992	442,658	132,464	29.9	37	42	21
1993	456,488	n.a.	33.0	39	30	31
1994	445,101	n.a.	33.0	35	35	30
1995	466,618	n.a.	34.0	33	33	34
1996	504,535	n.a.	37.0	30	29	41
1997	494,171	n.a.	38.0	30	36	33
1998	512,295	n.a.	32.0	35	32	34

Notes:

[a] Quantities of output and transactions (grain procured from farmers) are of raw grain in production year (April 1 – March 31) prior to 1986 and in calendar year starting from 1986.

[b] Quantity transacted as % of output between 1952 and 1992 are derived from data in *China's Market Statistical Yearbook 1993*. The percentage between 1993 and 1998 are from Huang (2001).

[c] The shares of grain transactions are derived from data on commercial grain. The shares between 1952 and 1978 are based on data in *Liangshi Tongji Ziliao 1949-1980 (Grain Statistical Information 1949-1980)* and *China's Market Statistical Yearbook* 1993 while the shares between 1978 and 1998 are from Huang (2001). The shares in some years do not add up to 100 due to rounding.

[d] Government quota procurement included quota and above-quota procurement before 1985 and equaled contract procurement thereafter.

Sources: NBS (1979); NBS (1984); Bureau of Commerce (1985); *Liangshi Tongji Ziliao 1949-1980 (Grain Statistical Information 1949-1980)*; *China's Market Statistical Yearbook 1993*; Huang (2001); *Almanac of China's Commerce* (various issues); and *Almanac of China's Domestic Trade* (various issues)

Productivity-enhancing policies

It should be noted that there is always an alternative to grain pricing policy that can also increase output. Productivity-enhancing policies would give a longer-lasting effect as far as grain yield is concerned. Why then did the Chinese government not increase the investment in agricultural infrastructure in this period? Instead, government expenditures on agricultural investment declined in the 1980s arousing concern over the sustainability of growth in domestic food supply. Budgetary expenditure on capital construction and science and technology decreased from 6.4 billion yuan in 1979 to the lowest of 2.5 billion yuan in 1981 and remained below 5 billion yuan until 1989 (*Finance Yearbook of China 2000*). In Roe and Pardey's (1991) compilation of agricultural research intensity ratios (ARI), which measure the expenditures on public-sector agriculture as a proportion of agricultural production, China's ARI declined from 0.47% in 1976-80 to 0.39% in 1981-85 while the weighted average ARI of 92 less developed countries remained at 0.41% and the weighted average ARI of all 110 countries surveyed increased from 0.72% to 0.76% in the same period. Less fiscal resources were made available to agricultural investment in this period for two reasons. First, a significant proportion of the central government's

budget had been used up by food subsidies to urban consumers. The proportion of government expenditures spent on total subsidies for grain and oil surged from 3% in 1978 to nearly 13% in 1983 and remained over 7% for the rest of the decade (NBS, 1986, p.36; ZJXZ, 1992; also see Table 2.3). Second, the fiscal reforms implemented in the 1980s induced a 'public expenditure policy bias' against agriculture (Huang and Zhang, 1997). The fiscal responsibility system (*caizheng baogan*) newly stipulated in 1987 between the central and local governments set limits on the amounts of revenues extracted from and subsidies injected into localities by higher levels of government (Rozelle and Boisvert, 1993). As a result of the fiscal decentralization, local budgets had to bear the majority of the outlays for agriculture including the urban food subsidies (Wong, 1991, pp.703-704). At the same time, extra-budgetary funds derived mainly from rural industries became an increasingly important source of revenues to the local governments (Wong, 1991, p.708; Oi, 1999b, pp.39-40). The reformed system motivated local governments to invest in the revenue-generating township and village enterprises but discouraged them from allocating their fiscal resources to agriculture.[29]

Decollectivization also appeared to have impeded agricultural investments. With the abolition of the commune system in the early 1980s, large-scale irrigation projects such as the construction of canals and dams had become much more difficult due to the failure to define property rights under HRS (Lin Wanlong, 2002, p.50). Huang and Rozelle's (1996) findings also suggest that HRS might have weakened China's research and extension systems. China experienced a significant decline in the production of public goods in the agricultural sector in this period as illustrated by the shrinking investment in agricultural infrastructure in Table 2.3. The only policy change that might have had a positive impact on agricultural investments was the signing of

[29] In the post-reform period, the increase in fiscal expenditure on agriculture has lagged behind the overall increase. Agriculture's share in the fiscal budget declined from 13.4% in 1978 to the lowest

15-year land-use contracts in 1984 between the government and farmers. The contracts were believed to encourage farmers to invest in productive activities by guaranteeing them long-term land tenure (World Bank, 1985, p.4).[30]

TABLE 2.5 SHARE OF GRAIN CONSUMPTION IN CHINA'S URBAN (CITY AND TOWNSHIP) HOUSEHOLD BUDGET, 1957-2001

		By Income Group						
Year	Overall	Lowest (first decile)	Low (second decile)	Medium low (second quintile)	Middle (third quintile)	Medium high (fourth quintile)	High (ninth decile)	Highest (tenth decile)
1957	22.76							
1964	22.40							
1981	12.95							
1982	12.89							
1983	12.17							
1984	11.28							
1985	8.95							
1986	8.11							
1987	7.57							
1988	6.85							
1989	6.76							
1990	6.61							
1991	7.05							
1992	6.25	9.23	7.98	6.99	6.20	5.61	5.20	4.58
1993	6.16	9.45	8.16	7.14	6.27	5.51	5.04	4.11
1994	7.08	11.29	9.49	8.52	7.13	6.36	5.55	4.61
1995	7.36	11.48	10.11	8.67	7.52	6.59	5.88	4.84
1996	6.93	10.95	9.41	8.12	7.09	6.25	5.40	4.57
1997	5.69	9.55	8.02	6.83	5.87	5.02	4.23	3.60
1998	5.24	8.82	7.33	6.36	5.43	4.64	3.96	3.23
1999	4.67	7.92	6.67	5.82	4.79	4.04	3.49	2.91
2000	3.77	6.75	5.44	4.72	3.92	3.26	2.84	2.28
2001	3.54	6.42	5.28	4.43	3.75	3.02	2.59	2.09

Sources: ZJXZ (1996); NBS (1996 - 2002) *ZJCJSD*

The unification of procurement and sales prices to curb fiscal deficits

In its various attempts in the second half of the 1980s to overcome the problem of stagnant grain output, the Chinese government had to incur an increasing outlay of

of 7.7% in 1985 and remained mostly below 10% in the 1990s (*China Statistical Yearbook 2001*).

[30] In a survey Lin (2000a, p.108) conducted on 5 counties in Hunan province in 1988, it was found that the average capital stock of the farm households had more than doubled since the adoption of HRS.

price subsidies again. After declining to 14.1 billion yuan in 1986 from the record high of 15.9 billion yuan in 1984, the price subsidies to grain and oil resumed an upward trend in 1987 and reached 24.7 billion yuan in 1990 (ZJXZ, 1992; also see the price subsidies for grain, oil and cotton in Table 2.3). To address the recurring problems of budget deficits and demand-supply imbalances, beginning in 1991, China's policy makers eventually raised the rationed sales prices of grain as the political risk was perceived to have sufficiently diminished. Following the increase in urban incomes, the share of expenditure on grains in an average urban households' budget dropped from 22.8% in the 1957 to 13.0% in 1981 and further to 6.3% in 1992 (Table 2.5).[31] This development trend reduced the resistance to the rise in sales prices and provided the right condition for the removal of the urban low food price policy.

Sales prices of rationed grains were first raised by an average of 68 percent in May 1991 and then by 40 percent in 1992 (*Almanac of China's Commerce 1992, 1993*). Grain rations and subsidies to urban consumers were abolished nationwide in 1993 with exceptions in Tibet, Gansu, and Hainan. The procurement and sales prices were unified and decontrolled in this year.[32] The unification of procurement and sales prices was a breakthrough in China's history of urban-biased policy and allowed the government to use sales prices to help balance the demand and supply of grain. The extension of price liberalization schemes initiated by individual local governments to the whole nation in 1993 also signified the political leaders' attempt to move further from plan to market. Grain markets were opened up at the same time allowing private

[31] Ke (1995, P.22) acknowledges the possibility of statistical errors in the estimate of 6.3% in 1992 but explains that these data still reflect the decreasing share of grains in urban household expenditures over time. The official estimates of the budget share of grain in urban households also reveal that the expenditure share of grain declines as the household incomes increase.

[32] The government announced the implementation of '*baoliang fangjia*', a policy of liberalizing procurement prices while maintaining procurement quantities (*Almanac of China's Agriculture 1994*, p.537). However, due to the price surge in late 1993, this policy was not strictly implemented after the spring of 1994. Since then, both procurement prices and quantities were fixed again. In Ke's (1995, p.40) words, it had become '*bao liang xian jia*' or '*bao liang ding jia*'.

grain traders to provide a full range of marketing services including purchasing, processing, transporting and marketing (Crook, 1999a, p.169). Undoubtedly the abolition of the urban grain rationing system was crucial to the reduction of budget deficits incurred in grain distribution. Government expenditures on price subsidies (grain, cotton, and oil) dropped significantly from 26.7 billion yuan in 1991 to 22.4 billion yuan in 1992 and further to 20.2 billion yuan in 1994 before they resumed an upward trend in 1995 (Table 2.3).

As happened numerous times in the past, policy retrenchment occurred when problems emerged. Following some unexpected price surges in the winter in 1993, rationed sales returned to many regions temporarily in 1994. To tackle the difficulties in enforcing contract fulfilment and to regain control of 70 to 80 percent of the grain marketing, the state made contract procurement compulsory again in spring 1994 whereby 50 m.m.t. were to be procured at fixed prices and 40 m.m.t. at negotiated prices (*Almanac of China's Domestic Trade 1995*, IV-2). Market sales by farmers were strictly prohibited until they had fulfilled their quota deliveries. Some regions even made the negotiated procurement mandatory and closed the grain markets, which inevitably aroused farmers' resentment (*China's Agricultural Development Report '95*). To enhance farmers' incentives to deliver grain to the government, the state adjusted the fixed procurement prices upwards by around 40% in 1994 and 1996 respectively to keep pace with the market prices, which increased by 31 percent in 1993, 51 percent in 1994, and 36 percent in 1995 (*Price Yearbook of China 1997*).[33]

The State Administration of Grain Reserve (SAGR) and grain wholesale markets

Apart from the difficulties in meeting procurement targets, other problems that emerged in the second half of the 1980s highlighted the deficiency of the existing grain

distribution system and prompted the government to install some market-oriented institutions to conduct price-stabilizing interventions and inter-regional grain trade. While it may be controversial whether it is desirable to stabilize grain prices,[34] an integrated nationwide marketing network is definitely necessary for improving the efficiency in China's grain distribution. Unfortunately, difficulties encountered in the implementation yet again obstructed the realization of the intended outcomes.

The first problem that the Chinese policy makers tried to tackle was price instability. Ever since grain markets were sanctioned in 1985, the increased price volatility (see Table 2.1a) added to the uncertainty about the return to any long-term investment and hence shortened farmers' decision-making horizon. To maximize short-term gain, they abandoned crop rotation, manure, and organic fertilizers, but increased the use of chemical fertilizer (*Zhongguo Caijing Bao (China Finance and Economics News)*, 9 April 1995; *Jingji Ribao (Economics Daily)*, 24 March 1999). These attempts to boost short-term productivity caused environmental problems and detrimental effects on long-term sustainable growth (State Council Project Team, 1997).

The second problem was inter-regional conflicts regarding grain transfers. Due to the fact that grain transfers were conducted at close to the quota procurement prices, surplus regions that supplied grains to deficit regions were in fact subsidizing the latter. (See Table 2.6 for a list of the grain surplus, grain deficit, and self-sufficient provinces.) Although this arrangement had existed ever since the installation of the quota procurement system in the central planning era, the conflicts became more acute after the fiscal reform in the mid-1980s that reduced the price subsidies provided by the

[33] In 1994, the actual increase in average prices paid to farmers was 60% for rice and 80% for wheat due to the higher negotiated prices (Aubert, 1997, p.177).

[34] Regarding the desirability and feasibility of price stabilization through direct government intervention, economists hold different views (Anderson and Roumasset, 1996; Timmer, 2000). Anderson and Roumasset (1996, p.62) suggest that the removal of destabilizing government distortions may be the most cost-effective method for increasing price stability.

central government. The price hikes in 1986 and 1988 further magnified the inter-regional conflicts of interests. To prevent neighbouring grain deficit regions from procuring from their farmers and driving up local market prices, which would jeopardize their own quota procurement, surplus regions erected trade barriers to obstruct the outflow of grain (Yuan, 1994, p.41). The price regulation imposed on inter-regional grain transfers had impeded beneficial regional specialization in grain production.

TABLE 2.6 GRAIN SURPLUS, GRAIN DEFICIT, AND GRAIN SELF-SUFFICIENT REGIONS IN CHINA

Surplus regions	Main exports	Deficit regions	Main exports	Self-sufficient regions	Main exports
1 Hebei	Wheat	1 Beijing		1 Inner Mongolia	
2 Heilongjiang	Corn, rice	2 Tianjin		2 Liaoning	Corn
3 Jilin	Corn, rice	3 Shanghai		3 Jiangsu	Rice
4 Anhui	Rice	4 Guangdong		4 Ningxia	
5 Jiangxi	Rice	5 Fujian		5 Xinjiang	Wheat
6 Shangdong	Wheat	6 Zhejiang			
7 Henan	Wheat	7 Hainan			
8 Hubei	Rice	8 Guangxi			
9 Hunan	Rice	9 Yunnan			
		10 Guizhou			
		11 Sichuan	Rice		
		12 Shanxi			
		13 Shaanxi			
		14 Gansu			
		15 Qinghai			
		16 Tibet			

Note: Exports refer to domestic trade mainly.
Sources: Li (1996); State Council Project Team (1996, pp.82-86); Chen and Findlay (2001)

In response to the above problems, the Chinese government established some new institutions to stabilize price expectations, to reduce risks for producers, users and traders, and to unify the grain markets (Watson, 1999, p.10). The new institutions included the State Administration of Grain Reserve (SAGR), some national and provincial-level grain wholesale markets, and the grain risk funds. The role of SAGR is to stabilize grain prices by intervening in the grain market (Ministry of Commerce, 1991). When it was established in September 1990 along with the central grain reserve

system, its first task was to reverse the trend of falling market prices that was triggered by the record-high grain output reached in that year and further aggravated by farmers' attempt to sell their grain stocks in anticipation of further decline in market prices. To put an end to the collapse of grain market prices, the SAGR procured grain at the old quota prices and stored them in the central strategic stocks (Crook, 1999a, pp.177-9; Han et al., 1992, p.106). The state ended up procuring 25 m.m.t. in excess of the fixed quota of 50 m.m.t. and effectively halted the price fall.

SAGR was called to action again when grain prices surged between late 1993 and 1995. Similar to the previous incident, the price hikes were aggravated by farmers' speculative behaviour. They hoarded their stocks in 1994-95 in anticipation of further price increases. Guided by the same expectation, the state grain enterprises rushed to purchase more grain on the market. The resultant price volatility alerted the policy makers to the need of involving local governments in the price-stabilizing market interventions. Grain risk funds were established for this purpose in 1994. While the central grain reserve stock managed by the SAGR was the core of a buffer stock system to stabilize grain prices, local governments were also required to maintain local grain reserves using their grain risk funds.[35] The outlays of these funds were mainly for the interest cost and other operating costs incurred in the maintenance of grain stocks as well as the price subsidies provided in market interventions (Tang and Huang, 1995, p.4). The central grain risk fund was financed wholly by the central government whereas the local funds were shared by the central government and the local governments concerned in a proportion of 1:1.5. It was the central government's initial

[35] According to SGA (1999), the central government instituted a grain reserve system in 1960 whereby a grain stock was to be gradually built up by the surplus of grain procurement over sales. The stock would be used to even out the periodical imbalances between demand and supply. According to Oi (1989, Chapter 4), on the other hand, a system of local grain reserves had been installed in 1957. Oi interpreted it as an additional instrument for the state to control the commercial grain that it could not command through taxes or procurement. The policy to maintain local grain reserves was abandoned in 1978 due to its disincentive effects on grain production.

step to delegate the responsibility of managing grain market stability to the local governments. But it did not function well because the implementation costs that local governments had to incur in the market interventions and maintenance of the grain reserves discouraged them from adhering to the stipulated policy.

To facilitate the price stabilizing market interventions, the state established in October 1990 the first national-level grain wholesale market in Zhengzhou specializing in wheat and corn transactions. Seven other national or provincial-level wholesale grain markets were later established in Changchun, Shanghai, Jiujiang, Jilin, Wushi, Shenyang, and Hubei. Another role of these wholesale markets was to facilitate direct horizontal transactions between provincial grain bureaus.[36] Such market-oriented transactions were supposed to eliminate the inter-regional subsidization and hence the conflicts of interests between grain surplus and deficit regions. However, as pointed out by various researchers (Watson, 1999; He, 2001; Wang and Huang, 2002), the wholesale markets have up till now not developed into an integrated national network with standardized trading rules. The high transaction costs in these national and provincial-level wholesale markets, which include heavy taxes and levies, have also discouraged regional grain bureaus and other traders from making use of their facilities. As a result, these wholesale markets fail to perform the crucial role of price formation and dissemination.

Provincial governor responsibility system (PGRS)

As mentioned in the previous section, the handling of inter-regional grain transfers had always been a daunting task for the central government, especially in the reform period when the opportunity cost of grain production was continuously rising.

[36] At the end of 1995, there were a total of 26 grain and oil wholesale markets at national or provincial level. In addition, there were over 300 grain and oil wholesale markets at prefecture or county level in China (*Almanac of China's Domestic Trade 1996*).

To rid itself of the overwhelming responsibility of reconciling regional demand-supply imbalances and the fiscal burden incurred in the provision of price subsidies, it delegated the task of agricultural development and food production to the provincial governments through the implementation of PGRS in 1995. Under this policy of decentralization, the provincial governors were required to maintain an overall balance of grain supply and demand of their jurisdictions, and to stabilize prices by regulating the market using local grain reserves financed by the grain risk funds. Grain production and distribution were supposed to be mainly market-oriented and no longer plan-directed (State Council Project Team, 1996, p.73). Inter-regional grain trade could only take place at the wholesale markets above county level (*Almanac of China's Agriculture 1996*). This new system would have worked well to tackle the problems of inter-regional grain trade and improve the efficiency of grain production and distribution if it had been facilitated by a well developed nationwide grain market. However, in the absence of such an integrated marketing network, as already mentioned in the previous section, the PGRS reduced to a regional self-sufficiency program. To achieve an overall balance between domestic demand and supply of grain, provincial governors resorted to administrative measures such as specifying the areas sown to grain and increasing fixed procurement quotas. Such measures represented a retrenchment in the market-oriented reform process and failed to boost the long-run productivity (Zhang et al., 1996; Zhu, 1997).

Just as the fiscal reform implemented in the mid-1980s had induced a public expenditure policy bias against agriculture, PGRS has created a similar bias against the grain surplus regions. Having to manage a large grain stock, partly to cover for those deficit regions, surplus regions always have a large proportion of their fiscal and financial resources tied up and hence incur high opportunity costs. Since the implementation of PGRS, they have got less financial support for managing the grain

reserves because the central government has diverted most agricultural development funds from grain base development to regional grain self-sufficiency projects (*liangshi zigei gongcheng*).[37] In another attempt to shed some of its financial burden, the central government requires local governments to match its provision of agricultural investment funds. This policy poses an obstacle to the development of grain surplus regions, which in general have very weak budget condition. Burdening these regions with additional financial obligations has impeded the realization of regional comparative advantage in grain production. There are findings showing that, since the implementation of PGRS, surplus regions have been producing less grain, or have increased their output by very little, whereas deficit regions have been producing more grain.[38] It has also been reported that provincial governments practiced protectionism in an attempt to maintain their local market stability, making inter-regional conflicts of interests more acute (State Council Project Team, 1996, p.75). The over-emphasis on regional self-sufficiency in the implementation of PGRS may have made the resource allocation less efficient. With the compulsory grain procurement reinstated in the policy package, the PGRS is also interpreted as a retrenchment in the liberalization of China's grain distribution system (Huang and Rozelle, 2002b, p.4).

Although grain production increased by 4.8 and 7.5 percent in 1995 and 1996 respectively (*Almanac of China's Domestic Trade 1996 & 1997*), it is difficult to accurately assess the impacts of PGRS on China's grain production. The substantial upward adjustments in the procurement prices in 1994 and 1996 and consecutive years of good harvests should have also contributed to the impressive growth in grain output

[37] In the early reform period, an efficiency-enhancing intervention took place in 1983 when the government began to establish commercial grain base areas to restrict the central government's agricultural investment funds to selected areas that had comparative advantage in grain production (*Almanac of China's Agriculture 1990*; Yang Hong, 1999, p.132). The resulted regional specialization, albeit limited, improved allocative efficiency. However, it gave way to the resurgence of regional self-sufficiency subsequent to the implementation of provincial governor responsibility system in 1995.

and delivery since the implementation of this new system. The self-sufficiency rate rose from 96.3% in 1994 to 100% in 1997 and 1998 (Crook, 1999b) and China reached the production targets for 2000 four years ahead of schedule in 1996. Despite all the implementation problems of PGRS, the Chinese government has persevered with its endeavour to decentralize grain distribution. Its later attempts to iron out the deficiencies of the new system will be discussed in Section 2.3.

The retention of restrictive grain trade policies

Since the inception of the economic reforms in late 1978, the Chinese government had gradually decentralized the authority of foreign trade transactions. Yet it maintained a tight control over the trade in strategic commodities such as grain, edible oil, cotton, etc., which were also subject to state pricing. In the early 1980s, the government instituted a system of export and import licensing to control the volume and composition of commodity trade. The export licensing system had begun since 1980 whereby licenses were issued by the Ministry of Foreign Economic Relations and Trade (later the Ministry of Foreign Trade and Economic Cooperation, MOFTEC), and sometimes by provincial governments, to prevent excessive exporting of certain commodities that remained significantly underpriced on domestic market due to price control (Lardy, 1992, p.45). Rice, corn, and soybeans were among those restricted by this system. The import licensing system was installed in 1984 to restrict imports to only the most urgently needed products to optimize the use of the limited foreign currencies. Under this system, the Ministry of Foreign Economic Relations and Trade issued import licenses for certain commodities on the basis of the availability of foreign exchanges and domestic supply and demand conditions (Lardy, 1992, pp.43-45; Tuan and Cheng, 1999, p.13). In 1993, the transfers of imported grain at fixed procurement

[38] It was noted that the outward grain transfers of some of the surplus regions were gradually declining over time (State Council Project Team, 1996, p.84).

prices to the regional grain bureaus concerned were replaced by an agency system whereby the state abolished the subsidies for grain imports. Under this new arrangement, the state intervened in grain trade through the issue of licenses subject to a quota system. COFCO maintained its monopoly status but now acted as an agent for the state trading in wheat, rice, and corn receiving a fee for its services.

According to Lardy (1992), the introduction of the licensing system reflected a liberalization of China's trade regime. Nevertheless, trade in grain remained under tight control due to its strategic nature although the restrictions on many commodities were gradually relaxed in the 1990s as the Chinese economy opened up further to the world. For example, while the Chinese government cut tariff rates substantially for a large number of tariff lines between 1992 and 1994 in its attempt to bid for WTO accession, tariff rates on imported grain remained unchanged in this period. They were close to or above 100% while the overall average tariff rate on agricultural products dropped from 40.3% to 32.6% in the adjustment in April 1996 and further to 20.4% in October 1997 (CASS-RDI, 1999, p.50). Basically the grain trade policy had not changed much since the central planning era. The 'airlock' that insulated the domestic market from the rest of the world was still in place. But now the purpose of the trade restrictions was no longer to redistribute income from agriculture to industry. Rather, they worked mainly to maintain a high self-sufficiency rate in grain production.

Through the licensing system, trade volumes of the commodities were supposed to be reconciled with domestic production and consumption to help balance demand and supply. However, in pursuit of their own interests, the government agents involved, especially the Grain Bureau and COFCO, did not always implement well-coordinated policies. The incompatible movements in domestic production, stock and trade resulted in some erratic fluctuations in China's grain trade volumes over time (Tang and Huang,

1995, p.9; State Council Project Team, 1996, p.105). One notable example was the large volumes of corn exported in 1993 and 1994. In those two years, increases in demand for feed grain caused corn prices to surge in China. Instead of meeting the shortfalls, however, the corn exports pushed the domestic prices even higher (Tang and Huang, 1995, p.11). Such uncoordinated movements in trade volumes are believed to have aggravated the price volatility in the domestic market and added uncertainty to the world market (State Council Project Team, 1996; World Bank, 1997a).

2.3 The post-reform period from 1997 to present

Towards the end of the 20th century, the incompatibility between the objectives of grain self-sufficiency and income distribution gradually diminishes in China. In particular, the implementation of grain procurement at protective prices in 1997 signified the convergence of the allocative role and distribution role of grain prices. To maintain grain self-sufficiency, it has become necessary to safeguard farmers' incentives, which increase with the net incomes they can derive from producing grain. Following China's accession to WTO in late 2001, China has to liberalize its trade restrictions and domestic grain distribution to comply with the non-discriminatory requirements. Against this background, China's policy makers have been striving to maintain farmers' production incentives and rectify the rudimentary problems of the state-regulated grain distribution system.

The switch from taxing to supporting grain farmers

Consecutive years of good harvests had resulted in a steady decline in the market prices of rice and wheat since 1996 dragging farmers' incomes behind the national growth. This trend aroused concern from China's policy makers for at least two reasons. First, they were reluctant to see Lester Brown's (1995) pessimistic

prediction about China having to rely on grain imports coming to pass. They were even prompted to specify their objective of maintaining 95% grain self-sufficiency in the White Paper on *The Grain Issue in China* (IOSC, 1996). Second, the widening gap between urban and rural incomes was believed to have significant impacts on rural-urban migration, farmers' purchasing power, and social stability in rural areas (Tuan and Cheng, 1999, p.4). The deteriorating situation in farming incomes can best be illustrated by the decline in rural per capita consumption in absolute terms in 1998 for the first time since the economic reform. It dropped by 27 yuan to 1590 yuan in that year compared with a rise of 146 yuan to 4332 yuan for urban households (*China's Agricultural Development Report '99*, p.75). In an attempt to safeguard farmers' incomes against declining grain prices and thereby maintain their production incentives, the state replaced the negotiated procurement system with protective procurement in November 1996 (*Price Yearbook of China 1997*, p.21). Whenever the market prices fell below the state procurement prices, negotiated procurement would be conducted at protective prices. The outlays incurred in the price subsidies would be financed by the grain risk fund.[39] Although it was not the first time the price protection policy was proposed, such a policy had never really been enforced until now, partly due to the fact that the state procurement prices were in general lower than the market prices. As noted by Lu (1999), this policy signalled a historical shift in the role of China's grain pricing policy. Again, due to the implementation costs that the grain bureaus and local governments have to bear, they have not been adhering to the price support policy. The implementation problem will be discussed further in Chapter 7.

[39] Under the price support scheme, the central government and the provincial governments each had to provide the state grain enterprises 0.06 yuan of subsidy for each kilogram of grain they purchased at support prices. But these subsidies were not enough to cover the price wedge (Tuan and Ke, 1999, p.26).

The implementation of protective procurement prices has further exacerbated the already enormous budget deficits incurred in grain distribution. The amount of price subsidies for grain, cotton and edible oil increased from 22.9 billion yuan in 1995 to 31.1 billion yuan in 1996, 41.4 billion yuan in 1997 and peaked at 56.5 billion yuan in 1998 (Table 2.3). Against the background of domestic market gluts resulting from consecutive years of good harvests, and in anticipation of an increase in grain imports following China's prospective accession to WTO, safeguarding grain farmers' incomes was regarded as the crucial step to maintain a high grain self-sufficiency rate. To contain fiscal deficits while carrying out such price protection, it became imperative to rectify the inefficient and loss-making operations of the grain bureaus.

Reform of the grain distribution system

The undue burdens on the financial system exerted by the inefficiency and rent-seeking activities of the grain bureaus prompted the state to launch two grain distribution reforms around the turn of the century. The objective was to eliminate the operating deficits of these state-owned enterprises and thereby contain the fiscal outlays incurred in grain distribution. The first reform in 1998 was targeted at the operations of the Grain Bureau. Seeing that this attempt had failed to rectify the deficiency of the state grain system, the policy makers launched a second reform in 2001 to liberalize the grain distribution.

The 1998 reform package, known as the 'Four Separations; One Perfection', aimed at eliminating the grain bureaus' opportunities to seek rents by abusing their dual role. The 'Four Separations' are:

1. Separating the policy and commercial operations of the Grain Bureau
2. Separating the central strategic stock of grain reserves from local working stocks of commercial reserves

3. Separating the central and local governments' roles in the management of grain production and marketing: The central government's role is to stabilize the markets for grain (and oil) by controlling imports and exports, to manage central grain reserves and to set support prices. The local governments' role is to manage food grain production and distribution under their jurisdictions.

4. Separating the outstanding loans from new loans for grain procurement

The 'One Perfection' is to rectify the grain marketing system by implementing the 'three policies and one reform' as follows:

(i) State grain enterprises are required to purchase surplus grain at protective price from farmers without limit.

(ii) State grain enterprises have to sell grain at higher-than-procurement prices to recover procurement costs and other expenses to avoid incurring operating losses.

(iii) The state adopts the 'closed system of grain procurement funds' to prevent the diversion of these financial resources to unauthorized uses. All proceeds from grain sales must be immediately returned to the Agricultural Development Bank of China as payments of principles and interests on the concession loans.

(iv) To make their management mechanism more market-oriented and improve their efficiency, the state grain enterprises are held solely responsible for their profits and losses.

The reform package turned out to be unsuccessful for at least two reasons. First, the reform failed to tackle the monitoring problems making it impossible to eliminate the rent-seeking activities of the state grain enterprises or to improve their efficiency. Second, amidst falling market prices, requiring these enterprises to procure grain at

protective prices was incompatible with the objective to contain their operating deficits. Instead, the enforcement of protective procurement irrespective of grain quality ended up with an increasing stockpile of unwanted low-quality grain exacerbating the financial and storage problems of the state grain system. Not only did the reform package fail to achieve its objectives, but also the government interventions in the market are seen as a retrenchment in China's agricultural reform (Huang and Rozelle, 2002, p.4).

To further rectify the monitoring problems of the state grain system, the Chinese government restructured the SAGR twice. After being placed under the State Planning and Development Commission in the 1998 government reorganization, SAGR was further restructured into two separate entities in April 2000 (*Almanac of China's Domestic Trade 2001*, pp.707-9). The State Grain Administration (SGA) (*guojia liangshi ju*) is a policy-oriented decision-making agency that formulates and supervises the implementation of grain distribution policy reform to address China's food security concerns. The China Grain Reserve Management Corporation (*zhongguo chubeiliang guanli zhong gongsi*) is charged with the administration of state grain reserves.

The state took a bolder approach in 2001 to tackle the inefficiency problem of the state grain enterprises. It was modelled on an autonomous reform initiated by Zhejiang province in 2000. The Zhejiang model entailed the complete liberalization of grain production, procurement and sales. All these decisions were to be guided by the market, which was also open to private enterprises. Since the reform, Zhejiang has seen a stable supply of grain at only slightly increased prices as well as higher rural incomes (Wang and Huang, 2002). Encouraged by the successful experience of this grain deficit province, the State Council enacted in August 2001 the extension of the Zhejiang

initiatives to three municipalities, namely Beijing, Tianjin and Shanghai, and four other coastal provinces including Fujian, Guangdong, Hainan and Jiangsu, which were all relatively affluent grain deficit regions (*China's Agricultural Development Report 2002*). Since April 2002, five grain surplus provinces including Anhui, Hunan, Hubei, Shandong and Jilin have also joined in the liberalization move. Now these provinces permit private grain traders to buy and sell wheat and rice in villages and townships instead of confining them to wholesale markets at or above county-level (*People's Daily Online*, 2 July 2002).

Meanwhile, to curtail the fiscal deficits incurred in the procurement and storage of unwanted low-quality grain varieties, the state phased out the procurement of spring wheat in northern China, and wheat, corn and early indica rice in southern China in 2000. This policy change is reported to have induced reallocation of resources to higher-quality grains that command greater demand. Further attempts to reduce government outlays have been made in the 2001 reform by requiring the state grain enterprises to feed themselves instead of relying on fiscal subsidies as before (*People's Daily Online*, 2 July 2002).

However, some Chinese researchers have also noted the implementation problems of the 2001 grain distribution reform (Gu and Shao, 2002; Han and Zhao, 2002; Wang and Huang, 2002). One problem is the confusion about the future role of the grain bureaus, especially in the grain deficit regions where much of the grain procurement has been taken over by private traders. Another problem is the difficulties to facilitate efficient market-oriented grain distribution in the absence of a well-developed integrated national market, as already discussed earlier. Specific obstacles identified as hindrances to inter-regional grain trade and specialization include the capacity constraints of the transport and storage systems and the difficulties to secure

loans from the Agricultural Development Bank for cross-province grain transactions (Han and Zhao, 2002). Undoubtedly, reforming the grain distribution system in China is an extremely complex issue whose success hinges on complementary reforms in various sectors of the economy.

Grain trade policy since 1997

Quantity-oriented trade restrictions have always shielded China's domestic grain sector from external interference allowing the policy makers to pursue their objectives by manipulating domestic prices, production and distribution. While other sectors have opened up to the global market and developed along the line of their comparative advantages, the maintenance of grain self-sufficiency implies the deprivation of these sectors, especially labour-intensive agricultural sector, their needed resources. Due to China's comparative disadvantage in the production of land-intensive crops, it has to incur an increasing cost adhering to its grain self-sufficiency policy. It has been reported that domestic prices of wheat, corn and soybean have surpassed their counterpart in the world market since the second half of the 1990s (Huang, 2001; Huang and Rozelle, 2002b). To safeguard farmers' income and maintain their incentives to produce grain, continued interventions in grain trade are necessary to supplement the support price policy in domestic market. However, the extent to which the Chinese government can exercise trade interventions is now constrained by the WTO disciplines.

Since its accession to WTO on 11 December 2001, China has commenced the implementation of those obligations committed in the Multilateral Trade Agreements reached in the accession negotiation process. In particular, the Chinese agriculture is now subject to the Uruguay Round Agreement on Agriculture (URAA), which is an integral part of the WTO Agreements. Under the URAA, China has to implement

scheduled concessions leading to trade liberalisation in the areas of market access for imports, domestic support to producers, and export competition upon accession through to 2004. Listed below are the major impacts of these concessions on the grain sector.

1. China has adopted tariff-rate quotas (TRQs) since 1997 as a means of restricting grain imports. As a condition for admission into the WTO, China has agreed to increase its quota annually to 2004. Imports of wheat, rice, and corn within the TRQs are subject to a tariff rate of only 1 percent. Additional amount of imports will be levied out-of-quota tariffs at a gradually declining rate that reaches 65 percent on 1 January 2004. These tariff rates reflect a substantial reduction from the pre-accession level of 114 percent that was applied until 1999. Upon WTO accession, China also has to relax the state trading practice to make room for private trading, which will occupy between 10% and 50% of the TRQs of various grain types (Table 2.7).[40]

2. Domestic support that China can provide to its agricultural sector will be quantified through the Aggregate Measurement of Support (AMS). The *de minimis* provision agreed upon between China and its negotiating partners (the US in particular) is 8.5 percent of the total value of the agricultural production (for product-specific support as well as non-product-specific support) during the relevant year. All subsidies, which include investment subsidies, input subsidies, and decoupled income support, etc. that are normally excluded from the calculation of the total AMS of developing country members, are subject to the 8.5% *de minimis* provision. This restriction is more stringent than the 10% provision normally applied to developing country members (WTO, 1994, Article 6.2 and WTO, 2001b, Paragraph 235).

TABLE 2.7 CHINA'S TARIFF RATE QUOTAS ON GRAIN IMPORTS DUE TO WTO ACCESSION, 2000-2004

Grain type		Unit	Year				
			2000	2001	2002	2003	2004
Wheat:	Total TRQ level	1,000 tons	7,300	7,884	8,468	9,052	9,636
	In-quota tariff	Percent	1	1	1	1	1
	Above-quota tariff	Percent	77	74	71	68	65
	Allocated to nonstate trade	Percent	10	10	10	10	10
Rice:	Total TRQ level	1,000 tons	2,660	3,325	3,990	4,655	5,320
	Short and medium-grain	1,000 tons	1,330	1,663	1,995	2,328	2,660
	In-quota tariff	Percent	1	1	1	1	1
	Above-quota tariff	Percent	80	70	60	50	40
	Allocated to nonstate trade	Percent	50	50	50	50	50
	Long-grain	1,000 tons	1,330	1,663	1,995	2,328	2,660
	In-quota tariff	Percent	1	1	1	1	1
	Above-quota tariff	Percent	80	70	60	50	40
	Allocated to nonstate trade	Percent	10	10	10	10	10
Corn:	Total TRQ level	1,000 tons	4,500	5,175	5,850	6,525	7,200
	In-quota tariff	Percent	1	1	1	1	1
	Above-quota tariff	Percent	80	70	60	50	40
	Allocated to nonstate trade	Percent	25	29	33	36	40
Soybeans:	Bound tariff	Percent	3	3	3	3	3
Soymeal:	Bound tariff	Percent	5	5	5	5	5

Source: Adapted from Tuan and Hsu (2001, Table B-1)

3. Most WTO members are committed to a gradual reduction in export subsidies in respect of budgetary outlay and export quantity with the exception of the least developed countries. During the six-year implementation period commencing in 1995, developing countries were allowed under certain conditions to use subsidies to reduce the costs of marketing and transporting exports (WTO, 1994, Article 9). However, China has committed to eliminating all export subsidies upon its WTO accession (WTO, 2001b, Paragraph 234). Again, this represents a more stringent restriction than those applied to other country members.

[40] Upon accession, TRQs on barley and soybeans were eliminated. Foreign exporters are expected to shift to barley and other coarse grains as soon as the TRQ for corn limits their shipments (OECD, 2000, p.130).

Despite the widely held prediction that China's grain sector would be seriously injured by the market access commitments, the worst has not happened due to some special factors at home and abroad. While there were large surpluses of grain accumulated in China in 2000 and 2001, many countries' grain harvests suffered from natural disasters in 2002 pushing their prices up by 25 to 30 percent (*South China Morning Post*, 12 December 2002). To many people's surprise, in its first year after WTO accession, China experienced an increase in grain exports coupled with a drop in imports. In the first 10 months in 2002, imports of grain were 2.39 million tons, down from 2.52 million tons in the same period in 2001 (ibid.). For the first time in its history, China became a net exporter of wheat with a trade surplus of 90,000 tons in 2002 (*People's Daily Online*, 22 February 2003). Yet Chinese officials acknowledge that this favourable import-export situation is not likely to last and there will be growing pressure from an increase in agricultural imports in the years to come (*People's Daily Online*, 11 December 2002).

While the favourable trade situation China encountered in the first year after its accession to WTO may not persist, the grim outlook many hold for its grain sector may not come to pass either. To predict the likely welfare impacts on China's grain farmers and grain consumers, one must have an accurate assessment of the pre-accession situation of China's grain sector and then gauge how that situation will change in the years to come. It should be noted that China's accession to WTO has not only exposed its grain producers to increasing threat from imports but also created an external force to help eradicate some long-standing distortions in its distribution system. The net welfare impact of China's WTO accession on its grain sector will be analysed in details in Chapter 6.

Productivity-enhancing policies

In the 1990s, Chinese policy makers became increasingly aware of the damaging effects of the under-investment in agriculture on its capacity growth, as it would become a constraint on the 'market contribution' that the agricultural sector could make to the rest of the economy.[41] In recognition of the urgency to relax the capacity constraint, they raised the priority of public investments in agriculture (IOSC, 1996). It was specified in the Ninth Five-Year Plan (1996-2000) and China's Long Term Plan to 2010 that emphasis would be given to increases in agricultural investments including rural infrastructural investment, and loans and credits for agricultural production with grain as the central crop (Huang and Zhang, 1997, p.185). Zeng Peiyan, the minister of the State Development and Planning Commission, reiterated in the Fifth Session of the Ninth National People's Congress in March 2002 the government's commitment to increasing agricultural investments with water-saving irrigation projects as one of the focuses. A large-scale water diversion project was launched at the end of 2002 to transfer water from Yangtze River to northern China. The project is to tackle the water shortage problem that has been identified in recent studies as a threat to future output growth of grain, especially of wheat (World Bank, 1997b; Lohmar and Wang, 2002). Despite policy makers' intention to promote public investments in agriculture, the weakness of the nation's fiscal system is identified as the major impediment to its actual growth (Huang, 2001, p.6). Again, it requires complementary fiscal reform to boost long-term agricultural productivity.

Another attempt to encourage private agricultural investment was the renewal of land tenure contracts in 1998 for another 30 years to promote household tenure security. Land tenure reform has been underway on experimental basis in villages and

townships in more developed coastal provinces where moderate land consolidation has been made possible through leasing and land trusts (Lohmar and Somwaru, 2002). A new law of rural land contracting has been implemented since 1 March 2003 to protect the fundamental interests of farmers and promote the development of farming industry in China (see *People's Daily Online*, 30 August 2002). These policies are to induce farmers to engage in long-term investment and pursue economies of scale. However, it is reported that farmers are sceptical about the effects of this law as they have learned from their experience that good laws could be spoiled by implementation problems (*South China Morning Post*, 2 March 2003). As noted by Johnson (1994, p.11), one of the impediments to the stipulation and enforcement of land use rights with permission to sell or rent the rights to others is the policy makers' attempt to protect the discretionary authority of the cadres at various levels. The effectiveness of the new law hinges on how determined and capable the policy makers in the central government are to overcome the resistance from the local-level governments.

2.4 Key objectives of and constraints on China's grain policy

The review in the previous sections shows how China's grain policy has evolved within an increasingly market-oriented economy that is gradually integrating with the global market. The review serves to identify the key elements that govern the policy formulation and thereby narrow down the scope of theoretical analysis that follows. The evolution of China's grain policy reveals some common objectives of agricultural policies that have been identified for other developing and developed economies. They include (i) the raising of revenue by taxing the agricultural sector in the early stage of economic development to capture resources for investment and

[41] Liu Suinian, vice-chairman of the NPC Committee of Agriculture and Rural Development, said that the cause of the slack domestic demand lied in the poor spending capability of farmers, who accounted for two-thirds of the country's population (*People's Daily Online*, 21 April 2000).

industrialization; (ii) the maintenance of low prices for urban consumers of food crops; (iii) the support of farmers' income when it falls below some acceptable level relative to the national average; (iv) the attainment of some level of self-sufficiency in specific goods, and to avoid excessive dependence on the international market; (v) the earning, or reservation, of foreign exchange to help alleviate the foreign exchange shortage; and (vi) the 'stabilization' and insulation of the domestic market from 'unstable' international markets (Krueger, 1993, p.94; Sah and Stiglitz, 1992, pp.15-16; Timmer, 1975, p.194).

The relative importance of these objectives varies over time with the economic and political conditions. A close scrutiny of the policy evolution in China reveals that the list of objectives can be grouped into two major goals. The first goal is to redistribute income between grain producers (agriculture) and grain users (industry), which encompasses objectives (i), (ii), (iii), and (v) on the list. The second goal is to achieve food security by means of grain self-sufficiency, which covers objectives (iv), (v) and (vi). I will incorporate these two goals in the objective function of China's grain policy in the theoretical analysis in the next few chapters.

The policy review in the previous sections shows that three major instruments have been used in China's pursuit of its policy objectives. They include (i) the grain procurement and marketing system; (ii) trade policies; and (iii) government's direct interventions in resource allocation through the control over sown areas and manpower, and indirect interventions such as agricultural investment. The historical account of China's grain policy developments reveals that the procurement policy has been the most important instrument in the government's pursuit of the goals regarding inter-sectoral income distribution and food security. Although trade interventions have been crucial to the maintenance of China's grain self-sufficiency, the persistent tightness of

these restrictions has made the grain trade volume relatively small, at least up till now (Table 2.2a). Therefore, China's grain trade policies play a less important role in the government's attempt to adjust its policies in response to changes in economic and political conditions over time. The government's direct interventions in resource allocation, especially the restrictions on land and labour uses in the central planning era, have played an important role securing the required amount of resources for grain production. But again, such interventions were relatively stable, except for the erratic massive reallocation of productive labour from agriculture to industry in the Great Leap Forward. In the reform period, developments such as the decollectivization, price liberalization of non-grain products and the emergence of rural industries have gradually eroded the scope of direct government interventions in resource allocation. And the indirect interventions in the form of agricultural investments also declined substantially due to the lack of available fiscal resources. The job to fulfil the targets of self-sufficiency and income distribution has largely been carried out by the procurement system. Based on these observations, I will focus on the grain procurement policy in the theoretical analysis in the next few chapters.

Another important element of the evolution of China's grain policy is the set of constraints that govern the policy formulation. We can identify three of them from the review in the previous sections: (i) the fiscal constraint; (ii) the external political constraint, with particular reference to China's commitments under the WTO disciplines; and (iii) domestic political constraints on the feasible range of grain prices and quota level. All these constraints determine to what extent a particular instrument, such as the procurement prices and rationed sales prices, can be manipulated by the government to achieve a specific goal. The impact of domestic constraints can be illustrated with the adherence to the policy of low urban food prices up to the early 1990s. For fear of social and political instability, the Chinese government refrained

from raising the ration prices of grain between 1979 and 1991 although the 'price reversal' was causing serious deficit problem. The theoretical analysis in Chapters 4 to 6 will incorporate all these three constraints governing China's grain policy formulation.

Lastly, the study of China's grain policy will not be complete without an examination of the actual outcome after a stipulated policy has been implemented. Whether a policy is effective depends, among other things, on the government's capacity to monitor its implementation. The policy review has already identified various implementation problems in the history of China. I will give a systematic analysis of the issue in Chapter 7.

CHAPTER 3

A MODEL OF GRAIN PROCUREMENT POLICY IN A CLOSED ECONOMY

Having identified in Chapter 2 the two most important objectives, namely sectoral income distribution and food security, and the fiscal constraint, domestic and external constraints governing the formulation of China's grain policy, now I proceed to construct an optimization model incorporating these crucial elements. To make the theoretical analysis more focused and manageable, I restrict it to the setting of the procurement price and quota in the grain procurement system. Other grain policies regarding trade and productivity enhancement are treated as exogenous. In particular, the analysis begins with the case of autarky and abstracts from the implementation costs of grain procurement and marketing. The model will be revised in Chapter 6 to take international trade into consideration and then in Chapter 7 to incorporate the implementation costs.

This chapter is structured as follows. To build the basic model of analysis, Section 3.1 derives the minimum procurement price that is required to induce farmers to fulfil their procurement quota. Section 3.2 studies how the quota procurement system redistributes income and its efficiency implications. Section 3.3 constructs the objective function of China's grain procurement policy capturing policy makers' preferences regarding income distribution and grain self-sufficiency. Section 3.4 first derives the trade-off between the two policy objectives that maintains allocative efficiency. Then it analyses the optimal choice of procurement price and quota in the absence of fiscal outlay.

3.1 The minimum procurement price

This section begins with the construction of a model that analyses how the Chinese government can use a quota procurement system to influence income distribution between grain producers and grain users in a closed economy. Since the installation of this system in the 1950s to facilitate heavy industrialization, the policy makers had been struggling to overcome the disincentive effect of the suppressed quota procurement prices on grain production and delivery. Before the two-track system was in place in 1985, there had been other measures such as above-quota procurement at higher prices and the imposition of penalty on non-delivery or under-delivery to enforce quota procurement. Among all these alternatives, the provision of price incentive through the market track has been proved to be more effective. Therefore I construct the model on the basis of the two-track procurement system. Nevertheless, as will be shown later in this chapter, the model can be easily adapted to accommodate the case in the central planning era and the early reform period prior to 1985 in which there was no market track but farmers were offered above-quota price premiums and would be penalised for not delivering their quotas.[42]

The model characterizes a two-track procurement system that functions as follows: (i) farmers are required to deliver a quota amount of marketed (or commercial) grain to the government at state-set fixed procurement price and (ii) upon fulfilment of the quota, farmers can sell surplus grain on the market. The fixed procurement price is assumed to be set below the market equilibrium price to extract producer surplus from farmers. The market track that enables farmers to sell surplus grain after delivering the quota amount to the state is to overcome the disincentive effect of the suppressed state-

[42] The local government can inflict penalties on farmers who fail or refuse to fulfil their quotas by denying them access to agricultural inputs, public goods and employment opportunities in township and village enterprises, as well as depriving their children of education opportunities (Huang Y., 1998, p.64).

set price. From farmers' perspective, receiving a lower return for their quota delivery to the state is the 'price' they must pay to gain access to the free market.

In the basic model of procurement policy formulation, I first assume the absence of penalty on those farmers who fail to fulfil their delivery quota. The penalty on non-delivery or under-delivery will be incorporated into the model later on. To simplify the analysis, I begin with the assumption that grain is a homogeneous product. The implications of differences in grain type (rice, wheat, corn, etc.) and quality will be considered in Chapter 7. Until then, there is only one set of grain price and quota. The basic model also includes the following assumptions:

1. The government and farmers have perfect information of the demand for and supply of marketed grain, which is net of farmers' own consumption.[43]
2. The government sells what it procures from farmers to grain users at the rationed sales price, which is set at the same level as the fixed procurement price. There is zero handling cost.
3. Farmers are profit maximisers and have identical marginal cost (MC) curves. The market supply curve of marketed grain is the horizontal sum of all these MC curves.
4. Farmers have the option of delivering the quota or not. The only penalty on farmers for not fulfilling the quota is to deny them access to the free market for surplus grain. Yet the government will buy at the fixed procurement price whatever amount

[43] This restrictive assumption is to simplify the analysis at the beginning and to ensure that the two-track system can achieve allocative efficiency. In Chapter 7, the assumption about the government having perfect information will be relaxed. And the assumption that farmers know the shapes of the demand and supply curves of marketed grain can be replaced by another assumption that farmers are permitted to purchase grain on the market and then resell it to the state to fulfil the delivery quota. Both Sicular (1988) and Lau et al. (2000) employ this alternative assumption, which makes the quota price infra-marginal and efficiency possible. Lau et al. (1997 & 2000) offers an in-depth analysis of the conditions required to achieve allocative efficiency under the two-track system.

farmers supply within the quota. Farmers who have delivered their quota can sell surplus grain on the free market.

5. Grain users who are entitled to the rationed grain supply derive marginal benefit from the grain that is at least as high as the market price.[44]

6. There is no international trade.

A set of market demand and supply curves of marketed grain is depicted by Q = D(P) and Q = S(P) respectively in Figure 3.1. Without government intervention on grain distribution, that is, in the absence of any government procurement system, the equilibrium price and quantity would be P* and Q*.[45] Let $\overline{P}$ and $\overline{Q}$ be the fixed procurement price and quota set by the government. Note that the $\overline{P}, \overline{Q}$ combination is below the supply curve. Farmers have the option of fulfilling the quota or delivering a smaller amount of grain to the state. The producer surplus derived from the two options will determine which option the farmers take. If they choose not to fulfil the quota, the profit-maximizing output will be Q' = S($\overline{P}$) and the producer surplus will be given by *area b* in Figure 3.1. If they fulfil the quota, they can sell surplus grain on the market. Under the assumptions specified earlier, the overall supply of marketed grain will be the same as in the absence of government's procurement. Point E in Figure 3.1 remains to be the equilibrium when the quota is fulfilled. In particular, farmers can sell surplus

[44] This assumption is to rule out the possibility of allocative inefficiency that may result from having the rationed grain supplied to those low-marginal value urban users. It is an acceptable assumption because black markets for rationed grain coupons, which emerged as early as the 1960s and lasted until the early 1990s, provided a mechanism to transfer the rights to buy rationed grain from low-marginal value consumers to higher-marginal value consumers. For descriptions of the emergence and phasing out of black markets for rationed grain coupons in China, see Zhang (1996, pp.290-96).

[45] As explained in Chapter 2, the government may have adopted other grain-related policies including the direct intervention in land and labour allocation, the provision of agricultural public goods and trade restrictions. These policies will shift the supply and demand curves and hence change P* and Q*. In the basic model, trade interventions are assumed to have obstructed any trade in grain while other policies are assumed to remain unchanged throughout the analysis.

grain at P* on the market. The quota procurement system can result in the same total supply of marketed grain as under a free market system.

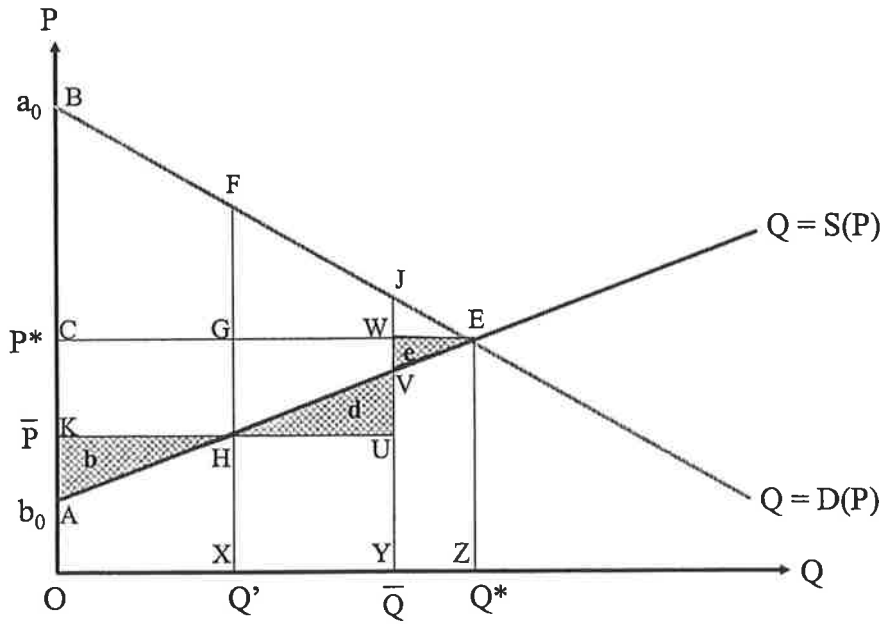

FIGURE 3.1 DELIVER QUOTA OR NOT?

To understand how farmers make their decision under the two-track procurement system, we need to examine their producer surplus. With reference to Figure 3.1, delivering the quota amount of grain to the state will bring a producer surplus of *area b* minus *area d*. For that to be worthwhile, farmers will need to take advantage of the privilege to sell surplus grain on the free market. To maximize their profits, farmers sell $Q^* - \overline{Q}$ of grain on the market at price P*, deriving a producer surplus of *area e* from the market sales. The total producer surplus will be $b-d+e$ in this case. Whether farmers will fulfil the quota or just deliver an amount of Q' to the government depends on the relative size of d and e. There are two possible cases.

Case (i): *Area* $d \leq$ *Area* e

In this case the gain from selling surplus grain on the market is greater than or equal to the loss in delivering the quota. Hence the farmers will fulfil the quota. They will produce Q* and sell the surplus grain at P* after delivering $\overline{Q}$ to the state at the procurement price $\overline{P}$. The state will sell the quota amount of grain at $\overline{P}$ to eligible grain users. Additional amount of grain can be purchased on the market at P*.

Here economic surpluses generated in the production of marketed grain are shared by two groups of agents, namely grain farmers and grain users. The previous analysis has shown how grain farmers derive producer surplus from selling commercial grain to the state or on the market. The rest of the surpluses, referred to as 'consumer surplus' in this model, go to grain users. It should be noted that grain users include (i) all households that consume commercial grain, (ii) industries that use grain as inputs, and (iii) the government, which was the sole owner of all heavy industries in the central planning era and now still occupies a significant share of China's industry.

When farmers fulfil their quota, producer surplus is given by $b-d+e$ whereas 'consumer surplus' is the sum of area BJUK and area EJW in Figure 3.1. Social surplus is maximized as represented by area ABE. Compared with a free market economy, an amount equal to $(P^*-\overline{P})\overline{Q}$ is transferred from farmers to grain users in this procurement system.

Case (ii): *Area d > Area e*

In this case the gain from selling surplus grain on the market is less than the loss in delivering the quota. Farmers will produce and deliver only Q' to the state, forsaking the privilege to sell surplus grain on the market. Compared with a free market economy, there is a deadweight loss of social surplus as illustrated by area EFH in Figure 3.1.

The analysis of the above two cases shows that if the $\overline{P}, \overline{Q}$ combination is chosen correctly, the government can use the quota procurement system to achieve some targeted income distribution without jeopardizing allocative efficiency. To see how it can be done, we have to derive the minimum procurement price (MPP) curve. The MPP curve is the locus of all combinations of procurement price and quota that provide just sufficient incentive for the farmers to deliver the quota amount of grain to the state by offering them the privilege to sell surplus grain on the market conditional on quota fulfilment.

As explained earlier, the condition for farmers to be willing to fulfil the quota is that $e - d \geq 0$. Therefore, $e - d = 0$ gives the MPP curve. For any $\overline{P}, \overline{Q}$ combination on or above the MPP curve, total supply of marketed grain will be Q*, which is the same as the free market equilibrium. With reference to Figure 3.1, the MPP curve can be expressed as follows.

$$
\begin{aligned}
0 &= e - d \\
&= (EWYZ - EVYZ) - (HVYX - HUYX) \\
&= [P^*(Q^* - \overline{Q}) - (TC|_{Q^*} - TC|_{\overline{Q}})] - \{(TC|_{\overline{Q}} - TC|_{S(\overline{P})}) - \overline{P}[\overline{Q} - S(\overline{P})]\} \\
&= P^*(Q^* - \overline{Q}) + \overline{P}[\overline{Q} - S(\overline{P})] - (TC|_{Q^*} - TC|_{S(\overline{P})}) \qquad (3.1)
\end{aligned}
$$

where TC is total cost. The last bracketed term can be simplified as follows.

$$TC|_{Q^*} - TC|_{S(\overline{P})} \equiv \int_{S(\overline{P})}^{Q^*} P\, dQ = \int_{S(\overline{P})}^{Q^*} P\, dS(P) = \int_{\overline{P}}^{P^*} P\, S'(P) dP$$

Substituting the last expression into equation (3.1), we can derive the following MPP curve.

$$P^*(Q^* - \overline{Q}) + \overline{P}[\overline{Q} - S(\overline{P})] - \int_{\overline{P}}^{P^*} P\, S'(P) dP = 0 \qquad (3.2)$$

To find the slope of the MPP curve, totally differentiate equation (3.2) to get

$$-P^*d\overline{Q} + [\overline{Q}-S(\overline{P})]d\overline{P} + \overline{P}[d\overline{Q}-S'(\overline{P})d\overline{P}] - d[\int_{\overline{P}}^{P^*} P\,S'(P)dP] = 0.$$

Simplifying the last equation, we have

$$\frac{d\overline{P}}{d\overline{Q}} = \frac{P^* - \overline{P}}{\overline{Q}-S(\overline{P})}. \qquad (3.3)$$

Let b_0 denote the vertical intercept of the supply curve such that $S(P) = 0 \;\forall\; P \leq b_0$. The MPP curve can be divided into three different segments according to the level of $\overline{P}$.

(i) $P^* > \overline{P} > b_0$

Within this range, the procurement price lies below the market price and $S(\overline{P}) > 0$. As can be seen in equation (3.3), the slope of the MPP curve is positive. NE in Figure 3.2 depicts the corresponding segment of the MPP curve.[46] When $\overline{P} = b_0$, producer surplus is zero (i.e. *area b* in Figure 3.1 disappears). Equation (3.1) gives the corresponding procurement quota Q_0 as follows.

$$P^*Q^* - (P^* - b_0)Q_0 - TC|_{Q^*} = 0$$

$$Q_0 = \frac{P^*Q^* - TC|_{Q^*}}{P^* - b_0}$$

For any procurement quota larger than Q_0, the procurement price has to rise above b_0. With reference to Figure 3.1, the corresponding producer surplus is given by the following area.

f = OKHX – OAHX

[46] The MPP curve in Figure 3.2 is constructed on the basis of a set of linear demand and supply curves as depicted in Figure 3.1. In the general case, the MPP curve may look different but the segment MNE is still upward sloping.

$$= \bar{P}\, S(\bar{P}) - TC\big|_{S(\bar{P})} = \bar{P}\, S(\bar{P}) - \int_{b_0}^{\bar{P}} P\, S'(P)dP\,. \qquad (3.4)$$

It can easily be verified that as both the procurement price and quota increase along this segment of the MPP curve, producer surplus of grain farmers increases at the expense of 'consumer surplus' of grain users.

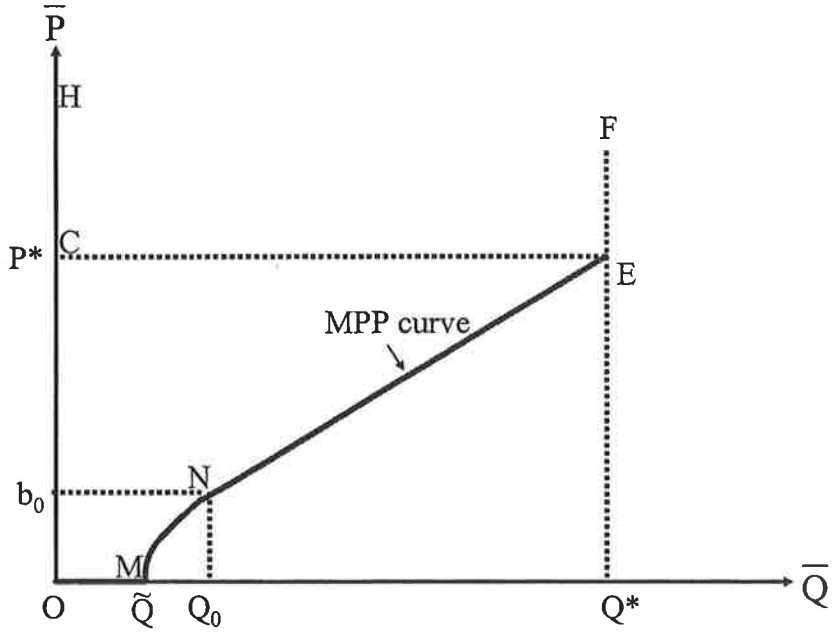

FIGURE 3.2 MINIMUM PROCUREMENT PRICE (MPP) CURVE

(ii) $b_0 > \bar{P} > 0$

In this case, $S(\bar{P}) = 0$. Yet farmers will still sell the quota amount to the government at $\bar{P}$ as long as they can derive sufficient producer surplus from the sales of surplus grain on the market at P* to fully compensate their loss in delivering the quota. From equation (3.3), we have

$$\frac{d\bar{P}}{d\bar{Q}} = \frac{P^* - \bar{P}}{\bar{Q}} > 0\,.$$

The slope of this segment of the MPP curve is also positive, as depicted by MN in Figure 3.2. Producer surplus is everywhere zero along this line segment. The entire social surplus will be captured by grain users resulting in the largest 'consumer surplus'.

(iii) $\overline{P} = 0$

In this case, farmers are required to deliver the quota amount of grain free to the government. With $\overline{P} = 0$, equation (3.1) gives the following MPP curve.

$$0 = P^*(Q^* - \overline{Q}) - TC\big|_{Q^*} \qquad (3.5)$$

Along this segment of the MPP curve, the slope is zero as depicted by OM in Figure 3.2. $\tilde{Q}$ is obtained by solving for $\overline{Q}$ in equation (3.5), which gives

$$\tilde{Q} = \frac{P^*Q^* - TC\big|_{Q^*}}{P^*}.$$

If the procurement quota is set at $\tilde{Q}$, produce surplus is zero. When the quota amount decreases from $\tilde{Q}$, producer surplus will increase as the 'tax' burden implicit in the free grain delivery decreases.

So far I have assumed away the case where the government may inflict a penalty on those farmers who fail to fulfil their quota. It can be verified easily that the inclusion of such a penalty will not affect the validity of my results. In the case of a lump-sum penalty, say of value x, on any grain delivery short of the quota amount, the MPP curve will become those combinations of procurement price and quota that satisfy the condition $e - d + x = 0$, or $e - d = -x$, giving rise to a lower MPP curve than the one derived above in the absence of penalty. A per-unit penalty of y will simply shift

the MPP curve downward by y. For simplicity, I adhere to the assumption of no penalty in the following analysis.

The MPP curve divides all combinations of procurement price and quota in Figure 3.2 into two regions. The one on or above the MPP curve comprises all those combinations that induce quota fulfilment resulting in total output being the same as under the free market. The combinations below the MPP curve do not provide sufficient incentive for the farmers to deliver the quota and hence the total supply of marketed grain falls short of the free market output level. The next section examines the implications for allocative efficiency and distribution of various $\overline{P}, \overline{Q}$ combinations.

3.2 Implications for income distribution and resource allocation

In this section, I show how a government can use the quota procurement system to redistribute income from grain producers to grain users and examine the impact on allocative efficiency. With reference to Figure 3.2, if the $\overline{P}, \overline{Q}$ combination lies above the horizontal line CE, the procurement price is above the market price. As the state will sell the procured grain as rationed grain to grain users at the same price, the sales price will be higher than the market price. While it is theoretically possible for the government to set the procurement price and the rationed sales price higher than the market price, this case is yet unlikely in China. Therefore, I restrict my analysis to the case where $\overline{P} \leq P^*$. I will study the possibility that $\overline{P} > P^*$ in the next chapter when price subsidy is involved.

Proposition 3.1: The quota procurement system can redistribute income from grain producers to grain users without affecting the total output of grain. That is, it can achieve the same social welfare as that under a free market.

Proof: All $\overline{P}, \overline{Q}$ combinations in area OCENM in Figure 3.2 can induce quota fulfilment, resulting in the same total output and the same social welfare as that under a free market. As the procurement price of quota grain, which is identical to the rationed sales price, is lower than the market price, income is redistributed from grain producers to grain users. ♦

Note that if the equilibrium quantity in the free grain market corresponds to the efficient level, Proposition 3.1 implies that the quota procurement system can redistribute income from grain producers to grain users without losing efficiency. This result is consistent with those of Sicular's (1988) and Lau et al's (2000) analyses that China's two-track quota procurement system need not have distortionary effects on resource allocation.

Proposition 3.2: The quota procurement system can extract the entire producer surplus from grain farmers without affecting the total output of grain.

Proof: If the chosen $\overline{P}, \overline{Q}$ combination lies on MN in Figure 3.2, social welfare is the same as that under a free market and the entire producer surplus is extracted from grain farmers and transferred to grain users. ♦

This is the extreme version of the case alleged by Gardner (1983, p.229) that the production-control approach in the form of Stalinist delivery quotas at state-specific prices could be used to redistribute all producer surplus to consumers with relatively small deadweight loss.

Proposition 3.3: It is possible for the government to extract economic surplus from grain producers without affecting the total output of grain by requiring them to deliver a certain amount of grain free of charge to the state before selling any grain on the market.

Proof: If the chosen $\overline{P}, \overline{Q}$ combination lies on OM in Figure 3.2, grain producers are required to deliver some free grain to the government. Along OM, social welfare will be the same as that under free market and part or all of the producer surplus will be transferred to grain users. ♦

Note that such a delivery quota of free grain is virtually a tax in kind, which transfers economic surplus from grain producers to grain users. It will be shown in Section 3.4 that the sole reliance on such 'grain tax' as a means of transfer is not as desirable as the quota procurement system.

What I have shown up to this point is that the two-track quota procurement system can redistribute income from grain producers to grain users while maintaining the same output level as under a free market. As long as the free market output level is efficient, the quota procurement system can be an efficient redistribution mechanism. The system itself need not be a source of distortion. Nevertheless, it must also be noted that inefficiency may arise from the government's attempt to command a procurement quota in excess of the efficient output level, or from its failure to offer sufficiently high procurement price to induce quota fulfilment.

It should be noted that in the absence of market for surplus grain (or other cash crops), resource allocation may not be efficient even if the government can enforce quota fulfilment by imposing penalties or offering above-quota price premiums. First, without market for surplus crops that allows farmers to derive additional income from their remaining resources after delivering the quota to the state, farmers would have no incentive to produce anything more than the quota amount. The resulting under-utilization of the available resources will give rise to inefficiency. Second, in the case where bonus price is offered to above-quota procurement, the incentive effect is similar to market sales of surplus grain. As long as grain farmers can derive sufficient producer

surplus from the above-quota procurement to compensate for the loss incurred in quota delivery, they will fulfil the quota. But then they will only supply a total quantity of grain up to the level where their marginal cost of production equals the above-quota bonus price. Obviously the state-set bonus price is not likely to be the same as the free-market equilibrium price, and hence such a price scheme will most likely result in inefficient resource allocation.

In the rest of the analysis, I only focus on the more interesting case of the two-track system where market exists alongside the state plan and examine the optimal policy choices that can achieve the government objectives without any distortionary effect on resource allocation. Thus only the region on or above the MPP curve is relevant to our analysis. Given that all $\overline{P}, \overline{Q}$ combinations in area OCENM in Figure 3.2 can redistribute income from grain producers to grain users without reducing economic efficiency, which of these points will the policy makers choose? To answer the question, we must incorporate the utility function of policy makers in the analysis.

3.3 The objective function of China's grain procurement policy

Adopting the political support function approach, I hypothesize that the decisions of policy makers are guided by their ideological belief and their attempt to maximize their political returns in terms of power and security of office. Their political returns would depend on their performance in relation to the achievement of various policy objectives. As already explained in the previous chapter, the two most important objectives of China's food and agricultural policy are to redistribute income between the agricultural and industrial sectors and to achieve food security. In this section, the specification of the objective function of China's grain policy formulation captures these two objectives.

Sectoral income distribution

In the optimization model of grain policy formulation, sectoral income distribution is reflected by the relative size of the producer surplus of grain farmers and the 'consumer surplus' of grain users derived from grain production and distribution. As explained in the previous chapter, China's policy makers redistributed income from agriculture to industry in the central planning era by means of the 'price scissors'. But it should be noted that the ultimate beneficiaries of such redistribution was the state, which had a majority stake in the industrial sector. To capture policy makers' preferences regarding the income distribution between grain producers and grain users, I include producer surplus and 'consumer surplus' as the first two arguments in the objective function. The evolution of China's grain policy is partly a result of the gradual change in policy makers' preferences regarding sectoral income distribution. Drawing on existing literature, we can make better sense of the revealed preference of China's policy makers in their pursuit of heavy industrialization and their later attempt to safeguard grain farmers' welfare.

Industrialization drive dominates the development strategy of virtually every developing country regardless of the political system. Both Krueger (1993) and Sah and Stiglitz (1992) highlight the industrialization drive as the reason for many developing countries' economic policies that favour industrial development at the expense of agriculture. In particular, Sah and Stiglitz (1992, p.25) attribute the "urban bias on the part of government officials" to the "ideological view that industrialization is the only path to true development", resulting in the concentration of government investments in the urban sector. Perhaps what makes a socialist economy's development strategy different is the high priority assigned to heavy industries. The consequence is a more intense industrialization drive exerting greater pressure on the

primary sectors. "To what extent prices should be twisted to squeeze the peasant sector? (Sah and Stiglitz, 1992, p.59)", a question asked by the Soviet government prior to the collectivization period, was therefore also relevant to China in the central planning period. Undoubtedly, China's policy makers attached a much larger weight to the 'consumer surplus' compared to the producer surplus in their food and agricultural policy objective function in the early stage of economic development.

As the Chinese economy develops, the government's objective regarding income distribution changes over time. While it is a widely held view that private savings would not increase sufficiently in a largely rural society, and that the only way to increase public savings was to tax agriculture indirectly (Krueger, 1993, p.93), it is reasonable to expect that with the advancement in industrialization and the rise in urban incomes, the taxing of agriculture is no longer the only way to increase public savings. As described in Chapter 2, the evolution of China's pricing policy in the 1990s appeared to reflect a gradual move away from taxing towards supporting agriculture. The adoption of protective prices in 1997 signified the change in the redistribution role of the procurement policy. And it has been widely publicized in recent years the Chinese leaders' concern for the welfare of farmers, especially those engaged in grain production (*China's Agricultural Development Report 2001*, p.95). Based on these observations, it is reasonable to expect that the weight attached to the producer surplus should have increased relative to that of the 'consumer surplus' in China's food and agricultural policy objective function. I will substantiate this allegation with the literature on the political economy of agricultural policy and analyse the impact of such a change on China's grain procurement policy in Chapter 5.

Food security

China's emphasis on food security stemmed from its recurring experience of crop failures and food shortages. The subsequent social and political instability increased the government's determination to secure output growth, provide rapid famine relief, maintain reserves for national security purposes, and stabilize food grain markets and prices (Crook, 1999b). While most of the definitions of food security refer to the levels of consumption rather than production,[47] the Chinese government has focused mostly on production. Political consideration has excluded the increase in grain imports as an alternative means of achieving food security. The rationale for the reliance on self-sufficiency can best be illustrated in a report written by the Ministry of Agriculture (1996, p.63). It concludes that without agricultural prosperity a country will lack a strong foundation for economic growth, and the resultant dependence on other countries will weaken its position in international economic and political relations. It is alleged that the maintenance of national sovereignty, social stability and long-term welfare is worth a higher economic cost. Along this line of thinking, the top priority in China's agricultural policy in the last two decades was to increase domestic food supply, mainly through intensified production and yield growth (Tuan and Cheng, 1999).[48] The State Council emphasized its determination by specifying for the first time in October 1996 the goal of a 95% self-sufficiency rate for grain (IOSC, 1996).[49]

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[47] The diverse perception of food security can be portrayed by a review conducted by Maxwell (1996), which includes a list of 32 definitions of the term used by different authors in 1975-1991. A more recent definition proposed in the 1996 World Food Summit is that food security exists "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".

[48] Vice Premier Yao Yilin stated clearly in 1986 the self-sufficiency policy objective that grain production needed to be increased from 400 million tons to about 500 million tons by the end of the century (i.e. an annual increase of more than 5 million tons) so that per capita grain availability could be maintained at the current level of 400 kilograms or slightly higher (Yang and Tyers, 1989).

[49] China's grain policy regarding self-sufficiency in recent years has mainly targeted at wheat, rice, and corn only, which account for 84 to 87 percent of total grain output in the 1990s.

The government's control over grain distribution increases with the amount of quota procurement relative to the total quantity of marketed grain, which is determined by the domestic demand and supply structure and the trade policy.[50] The self-sufficiency policy stance has led China's policy makers to favour a greater control over grain distribution. Given that the commercial grain-consuming population is not declining, an increase in the government's control over grain distribution can only be realized through the setting of higher quota level. Therefore, the policy makers' preference can be approximated by a preference for a larger procurement quota making it the third argument in the objective function. In the optimization model of the quota procurement policy, I hypothesize that policy makers' utility would increase with this quota amount up to a certain level and stay unchanged beyond that level, as further increase in the government's command of grain distribution is no longer regarded as necessary for the maintenance of food security.

Based on the above stipulations, the objective function or policy makers' preference is specified as follows.

$$U = U(CS, PS, \overline{Q})$$

where CS and PS denote the 'consumer surplus' and producer surplus respectively. I assume that U is twice differentiable. The first derivatives of U with respect to CS and PS, U_1 and U_2, are both larger than zero whereas their second derivatives are both negative. The first derivatives of U with respect to $\overline{Q}$, U_3, is larger than zero for small values of $\overline{Q}$. But U_3 becomes zero once $\overline{Q}$ exceeds a certain level. The case where $U_3 > 0$ reflects that the policy makers prefer a larger procurement quota. It is consistent with the early stage of development in China when the government attempted to

[50] Due to the institutional distortions such as the *hukou* system and the land tenure system, together with trade restrictions, the resultant equilibrium level of grain output would be different from the efficient output level in a market system where resource allocation is distortion-free.

command paramount control over grain distribution to achieve food security. As the Chinese economy develops over time, especially when productivity has improved sufficiently, and hence domestic supply has largely satisfied and even surpassed domestic demand, occupying a larger share of grain distribution has lost its appeal to the policy makers. In this situation, $U_3 = 0$.

3.4 Choosing the procurement price and quota

Before I proceed with the derivation of the optimal choice of procurement price and quota, I list below the policy makers' objective function along with some of its major characteristics.

$$U(CS, PS, \overline{Q})$$

where $U_i > 0$ and $U_{ii} < 0$ for $i = 1, 2$; $U_3 > 0$ for $\overline{Q} < \Theta$ and $U_3 = 0$ for $\overline{Q} \geq \Theta$.

I will study the case where $U_3 > 0$ in this section and leave the case where $U_3 = 0$ until the next chapter. In the following analysis, the policy makers choose the optimal $\overline{P}, \overline{Q}$ combination that maximizes their utility while maintaining allocative efficiency. The choice set is given by all the $\overline{P}, \overline{Q}$ combinations that lie on or above the MPP curve, that is, within area OCENM in Figure 3.2. The choice is made by solving the following maximization problem for the optimal $\overline{P}, \overline{Q}$ combination.

$$\text{Max } U(CS, PS, \overline{Q})$$

subject to $(\overline{P}, \overline{Q})$ lying on or above the MPP curve

Let $\overline{P} = g(\overline{Q})$ denote the MPP curve depicted by OMNE in Figure 3.2. Let CS* = CS(P*, Q*) and PS* = PS(P*, Q*) denote the levels of consumer surplus and producer surplus at the free market equilibrium. Let W* = CS* + PS* denote the

corresponding social surplus. First we need to specify the constraints that the $\overline{P}, \overline{Q}$ combination must lie on or above the MPP curve. When this constraint is satisfied, the total output under the quota procurement system is the same as that under a free market. One of the constraints is given as follows.

$$CS + PS = W^* \tag{3.6}$$

The other constraints relate to the minimum values of CS and PS that depend on where the $\overline{P}, \overline{Q}$ combination lies on the MPP curve. There are three different cases with reference to Figure 3.2.

Case (i): $Q_o \geq \overline{Q} \geq \tilde{Q}$

In this case, the minimum PS is zero and the minimum CS is CS*. The constraint is given below.

$$CS + PS = W^*,\ CS \geq CS^*,\ and\ PS \geq 0 \tag{3.7}$$

Constraint (3.7) is depicted by plane M'N'ST in Figure 3.3 with slope equal to -1 reflecting the one-for-one trade-off between CS and PS for any given $\overline{Q}$.

Case (ii): $\tilde{Q} \geq \overline{Q} \geq 0$

In this case, the minimum CS is CS* and the minimum PS depends on $\overline{Q}$. For example, when $\overline{Q}$ is set at zero, the minimum PS is PS*. When $\overline{Q}$ is set at $\tilde{Q}$, the minimum producer surplus is zero. From equation (3.5), we can derive the relationship between the minimum PS and $\overline{Q}$ as follows.

$$PS \geq P^*(Q^* - \overline{Q}) - TC\big|_{Q^*}$$

The constraint on CS, PS, and $\overline{Q}$ is given below.

$$CS + PS = W^*,\ CS \geq CS^*,\ PS \geq P^*(Q^* - \overline{Q}) - TC\big|_{Q^*} \qquad (3.8)$$

Constraint (3.8) is depicted by plane O'M'T in Figure 3.3 with slope equal to –1.

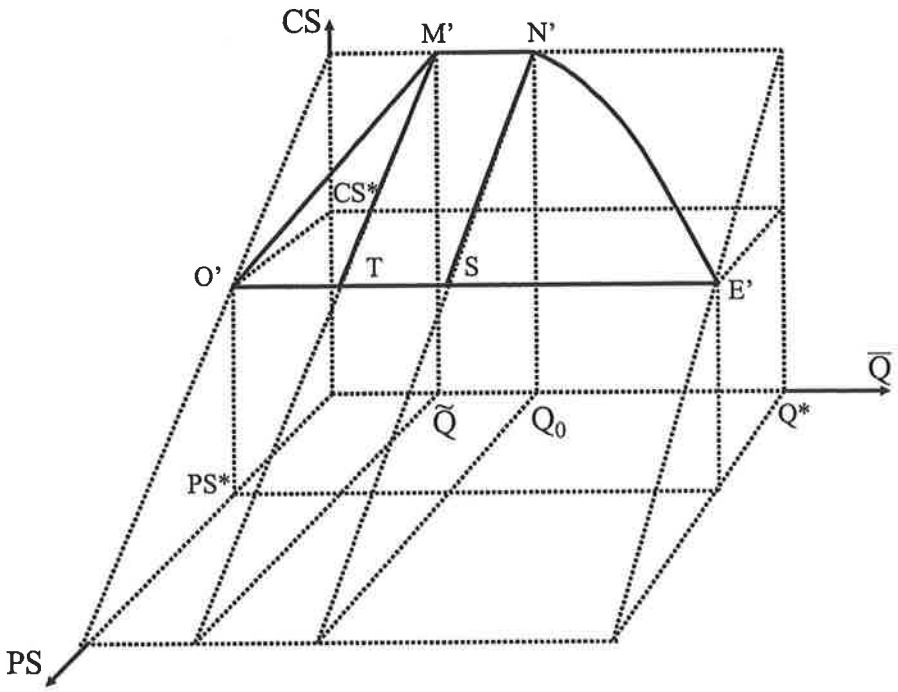

FIGURE 3.3 EFFICIENT TRADE-OFF AMONG PS, CS AND $\overline{Q}$

Case (iii): $Q^* \geq \overline{Q} \geq Q_0$

In this case, the minimum CS is CS* and the minimum PS varies with $\overline{Q}$ along NE in Figure 3.2 and is given by equation (3.4). Rewriting equation (3.4), we have the minimum producer surplus along NE given as follows.

$$f(\overline{Q}) = \overline{P}\, S(\overline{P}) - TC\big|_{S(\overline{P})}$$

$$= g(\overline{Q})\, S[g(\overline{Q})] - \int_0^{S[g(\overline{Q})]} S^{-1}(Q)dQ \qquad (3.9)$$

where $f' > 0$, which can be verified using equation (3.9) or equation (3.4) as follows.

$$\frac{df}{d\overline{Q}} = \frac{df}{d\overline{P}} \left.\frac{d\overline{P}}{d\overline{Q}}\right|_{MPP} = [\overline{P}\, S'(\overline{P}) + S(\overline{P}) - \overline{P}\, S'(\overline{P})][\frac{P^* - \overline{P}}{\overline{Q} - S(\overline{P})}]$$

$$= \frac{S(\overline{P})(P^* - \overline{P})}{\overline{Q} - S(\overline{P})} > 0$$

Thus, we have the following constraint on CS, PS, and $\overline{Q}$.

$$CS + PS = W^*,\ CS \geq CS^*,\ PS \geq f(\overline{Q}) \qquad (3.10)$$

Constraint (3.10) is depicted by plane N'SE' in Figure 3.3 with slope equal to –1.

To summarize, the constraint regarding CS, PS and $\overline{Q}$ is given by equations (3.7), (3.8) and (3.10) and depicted graphically by plane O'M'N'E' in Figure 3.3. Solving the following maximization problem gives the optimal $\overline{P}, \overline{Q}$ combination.

Maximize U(CS, PS, $\overline{Q}$)

subject to the constraint given by equations (3.7), (3.8) and (3.10)

The maximization problem can be visualized using Figure 3.3. The constraint is depicted by plane O'M'N'E'. The utility function can be thought of as represented by some indifference surfaces. The point at which the plane O'M'N'E' touches the highest indifference surface gives the solution to the maximization problem.

Lemma 1: The optimal $\overline{P}, \overline{Q}$ *combination must lie on N'E' in Figure 3.3.*

Proof: Suppose the optimal choice occurs at point X on plane O'M'N'E' that does not lie on N'E'. Given that O'M'N'E' is a horizontal ruled surface, a small horizontal movement towards the right along the surface will increase $\overline{Q}$ but leave consumer surplus and producer surplus unchanged. Since $U_3 > 0$, utility will increase. Therefore point X cannot be the optimal choice. ♦

We can draw an important implication from Lemma 1. Note that N'E' in Figure 3.3 corresponds to NE in Figure 3.2. Lemma 1 implies that the optimal choice must occur on NE in Figure 3.2. Therefore, although area OCENM in Figure 3.2 gives the feasible set of all $\overline{P}, \overline{Q}$ combinations that do not distort resource allocation, the policy makers will always pick a point on NE. There are two implications of this result. The first implication is summarized in the following proposition.

Proposition 3.4: To maximize their utility, the policy makers always set the procurement price at its minimum level.

Proposition 3.4 is very important in identifying the optimal choice of grain procurement policy. It rules out the possibility that the government will pay anything more than the minimum procurement price. This is consistent with what happened in China up to the early 1990s, particularly in the central planning era when grain procurement policy was a means to secure a sufficient food supply at the lowest possible cost so that the maximum amount of economic surplus could be extracted for investment in heavy industry.

The second implication of Lemma 1 is that the policy makers will not choose any of the $\overline{P}, \overline{Q}$ combinations along OM in Figure 3.2. Due to policy makers' preferences for the control of a larger share of the marketed grain, the quota size along OM is too small. Thus the 'grain tax' mentioned in Proposition 3.3 cannot be the optimal policy.

Given that the optimal $\overline{P}, \overline{Q}$ combination must lie on NE, from equation (3.9), we have PS = $f(\overline{Q})$. The utility function of the policy makers can be rewritten as follows.

$U = U(CS, PS, \overline{Q})$

$$= U(W^* - PS,\ PS,\ \overline{Q})$$

$$= U(W^* - f(\overline{Q}),\ f(\overline{Q}),\ \overline{Q}) \qquad (3.11)$$

Proposition 3.5: The optimal $\overline{P}, \overline{Q}$ *combination must satisfy the following condition.*

$$f' = \frac{U_3}{U_1 - U_2} \qquad (3.12)$$

Proof: Given equation (3.11), the optimal $\overline{P}, \overline{Q}$ combination must be a point at which $\frac{dU}{d\overline{Q}} = 0$.

$$\frac{dU}{d\overline{Q}} = U_1(-f') + U_2(f') + U_3 = 0$$

$$f' = \frac{U_3}{U_1 - U_2} \quad \blacklozenge$$

Since $f' > 0$ and $U_3 > 0$, the last equation implies that $U_1 > U_2$. At the optimal point, the marginal cost of an increase in the procurement quota, which is the utility loss resulting from a decline in the consumer surplus due to the necessary upward adjustment in the procurement price (and the rationed sales price), must be balanced by the marginal benefit, which is the total utility gain from an increase in the procurement quota and an increase in the producer surplus. Given that the marginal benefit from an increase in the procurement quota (U_3) is positive, the marginal benefit from an increase in the producer surplus (U_2) must be less than the marginal cost of a decline in the consumer surplus (U_1). In the next chapter, I will relax the assumption about equal procurement and rationed sales prices and consider the case where the government has to provide a consumer price subsidy. I will also do some comparative static analyses to examine how changes in some exogenous variables affect the choice of the optimal $\overline{P}, \overline{Q}$ combination.

CHAPTER 4

GRAIN PROCUREMENT POLICY WITH A CONSUMER PRICE SUBSIDY

In the previous chapter, I have examined how the policy makers pick the optimal combination of procurement price and quota without incurring any fiscal outlay. In reality, however, government's direct intervention in grain procurement and marketing usually involves fiscal deficits. In this chapter I consider the case in which the government has to provide price subsidy. I also study how the procurement price and/or quota will be adjusted when there are changes in the policy makers' preferences regarding food security or in the constraints governing the policy formulation. These comparative static analyses are conducted on hypothetical cases to examine the possible impacts of the changes in the key elements on the policy choices. Whenever possible, reference will be made to historical events of China's grain policy reform that are consistent with the prediction of the analyses. There are four sections in this chapter. Section 4.1 examines the optimal choice of procurement price and quota when the government has to provide subsidy to cover the excess of the procurement price over the rationed sales price. Section 4.2 studies the case where policy makers are indifferent to an increase in the procurement quota. The impacts of changes in the fiscal constraint and the cost of production on policy formulation will be analysed in Sections 4.3 and 4.4 respectively.

4.1 Optimal procurement policy in the presence of a consumer price subsidy

Let $\overline{P} = g(\overline{Q})$ denote the MPP curve derived in the previous chapter. That is, $g(\overline{Q})$ is the minimum procurement price the government must pay to grain producers

to induce them to supply $\overline{Q}$ in the absence of fiscal outlay. To accommodate the realistic case in which the government has to provide urban consumers with a food subsidy in the presence of price reversal, I relax the assumption about the equality between procurement price and rationed sales price. It would be interesting to find out whether the government will still pay the minimum price to farmers in the presence of a consumer price subsidy. To analyse this case, I introduce two variables to accommodate the possibility that both the procurement price and the rationed sales price can differ from the minimum procurement price given by $g(\overline{Q})$. Suppose the procurement price is set at $g(\overline{Q}) + s_p$. Given that $g(\overline{Q})$ is already the minimum, $s_p \geq 0$. Suppose grain bureaus sell the procured grain to grain users at a price of $g(\overline{Q}) + s_c$. What can we say about the value of s_c? s_c can be either positive or negative now that the government has the option to subsidize grain users. In addition, when the procurement system is to redistribute income from grain producers to grain users, it is unlikely for the rationed sales price to exceed or even equal the market price. Therefore it is reasonable to assume that the rationed sales price is lower than the market price P*. This imposes an upper bound on s_c, namely $s_c < P^* - g(\overline{Q})$. Government outlay, denoted by D, relates to s_p and s_c as follows.

$$D = (s_p - s_c)\,\overline{Q} \qquad (4.1)$$

To simplify the analysis and focus on the fiscal problem emerging from grain distribution, I assume that the government does not make any profit from grain marketing. Thus $D \geq 0$ and $s_p \geq s_c$. Producer surplus in this case comprises two parts, one associated with the minimum procurement price and the other associated with s_p.

$$PS = h(\overline{Q}) + s_p\,\overline{Q} \qquad (4.2)$$

where h is the producer surplus associated with the minimum procurement price. As I restrict my analysis only to those $\overline{P}, \overline{Q}$ combinations that do not distort resource allocation, consumer surplus is given by the equation below.

$$CS = W^* + D - PS$$

where W* is the social surplus under free market. Using equation (4.1) and (4.2), we can rewrite the last equation as follows.

$$CS = W^* - h(\overline{Q}) - s_c \overline{Q}$$

I assume that the government outlay is given exogenously. Subject to this outlay, the policy makers pick the optimal values of s_p, s_c and $\overline{Q}$ to maximize their utility. The optimization problem can be expressed as follows.

$$\text{Max} \quad U=U[W^* - h(\overline{Q}) - s_c \overline{Q},\ h(\overline{Q}) + s_p \overline{Q},\ \overline{Q}]$$

$$\text{subject to} \quad D = (s_p - s_c)\overline{Q}, \text{ and}$$

$$s_p \geq 0,\ \overline{Q} \leq Q^*,\ s_c < P^* - g(\overline{Q})$$

The Lagrangian function for the above maximization problem is given below.

$$\text{Max } U = U[W^* - h(\overline{Q}) - s_c \overline{Q},\ h(\overline{Q}) + s_p \overline{Q},\ \overline{Q}] + \lambda[(s_p - s_c)\overline{Q} - D]$$

Direct differentiation gives the following results.

$$\frac{\partial U}{\partial \overline{Q}} = U_1(-h' - s_c) + U_2(h' + s_p) + U_3 + \lambda(s_p - s_c) \qquad (4.3)$$

$$\frac{\partial U}{\partial s_c} = -U_1 \overline{Q} - \lambda \overline{Q} \qquad (4.4)$$

$$\frac{\partial U}{\partial s_p} = U_2 \overline{Q} + \lambda \overline{Q} \qquad (4.5)$$

$$\frac{\partial U}{\partial \lambda} = (s_p - s_c)\overline{Q} - D \qquad (4.6)$$

For internal solutions, equations (4.3), (4.4), (4.5) and (4.6) equal zero and can be solved for the optimal values of s_p, s_c, $\overline{Q}$ and λ.

Proposition 4.1: If $s_p > 0$, the optimal quota is the free market output level and grain producers will derive larger producer surplus than under the free market.

Proof:

Suppose we have an internal solution for s_p, i.e. $s_p > 0$. Equations (4.4) and (4.5) become zero. Solving them gives the following equality.

$$U_1 = U_2 = -\lambda$$

Substituting this result into equation (4.3), we have

$$\frac{\partial U}{\partial \overline{Q}} = U_1(-h' - s_c) + U_1(h' + s_p) + U_3 - U_1(s_p - s_c)$$

$$= U_3 > 0.$$

We have a corner solution for $\overline{Q}$, i.e. $\overline{Q} = Q^*$. From the properties of the MPP curve, we have $\overline{P} = P^*$. Since $s_p > 0$, producer surplus in this case is larger than that under the free market. ♦

The case where $s_p > 0$ has not occurred in China until the second half of the 1990s, which will be discussed in the next section. Given that the purpose to install the quota procurement system is to extract economic surplus from farmers while securing the target level of grain procurement, any procurement price with $s_p > 0$ cannot be the optimal choice. It implies that the parameters in the policy makers' utility function will rule out a positive s_p making $s_p = 0$ the only possible optimal choice. If $s_p = 0$, the procurement price will always be set at the minimum level. This is exactly the same result as in Proposition 3.4, except that a positive government outlay occurs in this case. Therefore, even in the presence of fiscal outlay, the procurement price is still set at its minimum level. All outlay goes to grain users, who can now acquire grain at an even lower sales price. This result is consistent with what actually occurred in China in its early reform period. As noted by Tuan and Cheng (1999, p.6), prior to the abolition

of the food grain rationing system in urban areas in 1993, most of the subsidies went to city consumers.

Let us examine a bit further the role of the fiscal outlay. Based on the above result, it appears that the fiscal outlay is to reduce the sales price. But its fundamental role is to reconcile the incompatibility between policy objectives and constraints. The idea can best be explained by means of Figure 3.2, which is reproduced below.

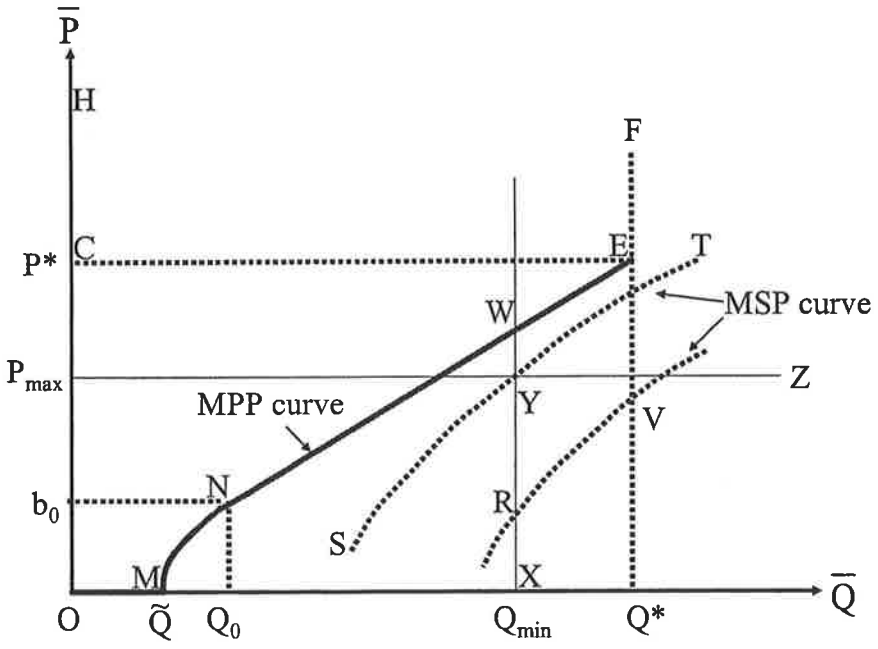

FIGURE 4.1 DIVERGENCE BETWEEN PROCUREMENT PRICE AND SALES PRICE IN THE PRESENCE OF FISCAL OUTLAY

The MPP curve OMNE corresponds to the case of zero government outlay. If there is no restriction on $\overline{Q}$ or $\overline{P}$, the policy makers can simply pick a point on the MPP curve to maximize their utility. The choice is given by Proposition 3.5 in Chapter 3. However, due to political or economic reasons, there may be bounds on the acceptable levels of $\overline{Q}$ and $\overline{P}$. For example, the government may wish to keep the sales price of grain below P_{max}, as what happened in China between 1967 and 1992 when the rationed sales price was held constant. Or the policy makers may regard it

imperative to procure at least an amount of grain equal to Q_{min}, which has prevailed throughout the history of China's grain policy. Incorporating these bounds, the feasible set of $\overline{Q}$ and $\overline{P}$ is given by region XYZ in Figure 4.1. These bounds imposed by the policy makers' objectives are incompatible with the MPP curve. In cases like this when there are conflicts between policy objectives and constraints, fiscal outlay will be required to reconcile the incompatibility.

When government outlay is zero, the rationed sales price must be set at the same level as the procurement price. Both the procurement price and sales price are given by $\overline{P}$ on the MPP curve. In the presence of fiscal outlay, however, the sales price can diverge from the procurement price. More precisely, there can be three different prices, namely, the minimum procurement price, the actual procurement price, and the rationed sales price. Proposition 4.1 shows that s_p cannot be positive. Therefore the actual procurement price is the same as the minimum procurement price. But the sales price can be lower than the procurement price. In addition to the MPP curve that shows the relationship between the procurement quota and the minimum procurement price, there is another curve that shows the minimum sales price (MSP) for any level of procurement quota. The vertical distance between the two curves, which represents the price differential, is determined by the amount of government outlay. Given that an amount equal to D is offered as price subsidy to grain users, the MSP curve will lie below the MPP curve by a vertical distance of $D/\overline{Q}$.

In Figure 4.1, the two dotted lines are two MSP curves representing two different amounts of fiscal outlay. The first one denoted by TS goes through point Y. In this case the fiscal outlay is just sufficient to meet simultaneously the constraint on procurement quota given by Q_{min} and the constraint on procurement price given by P_{max}. The procurement price is given by XW and the sales price is given by XY. The fiscal outlay incurred by the government is $WY \times Q_{min}$. But if the government is willing

to spend more, then the MSP curve will lie lower. The second dotted curve in Figure 4.1 corresponds to a larger fiscal outlay. As shown in the diagram, RV gives the sales price for different $\overline{Q}$ that lies between Q_{min} and Q* whereas WE gives the corresponding procurement price. The fiscal outlay is just sufficient to cover the difference between the two prices. In this case, the policy makers will choose the $\overline{P}, \overline{Q}$ combination that maximizes their utility. There is a third case where the fiscal outlay is insufficient to meet all the constraints at the same time. The resulting MSP curve will lie between the MPP curve and ST. There will be policy disequilibrium where objectives and constraints are incompatible with one another. I will study this case in Chapter 7 on the implementation problem of China's procurement system. When the available fiscal outlay can help satisfy all the constraints, the policy choice is given by the following proposition.

Proposition 4.2: For any given government outlay, the optimal $\overline{Q}$ *is given by the equation below.*

$$f' = \frac{U_3}{U_1 - U_2}$$

Proof:

As explained earlier, the optimal value of s_p is zero. The utility function can be simplified to

$$U[W^* - h(\overline{Q}) + D, h(\overline{Q}), \overline{Q}]$$

where $h(\overline{Q})$ is the producer surplus along the MPP curve. The policy makers choose the optimal $\overline{Q}$ to maximize their utility.

$$\text{Max } U = U[W^* - h(\overline{Q}) + D, h(\overline{Q}), \overline{Q}]$$

$$\text{subject to } \overline{Q} \leq Q^*$$

To have internal solution for $\overline{Q}$, the first order condition is

$$\frac{\partial U}{\partial \overline{Q}} = U_1(-h') + U_2(h') + U_3 = 0.$$

Solving the last equation, we have

$$h' = \frac{U_3}{U_1 - U_2} .$$

Since $U_3 > 0$ and U_1 and U_2 are finite, h' cannot be zero at the optimum. In addition, U_2 must be less than U_1 at the optimal $\overline{Q}$. To prove this result, suppose $U_2 \geq U_1$. Consider increasing $\overline{Q}$ a little. Producer surplus will rise and consumer surplus will fall by the same amount. The small increase in $\overline{Q}$ will lead to an increase in the policy makers' utility in two ways. First, since $U_3 > 0$, an increase in $\overline{Q}$ will always increase their utility. Second, when $U_2 \geq U_1$, the gain in policy makers' utility from an increase in producer surplus will at least offset the loss from an equal decrease in consumer surplus. Therefore, we can rule out the possibility of having $U_2 \geq U_1$ at the optimum. The optimal choice must occur at $U_2 < U_1$ and $U_3/(U_1-U_2) > 0$. This result implies that $h' > 0$. As has been explained in Chapter 3, the MPP curve has three segments and only the segment NE in Figure 3.2 (as in Figure 4.1) has $h' > 0$. Therefore the optimal $\overline{P}, \overline{Q}$ combination must lie on NE. Producer surplus along NE is denoted by f in the analysis in Section 3.4. Replacing h with f, we have

$$f' = \frac{U_3}{U_1 - U_2} \quad \blacklozenge$$

Note that the result of Proposition 4.2 is exactly the same as that of Proposition 3.5. Hence the optimal condition depicted in equation (3.12) applies to all non-negative values of fiscal outlay D. At this point I can draw an important policy implication. That is, farmers will only be paid the minimum procurement price if $U_3 > 0$, whether the

government subsidizes grain distribution or not. The assumption that policy makers favour a larger procurement quota is compatible with the situation in China in its early stage of development when the state was eager to secure an adequate supply of food for its growing urban work force at the lowest possible cost. As the Chinese economy develops and liberalizes over time, drastic changes within and outside the grain sector have altered the policy makers' preferences. It is no longer imperative or even desirable for the state to command a larger share of grain marketing. Policy makers' utility ceases to increase with the procurement quota once it has reached a certain level. As that point is approached, U_3 tends towards zero. Once it reaches zero, the quota procurement system only plays the role of income redistribution. In the next section, I will examine the situation that $U_3 = 0$.

4.2 Policy makers' indifference to a larger procurement quota

The previous optimization result that the procurement price of grain will always be set at the minimum level, whether the state subsidizes grain distribution or not, hinges on the assumption that policy makers prefer to command a larger share of grain marketing, i.e. $U_3 > 0$. In this section, I consider the case where $U_3 = 0$. It yields very different results regarding the optimal choice of procurement price. More precisely, the procurement price can exceed the minimum level required to induce quota fulfilment, i.e. $s_p > 0$. When $U_3 = 0$, the level of procurement quota is not important any more. We may then treat $\overline{Q}$ as an exogenous variable. Suppose $\overline{Q}$ is set at $\hat{Q}$. Note that the MPP curve has three segments, OM, MN and NE, as depicted in Figure 4.1. Since U_3 becomes zero only if $\overline{Q}$ exceeds a certain level, I assume that $\hat{Q}$ lies on NE. Using the same notation as in Chapter 3, I represent the producer surplus along NE by $f(\overline{Q})$. Policy makers' utility function can be expressed as follows.

$$U[CS, PS] = U[W^* - f(\hat{Q}) - s_c\hat{Q},\ f(\hat{Q}) + s_p\hat{Q}]$$

where $\hat{Q} \geq \Theta$

As discussed in the previous section, the procurement price is set at $g(\hat{Q}) + s_p$ and the rationed sales price is set at $g(\hat{Q}) + s_c$, where $g(\hat{Q})$ is the minimum procurement price corresponding to $\hat{Q}$ and the fiscal subsidy is $D = (s_p - s_c)\ \hat{Q}$. We then have the following optimization problem.

$$\text{Max} \quad U[W^* - f(\hat{Q}) - s_c\hat{Q},\ f(\hat{Q}) + s_p\hat{Q}]$$

$$\text{subject to} \quad D = (s_p - s_c)\ \hat{Q} \tag{4.7}$$

$$s_p \geq 0 \text{ and } s_c < P^* - g(\hat{Q})$$

The Lagrangian function for the maximization problem is given below.

$$U = U[W^* - f(\hat{Q}) - s_c\hat{Q},\ f(\hat{Q}) + s_p\hat{Q}] + \lambda[(s_p - s_c)\ \hat{Q} - D]$$

Direct differentiation shows that

$$\frac{\partial U}{\partial s_c} = -U_1\hat{Q} - \lambda\hat{Q} \tag{4.8}$$

$$\frac{\partial U}{\partial s_p} = U_2\hat{Q} + \lambda\hat{Q} \tag{4.9}$$

We have to consider two possible cases. First, if we have an internal solution for s_c and s_p, i.e. $s_p > 0$ and $s_c < P^* - g(\hat{Q})$, then equations (4.8) and (4.9) will become zero. On solving, we have

$$U_1 = U_2.$$

The last equation, together with constraint (4.7), determines the optimal values of s_p and s_c. Depending on the size of D, s_c can either be less than or equal to s_p.

Second, it is also possible to have a corner solution for s_p. In this case, $s_p = 0$, i.e. the procurement price will be set at its minimum level, and $s_c = -D/\hat{Q}$. From equation (4.9), maximization requires that

$\lambda < -U_2$.

Optimal s_c requires that $\frac{\partial U}{\partial s_c} = 0$. From equation (4.8), we have

$\lambda = -U_1$.

Combining the last two conditions, we have

$U_1 > U_2$. (4.10)

If inequality (4.10) is satisfied when U_1 and U_2 are evaluated at $s_p = 0$ and $s_c = -D/\hat{Q}$, then the procurement price is set at its minimum level.

Proposition 4.3: Suppose policy makers' utility function is given by U(CS,PS) and $\overline{Q}$ is an exogenous variable. The optimal procurement price can be higher than the minimum level given by the MPP curve.

Proof:

If inequality (4.10) is not satisfied, the solution to the optimization problem corresponds to $s_p > 0$ and the procurement price will be above its minimum level. ♦

Proposition 4.3 solves the 'puzzle' in the previous result that the procurement price is always set at the minimum level with the fiscal outlay being used only to finance the price subsidy to grain users but not to grain farmers. Proposition 4.3 shows that when the procurement quota ceases to increase policy makers' utility, the procurement price can exceed the minimum level. To understand why, we have to revisit the result of Proposition 3.4 derived under the assumption that the quota amount appears in the objective function as a separate argument and brings positive utility to policy makers. In such a case, a higher procurement price is offered to farmers only to induce them to deliver a larger quota. Thus the government cannot afford to pay anything more than the minimum procurement price. When policy makers do not care about the quota level, however, a change in their preference in favour of grain farmers'

welfare will likely raise the procurement price above the minimum level, especially when fiscal subsidies are available for grain marketing.

The results of Propositions 3.4 and 4.3 are consistent with the evolution of China's grain policy over time. In the early stage of economic development, the overriding emphasis on grain self-sufficiency amidst food shortages led China's policy makers to favour a larger grain quota. This preference is reflected by $U_3 > 0$ in their objective function. Proposition 3.4 shows that the procurement price will be set at its minimum level in this case, which is consistent with what had happened in China until the first half of the 1990s. However, when domestic shortages gradually become less of a problem, a larger procurement quota has lost its appeal to policy makers resulting eventually in $U_3 = 0$. Proposition 4.3 shows that in this case the procurement price can exceed the minimum level and part of the fiscal outlay will be used to finance the higher price paid to grain producers. It is therefore possible for the procurement price to lie above the equilibrium market price P*. This is consistent with what has occurred in China since 1997 when the procurement price exceeded the market price.

To tie up one loose end, let us consider the choice of $\overline{Q}$ when $U_3 = 0$. I have argued earlier that the choice of the procurement quota is not important and it may as well be treated as exogenously given. In the following analysis, I substantiate the claim that the choice of $\overline{Q}$ is not important when $U_3 = 0$.

Proposition 4.4: Suppose $U_3 = 0$ and the utility function of policy makers takes the following form.

$$U[W^* - f(\overline{Q}) - s_c\overline{Q},\ f(\overline{Q}) + s_p\overline{Q}]$$

For a given fiscal outlay, the choice of $\overline{Q}$ will not affect the optimal levels of consumer surplus and producer surplus. However, it will affect the choice of s_p and s_c.

Proof:

Suppose $\overline{Q}$ is set at $\overline{Q}_0$. Let the optimization solution of s_c and s_p be s_c^0 and s_p^0. The corresponding consumer surplus and producer surplus will be $[W^* - f(\overline{Q}_0) - s_c^0\overline{Q}_0]$ and $[f(\overline{Q}_0) + s_p^0\overline{Q}_0]$ respectively. Suppose we increase $\overline{Q}_0$ to $\overline{Q}_1$. Then $f(\overline{Q})$ will increase by $f(\overline{Q}_1) - f(\overline{Q}_0)$. Suppose we change s_c from s_c^0 to s_c^1 such that the resulting consumer surplus remains unchanged as shown below.

$$W^* - f(\overline{Q}_0) - s_c^0\overline{Q}_0 = W^* - f(\overline{Q}_1) - s_c^1\overline{Q}_1 \qquad (4.11)$$

To examine the size of the producer surplus at $\overline{Q}_1$ relative to that at $\overline{Q}_0$, let us rewrite equation (4.11) as follows.

$$[f(\overline{Q}_1)+s_p^1\overline{Q}_1] - [f(\overline{Q}_0)+s_p^0\overline{Q}_0] = s_c^0\overline{Q}_0 - s_c^1\overline{Q}_1 + s_p^1\overline{Q}_1 - s_p^0\overline{Q}_0 \qquad (4.12)$$

Since government outlay is fixed, we must have

$$(s_p^1 - s_c^1)\overline{Q}_1 = (s_p^0 - s_c^0)\overline{Q}_0.$$

Using the last equation, equation (4.12) becomes zero, which means that the producer surplus will also be the same for the two quota levels. Thus the consumer surplus, producer surplus and policy makers' utility are all identical under $(\overline{Q}_0, s_c^0, s_p^0)$ and $(\overline{Q}_1, s_c^1, s_p^1)$. In other words, the choice of $\overline{Q}$ does not affect the resulting welfare distribution between grain users and grain producers although a different set of optimal s_c and s_p is associated with each different $\overline{Q}$. ♦

4.3 Changes in fiscal outlay

How much fiscal outlay a government can incur in grain marketing is governed by the tightness of its budget constraint. It depends on the availability of fiscal resources as well as the other competing uses and how they compare in importance with grain distribution. In this section I analyse the impact on the choice of the optimal $\overline{P}, \overline{Q}$ combination of a change in fiscal resources available for grain distribution.

Again, I consider two cases, namely, $U_3 > 0$ and $U_3 = 0$. To simplify the analysis, from now on one more assumption is added to the basic model. That is, policy makers' utility function is additively separable and can be expressed as follows.

$$U = V_c[W^* - f(\overline{Q}) + D] + V_p[f(\overline{Q})] + V_q(\overline{Q})$$

Proposition 4.5: Suppose $U_3 > 0$. An increase in government outlay will increase the procurement price and quota and vice versa.

Proof:

Again, when $U_3 > 0$, all the government outlay will go to grain users whereas farmers will be paid only the minimum procurement price. The first order condition for utility maximization is given by

$$V_c'(-f') + V_p'(f') + V_q' = 0.$$

Differentiating the last equation with respect to D, we have

$$\frac{d\overline{Q}}{dD} = \frac{f'V_c''}{f''(V_p - V_c) + (f')^2(V_p'' + V_c'') + V_q''}.$$

The second order condition for maximization ensures that the denominator is negative. If marginal utility diminishes, V_c" is negative and hence the numerator is negative. An increase in fiscal outlay will increase the quota. Given an upward-sloping MPP curve, the procurement price will also increase. The reverse holds for a decrease in fiscal outlay. ♦

The implication of Proposition 4.5 is more interesting when we consider a decrease in available fiscal resources. It implies that a tighter fiscal constraint will lead to a reduction of both the procurement quota and price. When a smaller amount of fiscal resources is available to grain users as price subsidy, they will have to pay a higher price for grain and hence suffer from a smaller consumer surplus. Due to the diminishing marginal utility of policy makers in both the consumer surplus and

producer surplus, the decline in the consumer surplus will increase the marginal benefit of an increase in the consumer surplus relative to the marginal cost of an equal decrease in the producer surplus. Policy makers will adjust the procurement policy to lower the producer surplus and increase the consumer surplus until their utility is maximized again, albeit at a lower level than before. In so doing, the procurement price and quota will be adjusted downward along the MPP curve. This result is consistent with the gradual downward adjustments in the contract procurement quota from 75 m.m.t. in 1985 to 50 m.m.t. in 1989. These quota reductions were in fact an attempt to reduce both the procurement price and quota and thereby contain the fiscal deficits.[51]

Proposition 4.6: Suppose $U_3 = 0$ and both s_c and s_p have internal solutions. An increase in government outlay will increase the procurement price and reduce the sales price.

Proof:

Given a procurement quota $\hat{Q}$ at which $U_3 = 0$, policy makers' utility function can be expressed as follows.

$$U = V_c[W^* - f(\hat{Q}) - s_c\hat{Q}] + V_p[f(\hat{Q}) + s_p\hat{Q}]$$

where $\hat{Q} \geq \Theta$

They maximize their utility subject to the following budget constraint.

$$D = (s_p - s_c)\hat{Q}$$

Assuming internal solutions for both s_c and s_p, we have the following first order condition for utility maximization as derived in Section 4.2.

$$V_c' = V_p'$$

[51] It turned out that the government had to adjust the procurement price upward later to compensate farmers for the surge in production costs. The policy adjustments in response to changes in costs will be discussed in the next section.

Differentiating the first order condition with respect to D, we have the following results.

$$\frac{ds_p}{dD} = \frac{V_c"}{\hat{Q}(V_c"+V_p")}$$

$$\frac{ds_c}{dD} = \frac{-V_p"}{\hat{Q}(V_c"+V_p")}$$

Under the assumption that marginal utility diminishes, V_c" and V_p" are negative. Then $ds_p/dD > 0$ and $ds_c/dD < 0$. Given an unchanged procurement quota, the minimum procurement price will not change. An increase in s_p and a decrease in s_c result in a higher procurement price and a lower sales price. ♦

4.4 Changes in costs

As a result of economic developments within and outside the grain sector, the costs of grain production have seen drastic changes over time. The model of grain policy formulation can also shed light on the adjustments in the procurement policy in response to such changes. Let β be the shift parameter that captures the change in production cost. An increase in β indicates a rise in cost leading to an upward shift in the supply curve. The upward shift in the supply curve will reduce the total economic surplus derived from grain production and sales, that is, $dW^*/d\beta<0$. An increase in cost will also affect the producer surplus along the MPP curve, now depicted by $f(\overline{Q}, \beta)$. To ascertain this impact, we need to find the sign of $df(\overline{Q},\beta)/d\beta$. This can best be analysed using Figure 3.1 in Chapter 3, which is reproduced as Figure 4.2.

The original supply and demand curves of marketed grain are depicted by $Q = S_1(P)$ and $Q = D(P)$ respectively in Figure 4.2. As explained in Chapter 3, if $\overline{P}$ and $\overline{Q}$ are the optimal combination of procurement price and quota that lies on the MPP curve (as illustrated in Figure 4.1), the corresponding producer surplus is given by *area b* as

area d = area e. Now suppose marginal cost of grain production increases by x. The supply curve will shift upward by x as illustrated by the shift from $S_1(P)$ to $S_2(P)$ in Figure 4.2. The adjustment in the procurement policy is given by the following three propositions.

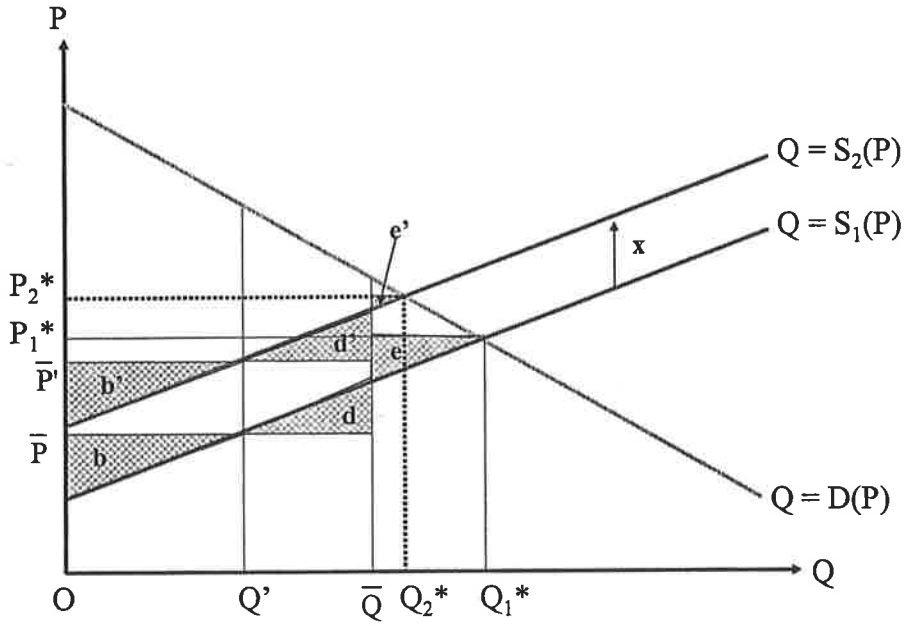

FIGURE 4.2 CHANGE IN MPP CURVE IN RESPONSE TO CHANGE IN COST

Proposition 4.7: An increase in cost will shift the MPP curve upward. For the same procurement quota, the minimum procurement price is higher and the associated producer surplus is larger.

Proof:

Consider the policy option of raising the procurement price by x, i.e. from $\overline{P}$ to $\overline{P}$' in Figure 4.2, while keeping the quota level at $\overline{Q}$. Now that both price and cost have increased by the same amount, if grain producers do not fulfil their quota, their optimal sales volume will be Q' and the producer surplus will still be equal to *area b* (as *area b' = area b*). Now consider farmers' option of fulfilling the quota and gaining access to

the free market for surplus grain. The equal increase in the procurement price and cost will keep *area d'* in Figure 4.2 the same as *area d*. However, the equilibrium price in the free market will increase by less than x as long as the demand curve is not perfectly inelastic. Therefore the producer surplus derived from the sales of surplus grain on the free market decreases from *area e* to *area e'*. As *area e'* is smaller than *area d'*, the amount of the producer surplus derived from quota fulfilment will be less than *area b'*. Producers will not fulfil the quota but simply supply Q'. To induce them to deliver the quota amount of grain to the government, the procurement price must be increased by an amount more than x to increase farmers' benefit of fulfilling the quota. That is, the procurement price must be increased sufficiently such that *area d'* is reduced until it is equal to *area e'*. With such an adjustment in procurement price holding the quota unchanged, there will be an increase in the producer surplus, represented by a larger *area b'* in Figure 4.2. That is, $df/d\beta > 0$. ♦

Now let us examine the impact of cost increases on the choice of the optimal grain procurement policy. Consider the case where $U_3 = 0$. From the previous analyses, we know that in this case the procurement price can either be higher than or equal to the minimum level given by the MPP curve. If the procurement price is equal to the minimum level, Proposition 4.7 implies that the procurement price must increase. A more interesting case is where the procurement price is higher than its minimum level. Will an increase in cost lead to an increase in the procurement price?

Proposition 4.8: Suppose $U_3 = 0$ and both s_c and s_p have internal solutions. An increase in cost will cause s_c and s_p to fall. Hence an increase in cost will not necessarily raise the procurement price unless it is already set at the minimum level.

Proof:

Incorporating the shift parameter β to capture the change in cost of production, we can express policy makers' utility function as follows:

$$U = V_c[W^*(\beta) - f(\hat{Q}, \beta) - s_c\hat{Q}] + V_p[f(\hat{Q}, \beta) + s_p\hat{Q}].$$

Policy makers maximize their utility subject to the following budget constraint:

$$D = (s_p - s_c)\hat{Q}.$$

The first order condition for utility maximization is given by

$$V_c' = V_p'.$$

Differentiating the last equation with respect to β, we have

$$\frac{ds_p}{d\beta} = \frac{ds_c}{d\beta} = -(\frac{1}{\hat{Q}})\frac{\partial f}{\partial \beta} + (\frac{V_c''}{V_c''+V_p''})(\frac{1}{\hat{Q}})\frac{dW^*}{d\beta}. \qquad (4.13)$$

It has already been shown that $dW^*/d\beta < 0$ and $\frac{\partial f}{\partial \beta} > 0$ for an unchanged quota. Thus $ds_p/d\beta = ds_c/d\beta < 0$. Both s_p and s_c will fall. ♦

Proposition 4.8 states that an increase in cost does not necessarily increase the procurement price offered by the government to grain producers. While the minimum procurement price will increase with the higher cost, both s_p and s_c will fall. It is therefore uncertain in which direction the actual procurement price and rationed sales price will move. The idea is that an increase in cost harms grain users who also buy grain from the free market. An increase in cost leads to higher market price, which in turn reduces their consumer surplus. The decision regarding the adjustment in the actual procurement price and sales price has to balance policy makers' marginal utility of grain producers' welfare with that of grain users' welfare. Whether the actual procurement price and sales price rise or fall depends on the relative size of the upward adjustment in the minimum procurement price and the downward adjustment in s_p and s_c.

Now consider the case where $U_3 > 0$. Incorporating the shift parameter β, policy makers' utility function can be expressed as follows.

$$U = V_c[W^*(\beta) - f(\overline{Q}, \beta) + D] + V_p[f(\overline{Q}, \beta)] + V_q(\overline{Q})$$

where $dW^*/d\beta < 0$, $f_1 > 0$, $f_2 > 0$, and $f_{12} > 0$.

Proposition 4.9: Suppose $U_3 > 0$. An increase in cost will reduce the procurement quota but may not necessarily raise the procurement price.

Proof:

The first order condition for utility maximization is given by

$$\frac{dU}{d\overline{Q}} = V_c'(-f_1) + V_p'(f_1) + V_q' = 0.$$

Differentiating the last equation with respect to β, we have

$$\frac{d\overline{Q}}{d\beta} = \frac{f_{12}(V_c'-V_p') - f_1 f_2(V_c''+V_p'') + f_1 V_c''(\frac{dW^*}{d\beta})}{f_{11}(V_p'-V_c') + (f_1)^2(V_p''+V_c'') + V_q''}.$$

From the second order condition, the denominator must be negative. The numerator's sign is positive as $V_c' > V_p' > 0$ and $f_{12} > 0$. The first inequality is inferred from Proposition 4.5 in Chapter 4. The second inequality can be easily verified with reference to Figure 4.2. Hence $d\overline{Q}/d\beta$ is negative. That is, the optimal policy adjustment to an increase in cost is to reduce the procurement quota. However, the adjustment in $\overline{P}$ is uncertain as it is determined by two factors. For the same $\overline{Q}$, the minimum procurement price has to rise following an increase in cost. But a smaller $\overline{Q}$ will reduce the minimum procurement price. ♦

The analyses in this chapter have shown that grain farmers may be paid higher than the minimum procurement price for their quota delivery when policy makers' utility no longer increases with the procurement quota. With unchanged production

cost, the procurement price may increase with the amount of fiscal outlay available for grain distribution. When there is an increase in the cost of grain production, the procurement quota will be adjusted downward in the case where $U_3 > 0$ but will remain unchanged if $U_3 = 0$. In either case, the adjustment in the procurement price is uncertain. A reasonable conjecture is that the larger is the increase in cost, the more likely will there be an upward adjustment in the procurement price. Therefore, when $U_3 > 0$, a substantial increase in cost will give rise to a higher procurement price but a smaller procurement quota, which is consistent with the case in China between 1985 and 1989.

CHAPTER 5

ADJUSTMENTS IN THE PROCUREMENT POLICY TO MEET INCOME DISTRIBUTION OBJECTIVES

The previous chapter has discussed how the changes in the fiscal constraint, cost of grain production, and policy makers' preferences regarding the procurement quota influence the formulation of China's grain procurement policy. This chapter studies another crucial element that has been and will carry on guiding China's grain policy, which is policy makers' preference regarding sectoral income distribution. While the changes in those factors discussed in Chapter 4 are more easily observable, the one to be dealt with now is less so. It is not readily ascertained whether the implementation of protective procurement price since 1997 is to maintain grain self-sufficiency or is a result of the change in policy makers' preferences in favour of farmers' welfare. Therefore I first draw on the literature on the political economy of agricultural policy in Section 5.1 to substantiate my allegation in Chapter 3 that the weight of producer surplus is likely to have increased relative to that of 'consumer surplus' in China's food and agricultural policy objective function over time. In Section 5.2 I proceed to analyse the implication of such a change for the grain policy formulation.

5.1 Determinants of the policy makers' preference regarding income distribution

There has been a well-documented tendency in Western Europe and Northeast Asia that government policies change gradually from taxing the agricultural sector and supporting the industrial sector in the early stage of economic development to supporting agriculture when the economy has reached a higher income level (Anderson

and Hayami, 1986; Lindert, 1991). First of all, the rationale for the governments in low-income developing countries to tax agriculture is the industrialization drive mentioned in Chapter 3. Due to the consideration of administrative costs, these governments tend to favour the policies of suppressing domestic food prices and exercising trade interventions, instead of using other less distorting means of raising taxes from the rural sector.[52] For centrally planned economies like the former Soviet Union and the PRC in particular, taxation through price was regarded as the most effective single device because of the extreme convenience of collection which did not require a special fiscal apparatus and for reasons of political expediency (Sah and Stiglitz, 1992, p.91).

We then have to ask a question: what is the reason for a country to switch from taxing to supporting agriculture at a more advanced stage of economic development? The social concern approach attributes the switch in redistribution policy to the government's attempt to slow the pace of change in internal income distribution that would take place as a result of market forces (Corden 1997, p.61). According to the Engel's Law, income elasticity of demand for food is less than one and declines as incomes rise. As an economy develops and industrializes, market forces will lead to a decline in the relative income of the agricultural sector. Such a downward trend will be more drastic in a country that has a greater comparative disadvantage in agriculture. It is likely for its government to come under greater pressure to provide assistance to the disadvantaged rural sector. As a result, it is found that the switch from taxing to supporting agriculture tends to take place at a lower level of per-capita income the

[52] Governments in developing countries usually find it very difficult to monitor transactions within the rural sector making it infeasible to impose taxes on rural wage income (Sah and Stiglitz, 1992, p.19). On the contrary, it is less costly to monitor trade between a country and the rest of the world due to the limited number of ports capable of handling large shipments. Therefore, these countries prefer to tax foreign trade (ibid, p.32). Similarly, it is administratively much less costly to redistributing income from farmers by suppressing procurement prices than collecting income taxes from farmers in China.

smaller the country's comparative advantage in food production (Anderson and Hayami, 1986, p.16).

To further explain the variation in agricultural protection across countries and over time, political economists study the behaviour of various interest groups involved in the redistribution policy. They have established in the literature that those groups whose economic interests will be adversely affected by a proposed policy change will try to block the change even though it will benefit the society as a whole. The larger is the damage of the new policy to these special interests and the less costly it is for them to organize, the greater will be their resistance to the policy change (Olson, 1965; Rausser and Foster, 1990; Lindert, 1991; Anderson, 1992, 1995). Along this line, they have identified the following factors that determine the demand and supply of assistance to agriculture.

Agriculture's share of GDP and employment

The lower the share of agriculture in GDP and employment, the less per capita harm to other sectors caused by any given level of assistance to agriculture. The resulting reduction in resistance to such policy will reduce its cost in terms of political support and hence increase its supply. The lower the agricultural share in employment, the more per capita benefit to farmers for any given assistance to agriculture. The smaller agricultural population also reduces the free-rider problem. Potential benefits for farmers will be reflected to a greater extent in their political support to the government, leading to an increase in demand for agricultural assistance (Anderson, 1995; Lindert, 1991).

The relative labour-intensity of farming

Raising the relative price of farm products will have less spillover effect on non-farm sectors in the form of driving up wages and other costs of production, the lower the labour intensity of agriculture. When labour intensity declines as an economy grows, it becomes less costly for other sectors to support agriculture, leading to an increase in supply of assistance to agriculture (Anderson, 1992).

The share of farm products in household expenditure

The lower the share of farm products in household expenditure, the less impact of any given increase in assistance to agriculture on the non-farm sector, and hence the less the resistance to such policy and the less costly the supply of such assistance (Anderson, 1995).

Income distribution considerations

The lower agricultural income relative to non-agricultural income, the greater is the dissatisfaction of the farming sector, which will lead to an increase in demand for assistance, and the less the resistance to such policy. Policy makers may also care more about the welfare of the disadvantaged groups in policy formulation leading to an increase in supply of assistance to these groups (Baldwin, 1996).

Policy makers' ideology and preference

Sometimes policy makers' ideological belief might supersede the political support that they can gather to become the most important determinant of their ranking of various objectives. As noted by Baldwin (1996, p.159), this is more likely to be the case for authoritarian leaders. While such leaders are usually less constrained by legal and other institutional conditions, their economic policies are more heavily influenced by the ideologies that shape their economic and social views rather than by political

pressures from domestic economic interest groups. Nevertheless, their pursuit of ideology-guided goals is still guarded by their concern about the possibility of losing political power through military coups, riots, and mass demonstrations triggered by policies unpopular with various economic and social groups.

Acemoglu and Robinson (2000) refer to the explanation of cross-country variations in agricultural protection with reference to the redistribution of economic interests as the 'economic-losers hypothesis'. They point out that this approach cannot explain different policy decisions of some countries in which there are similar impacts on economic interests. One notable example is the contrast between Britain and Japan. The British government stipulated the Corn Laws in 1815 to protect grain farmers' income after the Napoleon Wars. During the wars, British farmers of corn and wheat expanded their acreage and enjoyed high prices for their produce as grain supplies from the Continent had been cut off. To maintain domestic prices after the Napoleon Wars, import prohibition was called for giving rise to the Corn Laws. However, subsequent to the repeal of the Corn Laws since 1846, the British government took no action to protect its farming community, especially the landlords, from the world decline in wheat price after 1870.

A case of agricultural protection similar to the stipulation of the Corn Laws can be found in the history of Japan. When the Russo-Japanese War broke out in 1904, the Japanese government imposed a 15 percent ad valorem tariff on imported rice supposedly to raise revenue for financing the war. When the war was over the following year, however, the land interests managed to lobby the government to preserve this tariff and eventually made it permanent in 1906 as a specific duty (Hayami, 1972). As noted by Anderson (1983), the heated debates between the interest groups lobbying for the rice tariff, namely, farmers and farm bureaucracies, and those

against it, including manufacturing and commerce groups, were not unlike those leading to the repeal of the Corn Laws six decades earlier. The conflict between these interest groups in Japan was compromised by allowing duty-free imports from Taiwan and Korea under the imperial self-sufficiency policy.

When another surge in the demand for agricultural protection emerged in the second half of the 20th Century, political developments in Japan let to persistent agricultural protection, an outcome very different from that in Britain. After WWII, food shortages that emerged from the shortfall of manpower and other inputs and increased demand of 6 million repatriates created a favourable situation for farmers in Japan. Their incomes exceeded average household incomes substantially until 1948. Since the 1950s, however, structural changes in the Japanese economy had led to steady deterioration in the relative income of farmers. The change in income distribution resulted in strong demands for agricultural protection on the grounds of equity and social justice (George and Saxon, 1986). Due to the enhanced electoral power of farmers and the rise of a new breed of agricultural cooperative, which emerged as part of the post-war democratization of Japan, the forces of protection triumphed again. As a result, Japan's rice production has now become the most protected in the world with domestic producer prices being 60 percent higher than in South Korea and more than 10 times higher than in the US (Fukuda et al., 2003).

Observing that the 'economic-losers hypothesis' cannot account for the different policy decisions in countries such as Britain and Japan, Acemoglu and Robinson (2000) propose the 'political-loser hypothesis' focusing on the redistribution effect of policy changes on political power. This approach predicts that a change in policy will be blocked by interest groups only if they believe their political power will be eroded. Acemoglu and Robinson apply this hypothesis to explain why the land

interests in Britain did not resist the Industrial Revolution although the associated repeal of the Corn Laws in 1846 was against their economic interests. They point out that the lack of resistance from the landlords was due to the belief that they could secure their political power. It therefore translated into a smaller demand for agricultural protection.

Whether the focus is on the redistribution effect of a policy change on economic interests or political power, both hypotheses are to explain the policy making with reference to the ability and willingness of policy makers to assist farmers as well as the strength of the resistance from other sectors. They can shed light on the grain policy formulation in China despite the fact that there is not yet explicit lobbying by interest groups in China. The Chinese policy makers are concerned about the possibility of losing political power and hence will contemplate on the benefits and costs before formulating any redistribution policy. Their preference internalises the opposing forces of the various interest groups involved in the policy under consideration even though their ideological belief is still the dominant factor.

In the central planning era, China was a tightly closed economy in which the government could easily block any undesirable influences from the outside world. The multitude had been very submissive allowing the government great freedom to pursue its goals at the expense of their individual well-being. Through ideological propaganda, political leaders had largely prevented any possible upheavals which might be triggered by the adverse effects of unpopular policies on the people. In the implementation of the heavy-industry oriented strategy, the government sided with the industrial sector as it was the major beneficiary of the economic surpluses extracted by the 'price scissors'. At that time, farmers' welfare had hardly any weight in China's food and agricultural

policy objective function. Any incentive that the government offered to them was for the maintenance of grain self-sufficiency only.

This situation has changed gradually since the 1980s with the opening up of the Chinese economy to the world and the associated economic growth. The market-oriented reforms and the decentralization in decision making have loosened the tie between the central government and the industrial sector. The economic developments have also forged fundamental changes in people's ideological belief and behaviour. They are now more ready to fight for their own welfare. In particular, seeing that they still have to struggle for subsistence while the national economy is prospering, farmers cannot help but express their grievances outwardly in riots and demonstrations. Among other things, the emergence of social unrest in the countryside has increased the political stake of China's leaders in farmers' welfare.[53] The closer link between policy makers' political power and farmers' well-being makes the findings in the political-economy literature all the more relevant to China's grain policy formulation.

Based on the determinants of demand and supply of agricultural protection identified in the literature, what can we say about the change in China's food and agricultural policy objective function over time? To answer this question, I borrow Anderson's (1992) simple model of political market. In his model, government policy regarding taxing or supporting agriculture is determined by the interaction between the demand and supply of such policy. The horizontal axis in Figure 5.1 measures the 'quantity' of assistance to agriculture in terms of the effective protection coefficient (EPC, the percentage by which the policy has raised value-added) for this sector relative to the average EPC for other sectors in the economy. The vertical axis

[53] The link between rural poverty and social unrest in the countryside has been widely reported in the mass media (*Jingxun Shuju (Accurate Information and Data)-H02*, 31 December 2001; *Jingji Ribao (Economics Daily)*, 9 August 2002). The political leaders' recognition of the problem prompted

measures the 'price' of a unit of assistance to agriculture. Modifying this model slightly, I use it to explain how the Chinese policy makers' preference regarding income distribution has changed over time. Instead of treating the government as the supplier of protection responding to the demand and resistance from different interest groups, I interpret the demand and supply of government assistance in Figure 5.1 as the forces that influence policy makers' preferences. If the interaction between the demand and supply results in an EPC greater than 1, the policy makers favour agriculture more than other sectors. On the contrary, an EPC less than 1 implies a preference disfavouring agriculture.

On the supply side, the 'price' of a unit of assistance to agriculture is the marginal cost of supplying assistance to agriculture from the policy makers' perspective. It is the loss of political support they could gather from other sectors that will be harmed by the increase in assistance to the agricultural sector, or the cost of additional budget outlays if the government tries to maintain the welfare of other sectors while increasing the assistance to agriculture. The supply curve is upward sloping because the marginal cost rises with additional assistance. On the demand side, the 'price' reflects the marginal benefit of such assistance to the policy makers in terms of the achievement of certain goals and increase in political support from the benefited farmers. The demand curve is downward sloping as the marginal benefit decreases with additional assistance. It should be noted that the price of an additional unit of assistance to agriculture is affected not only by the benefits and costs created for the various interest groups, but also by the extent to which these welfare changes are converted into political support or opposition to the government, that is, how sensitive or

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the experiment in Anhui Province with the rural taxation reform in 2000 in an attempt to reduce the excessive burden on rural households.

responsive each interest group is to changes in its collective welfare (Rausser and Foster, 1990, p.645).

All except one of the determinants discussed earlier would have led to an increase in the demand and supply of agricultural support in China prior to its accession to WTO. The shares in GDP, employment, and household expenditure of agriculture in general, and grain production in particular, have fallen substantially over time (see Tables 1.1 and 2.5). These changes would have led to a lower resistance to the increase in agricultural support. The income distribution consideration would have increased both the demand and supply of assistance to the farm sector. As already mentioned in Chapter 2, the widening gap between rural and urban incomes has become a great concern to the Chinese political leaders since the 1990s. The dispersion in income growth would have altered policy makers' preferences in favour of agriculture.

The only exception that does not contribute to an increase in demand and supply of agricultural assistance is the relative labour intensity of farming. China's farming sector is still very labour-intensive for several reasons. First, China is endowed with an abundant supply of labour and the *hukou* system has obstructed the outflow of surplus labour from the farming sector. Second, the scarcity of land and the small scale of farm production restrict the application of capital-intensive method. Third, the heavy industry-oriented development strategy in the central planning period extracted a huge amount of economic surplus from agriculture and deprived it of investible capital. Lastly, the fiscal reforms since the 1980s have induced a 'public expenditure policy bias' against agricultural investment.

Nevertheless, taking all these factors into consideration, we have reasons to believe that both the demand and supply curves of agricultural support have shifted to the right. The looser lie between the central government and the industrial sector as

well as the greater political stake of China's leaders in farmers' welfare would have enhanced such a change. The result, as illustrated by the shift from D_1-S_1 to D_2-S_2 in Figure 3.1, is an increase in the effective protection coefficient (EPC) from a level far below 1 in the central planing era to a level close to or above 1 around the time of China's accession to WTO. A rise in EPC corresponds to an increase in the weight of producer surplus of grain farmers relative to that of 'consumer surplus' of grain users in China's food and agricultural policy objective function. What we observe in reality is consistent with this result. There has been an upward trend in assistance to grain production in China, from negative to close to zero. Some studies even suggest that the assistance to individual crops such as corn and wheat has become positive in recent years (Huang, 2001; Huang and Rozelle, 2002). In fact, since the fixed procurement prices surpassed market prices in 1997, the procurement quota appears to have turned into an instrument for protecting the welfare of grain farmers instead of taxing them. However, it should be noted that the actual amount grain farmers receive for their quota delivery may be much less than the stipulated procurement price due to the illegal collection of rural levies by grain stands on behalf of local governments. This is an issue separate from the central government's income distribution policy and will be discussed further in the next two chapters.

Given all the above changes within the Chinese economy, will the upward trend in agricultural support persist in the future? There are two factors that provide checks and balances against such an upward trend in China. They are the external constraint imposed by China's trading partners under the governance of WTO and the budget constraint on fiscal resources available for agricultural support.

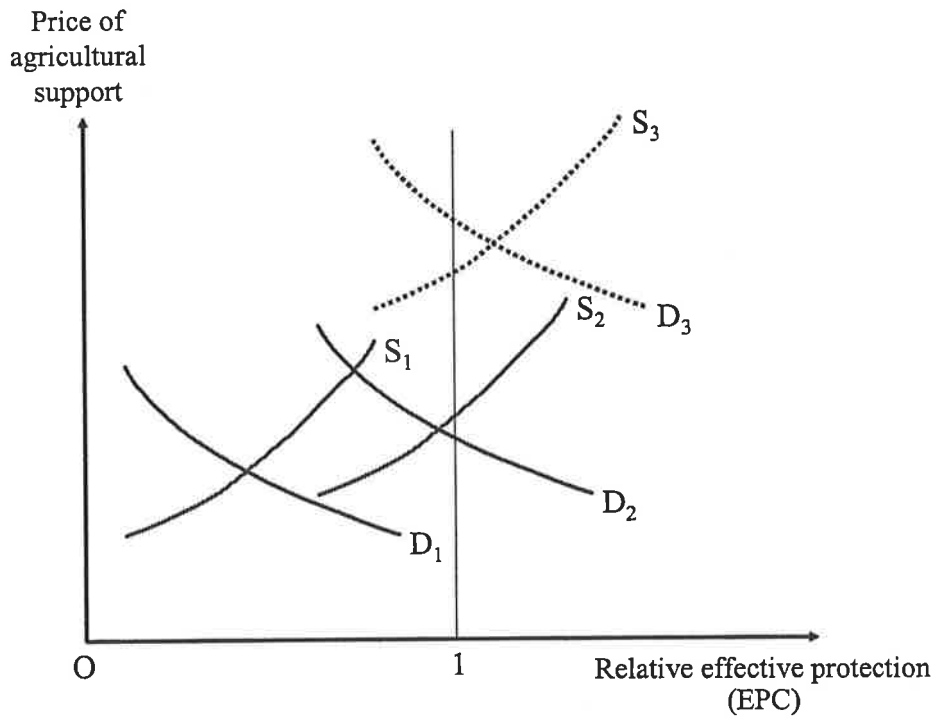

FIGURE 5.1 TAXING OR SUBSIDIZING AGRICULTURE?

The external forces of foreign interest groups, governments, and international institutions

The globalization of economic activities increases the interdependence among nations. The formation of domestic as well as trade policies of a country is increasingly influenced by foreign governments and international organizations (Baldwin, 1996). China's accession to WTO has brought not only the privileges of the most favoured nation (MFN) treatment, but also placed the nation under some stringent constraints regarding the formulation of domestic marketing and trade policies. In particular, China's commitments to the expansion of market access and the restrictions on domestic support will certainly impede the future increase in the supply of assistance to its farming sector despite the increase in demand arising from domestic economic restructuring subsequent to the WTO accession. As noted by Baldwin (ibid, p.165), if the country is highly dependent on export markets, its authoritarian leader will be quite responsive to pressures from foreign countries. Apparently the Chinese government has

to take the external factor seriously because to renege on its commitments would involve its trading partners reducing their openness to Chinese exported goods. It is therefore unlikely for China to follow in the footsteps of the East Asian countries such as Japan and South Korea to adopt protectionist policy stance to maintain grain farmers' income.

The impacts of China's accession to WTO on the demand and supply of agricultural support can be illustrated with the shift from D_2-S_2 to D_3-S_3 in Figure 5.1. While the effective protection coefficient (EPC) may rise above 1 due to the substantial increase in demand for agricultural assistance as the Chinese economy develops further, the EPC cannot deviate too much from 1 due to the higher economic and political costs of agricultural support. In other words, further increase in the weight of grain farmers' welfare in policy makers' objective function will be restrained by the external factor in relation to China's commitments under WTO disciplines.

Budgetary considerations

To protect its agricultural sector, China faces a much greater fiscal problem than other European and East Asian countries. Currently agriculture still accounts for half of China's labour force (see Table 1.1). Its vast agricultural population makes it quite infeasible to support farmers the same way as in EU and Japan. According to some USDA estimates, the 8.5% cap on the Aggregate Measurement of Support (AMS) would amount to US$14 billion (Fang et al., 2002, p.33). China's Ministry of Agriculture produces another set of figures with reference to the 8.5% provision of AMS (*China's Agricultural Development Report 2002*, p.80). They estimate that the product-specific support that applies to wheat, rice, corn, and cotton can increase by US$6.5 billion whereas the non-product-specific support can increase by US$17.4 billion. Given that the total government expenditure on agriculture was only US$14.9

billion in 2000 (Table 2.3), these estimates reveal that the amount of producer subsidies permitted under the WTO agreements is likely to exceed the fiscal capacity of the Chinese government for the foreseeable future. Therefore the fiscal capacity of the Chinese government is more likely to be the binding constraint on the supply of agricultural assistance. The impact of the fiscal constraint can be explained with reference to Figure 5.2. In the absence of such a constraint, or when it is not binding, the equilibrium level of EPC will be at x as determined by D_3 and S_3. Bound by the fiscal constraint, EPC will drop from x to y.

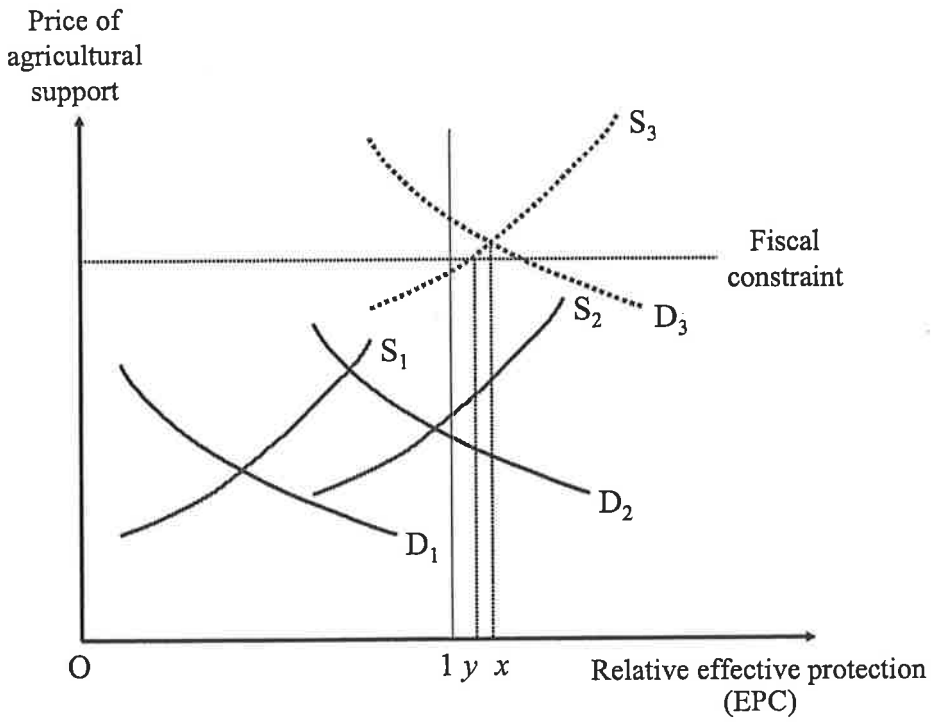

FIGURE 5.2 FISCAL CONSTRAINT ON AGRICULTURAL SUPPORT

All in all, based on the analysis of the changes in the demand and supply of agricultural protection in China, it is a justified conjecture that there is a gradual increase in the weight of producer surplus of grain farmers in the food and agricultural policy objective function. Let us find out how this change in policy makers' preferences affects the grain procurement policy.

5.2 Policy response to the evolution in preferences in favour of producers

In this section I analyse how a change in policy makers' preferences in favour of grain farmers affects the optimal choice of the $\overline{P}, \overline{Q}$ combination. There are two cases to examine: (i) policy makers' utility increases with the size of the procurement quota, i.e. $U_3 > 0$; and (ii) policy makers are indifferent to an increase in procurement quota, i.e. $U_3 = 0$. Consider the case where $U_3 > 0$. From Lemma 1 in Chapter 3 we know that the optimal $\overline{P}, \overline{Q}$ combination will lie on segment NE of the MPP curve depicted Figure 3.2. It has also been shown in Chapter 4 that when $U_3 > 0$, all the government outlay will go to grain users and farmers will be paid only the minimum procurement price. Incorporating all these previous results and the assumption that policy makers' utility function is additively separable, we have the following objective function.

$$U = V_c[W^* - f(\overline{Q}) + D] + \alpha V_p[f(\overline{Q})] + V_q(\overline{Q})$$

α is a parameter to capture the changes in policy makers' preferences regarding sectoral income distribution. An increase in α reflects a change in their preferences in favour of grain farmers' welfare.

Proposition 5.1: Suppose $U_3 > 0$. A change in policy makers' preferences in favour of grain producers will increase the procurement price and quota.

Proof:

The first order condition for utility maximization is given as follows.

$$V_c'(-f') + \alpha V_p'(f') + V_q' = 0 \qquad (5.1)$$

Differentiating equation (5.1) with respect to α, we have

$$\frac{d\overline{Q}}{d\alpha} = \frac{-f'V_p'}{f''(\alpha V_p' - V_c') + (f')^2(\alpha V_p'' + V_c'') + V_q''}.$$

The second order condition for maximization ensures that the denominator is negative. Since the numerator is also negative, an increase in α will lead to an increase in $\overline{Q}$. Given the upward-sloping MPP curve, a larger $\overline{Q}$ means a higher procurement price. ♦

Given the one-for-one trade-off between the consumer surplus and producer surplus, an increase in the producer surplus always leads to an equal reduction in the consumer surplus. The marginal benefit to policy makers of an increase in the producer surplus is always matched by the marginal cost of an equal decrease in the consumer surplus. When policy makers' preferences change in favour of grain producers, the marginal benefit of an increase in the producer surplus increases relative to the marginal cost at the original $\overline{P}, \overline{Q}$ combination. To maximize policy makers' utility, the procurement policy will be adjusted to increase the producer surplus at the expense of the consumer surplus. At the same time, given the positive marginal benefit of an increase in the procurement quota ($U_3>0$), the quota will be set at the highest possible level. Therefore the new optimal $\overline{P}, \overline{Q}$ combination will move to a higher level of procurement price and quota along the MPP curve.

Now consider the case where $U_3 = 0$. Policy makers' utility function becomes

$$U = V_c[W^* - f(\hat{Q}) - s_c\hat{Q}] + \alpha V_p[f(\hat{Q}) + s_p\hat{Q}] \qquad (5.2)$$

where $\hat{Q} \geq \Theta$.

Proposition 5.2: Suppose $U_3 = 0$ and both s_c and s_p have internal solutions. A change in policy makers' preferences in favour of grain producers will increase the procurement price as well as the sales price.

Proof:

To have internal solutions for both s_c and s_p, as derived in Section 4.2, utility maximization requires the following first order condition.

$$V_c' = \alpha V_p'$$

Differentiating the first order condition with respect to α, we have

$$\frac{ds_c}{d\alpha} = \frac{ds_p}{d\alpha} = \frac{-V_p'}{\hat{Q}(\alpha V_p'' + V_c'')}.$$

Under the assumption of diminishing marginal utility, V_c'' and V_p'' are negative. An increase in α will lead to an increase in s_p and s_c. Given that the procurement quota remains unchanged, so does the minimum procurement price. Increases in s_p and s_c lead to higher procurement price and sales price. ♦

When $U_3 = 0$, the marginal benefit and the marginal cost of an increase in the producer surplus must equal each other at the optimal $\overline{P}, \overline{Q}$ combination. If the marginal benefit increases relative to the marginal cost due to the change in policy makers' preference, their utility can be increased by raising the producer surplus and allowing the consumer surplus to decrease by the same amount. To accomplish this with a fixed fiscal outlay, both procurement price and sales price will be adjusted upward until the marginal benefit and the marginal cost of an increase in the producer surplus are equal again. The heavier is the weight of farmers' welfare in policy makers' utility function, or the larger is U_2, the higher will be the procurement price for any given quota. And as explained in the previous section, we have reasons to believe that the weight of grain farmers' welfare in the objective function of China's grain policy has increased over time, at least in recent years. The gradual change in policy makers' preferences in favour of grain farmers helps explain why the procurement prices of grain have exceeded domestic market prices.

CHAPTER 6

CHINA'S GRAIN POLICY AFTER WTO ACCESSION AT END-2001

There is a general consensus that while the Chinese economy as a whole will benefit from its accession to WTO, certain sectors may be 'injured' by surges in imports. The grain sector is one of those identified to be adversely affected by China's commitment to concessions on market access. In particular, it is believed that grain producers are among those who will suffer the most injury in the accession as they face greater import competition and a likely fall in grain prices. In this chapter, I set out to show that this may not be the case. The fallacy of the argument about the adverse impact on grain farmers is that it is based on a free market economy. However, China's grain distribution is still governed largely by a state procurement system, which is quite different from a free market system. Accurate assessment of the impact of increased grain imports on China can only be conducted with reference to the procurement system while it remains in place. Conclusions based on a free market may be wide off the mark as far as the prediction of the welfare impact of China's accession to WTO is concerned. As will be shown later, the many undesirable outcomes that Chinese policy makers worry about are simply the result of inappropriate analysis of the case of China in the inappropriate context of a free market system.

Three important findings emerge from this chapter. The current thinking is that China's commitment to an increase in market access to foreign grain suppliers under the WTO Protocol of Accession will jeopardize the already poor grain farmers in China. It is believed that grain imports will depress domestic prices and hence reduce grain farmers' income, which may lead to social turmoil. The first finding of this

chapter is that such conjecture is unfounded and China's joining WTO can benefit grain farmers. The more these farmers are exploited under the quota procurement system, the more likely they will benefit from China's accession to WTO. Many worry that the Chinese government has to incur a huge fiscal outlay in its attempt to safeguard grain farmers' income. The second finding is that safeguarding grain producers' welfare need not drain fiscal resources. Thirdly, this chapter shows that WTO membership provides China with a golden opportunity to liberalise the grain distribution system completely and abolish the quota procurement system, ridding the state of the heavy fiscal burden. Complete liberalisation of the grain sector and WTO accession should go hand in hand as the two together can benefit grain producers and grain users at the same time.

This chapter is organized as follows. Section 6.1 shows how an increase in grain imports will jeopardize farmers' welfare under a free market system. Section 6.2 explains why there need not be such an outcome under the quota procurement system in China. In particular, by choosing an appropriate level of grain imports and adjusting the procurement price accordingly, the Chinese government can safeguard grain farmers' welfare without tapping fiscal resources. Section 6.3 examines the constraints on the choice of import level and discusses how these constraints determine whether the Chinese government can successfully liberalize the grain distribution system after its accession to WTO without hurting grain producers, grain users or straining the state budget. Lastly, Section 6.4 explores a possible alternative to the TRQ system that can increase the resources available to the Chinese government when it is necessary to provide trade adjustment assistance to grain producers.

6.1 Impacts of TRQs under a free market system

The model specified in the previous few chapters can be easily revised to accommodate for trade in grain. Despite the engagement in international trade, grain distribution in China could well be described by a model of closed economy. The tight control on the grain trade volumes has insulated the domestic market from any price movements in other markets in the world. The amount of grain allowed to cross the Chinese border has largely been policy determined and can be treated as an exogenous variable. An increase (decrease) in the quantity of net grain imports can be represented in the revised model by a shift in the supply curve to the right (left) by the amount of the net change. Political and ideological considerations are the overriding factors that have been guiding China's grain trade policy, where the concern for food security has prevailed throughout Chinese history.

However, China's accession to WTO has begun to change the environment of policy making. The most important immediate implication for the volume of grain trade hinges on the stipulation of tariff rate quotas on wheat, rice and corn. To capture the impact of this change, I replace the autarky assumption in the basic model of grain policy formulation with the following assumptions.

1. Imported grain and domestically produced grain are homogeneous.
2. As the actual in-quota tariff rate is only 1 percent for wheat, rice, and corn, to simplify the analysis, I assume that grain imports are tariff-free as long as the quantity does not exceed the TRQ.
3. When the actual amount of grain imports is still within the TRQ, I assume the small country case in which the increase in China's import volume will not affect the world price. If the amount of grain imports exceeds the quota, I assume the large country case where the world price rises with the increase in China's import

volume. It should be noted that assuming the large country case for all import volume does not change the basic result of the welfare impact of the TRQ.

4. There is no mark-up on imported grain.

To begin with, consider the impacts of grain imports *if China is under a free market system*. D and S in Figure 6.1 represent the domestic demand and supply of grain in China. Under autarky, the free market equilibrium price and quantity are P_0* and Q_0* respectively. Consumer surplus (CS), producer surplus (PS) and social surplus (SS) are given by the following areas.

$CS_0 = AME$

$PS_0 = BME$

$SS_0 = CS_0 + PS_0 = ABE$

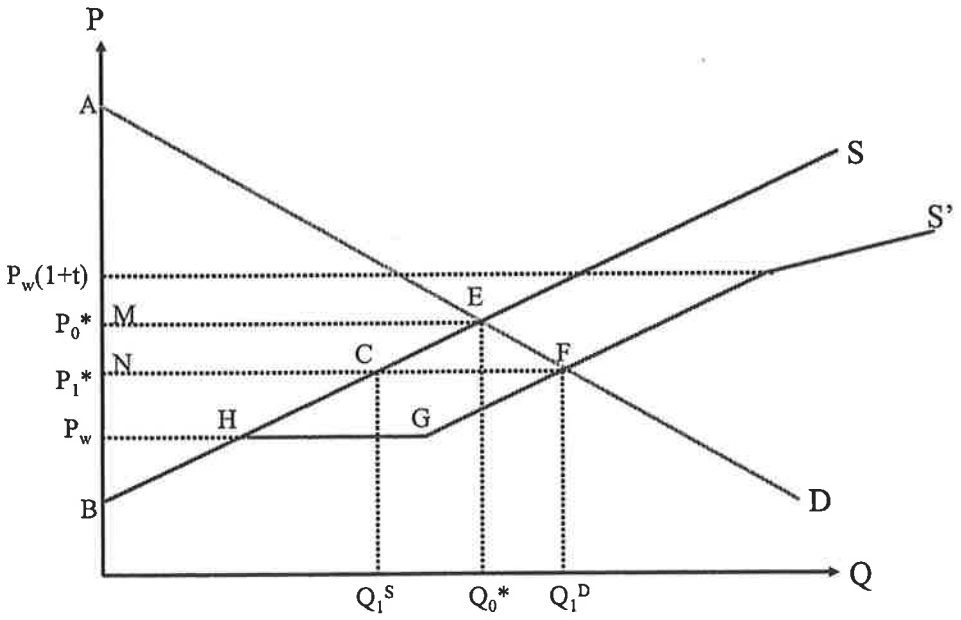

FIGURE 6.1 GRAIN IMPORTS UNDER TRQ

Under the TRQ arrangement, the impact of net grain imports on the Chinese market can be represented by a rightward shift in the total supply of grain depicted by

S', which is the sum of domestic and imported grain. S' has kinks at the price levels P_w and $P_w(1+t)$, where P_w is the prevailing world price and t is the out-of-quota tariff rate. The kinks at P_w are due to the fact that no imports will be available below the world price leaving quantity supplied of grain the same as under autarky for prices lower than P_w. Between P_w and $P_w(1+t)$, total supply of grain is increased by the amount of the quota, reflected by the segment of S' that is parallel to the domestic supply curve S. Any additional amount of grain imports exceeding the TRQ will be subject to the out-of-quota tariff and hence will be available only at prices above $P_w(1+t)$. The segment of S' that corresponds to these higher prices is not perfectly elastic because this is a large-country case.

There are three possible cases depending on the actual amount of grain imports compared with the TRQ: (i) the import volume exceeds the quota; (ii) the quota is filled and binding; and (iii) the quota is not filled. Based on the observation that the out-of-quota tariff rate is likely to be prohibitive at least for the foreseeable future, we can rule out the first case. Now let us consider the second case in which the TRQ is filled and binding on the actual quantities of grain imports. As illustrated in Figure 6.1, the equilibrium market price drops to P_1*. Quantity of domestic grain supply decreases to Q_1^S while grain consumption increases to Q_1^D. Consumer surplus, producer surplus, and social surplus derived from grain production and consumption in China become:

$$CS_1 = ANF$$

$$PS_1 = BNC$$

$$SS_1 = CS_1 + PS_1 + CFGH$$

$$SS_1 - SS_0 = EFGH$$

CFGH is the sum of tariff revenue (which is zero under the assumption of zero in-quota tariff rate) and quota rent (if it is all reaped by the Chinese trading enterprises). I leave

the quota rent and tariff revenue aside until Section 6.4 and focus only on producer surplus and consumer surplus in the following analysis. Apparently grain users gain at the expense of grain producers because the former can now buy a larger quantity of grain at a lower price whereas the latter can only sell a smaller quantity at a lower price. As long as the world price is below the domestic price in China, there will be some net gain in social surplus. The larger is the quota, the larger is the welfare gain that China can derive from grain imports and the larger the injury inflicted on grain producers, ceteris paribus. It can be easily verified that the direction of the welfare impacts on grain users and grain producers is the same whereas the magnitude is smaller in the third case in which the quota is not filled. The major difference in the third case is that, as domestic price in China drops to the world price, there is neither tariff revenue for the Chinese government nor quota rent for the trading enterprises.

6.2 Impacts of TRQs under the quota procurement system

In the previous section, I have shown that imports hurt grain producers and benefit grain users under a free market system. The larger is the amount of imports, the larger will be the reduction in producer surplus. In this section, I examine the impacts of TRQs on China's grain sector using the model of the quota procurement system developed in Chapter 3. I evaluate the desirability of an outcome on the basis of the Pareto principle. In particular, an outcome is desirable if it benefits both grain producers and users.

As explained in Chapter 3, under the procurement system that redistributes economic surplus from grain farmers to grain users in the absence of trade, there is a trade-off between producer surplus (PS) and consumer surplus (CS) as depicted by the surface O'M'N'E' in Figure 3.3. It can be easily seen from this horizontal ruled surface that except on the boundary O'M'N'E', any given income distribution can be achieved

by different combinations of procurement price and quota. To simplify the analysis, I first assume the absence of price subsidy. For a given procurement quota, the three-dimensional trade-off between PS and CS illustrated in Figure 3.3 can be reduced to the two-dimensional trade-off depicted by AW in Figure 6.2. Note that along AW, social welfare is maximized. Point A corresponds to a point on N'E' in Figure 3.3, at which the consumer surplus reaches the highest possible level for the given procurement quota. In other words, farmers are paid only the minimum procurement price (MPP) required to induce quota fulfilment. There is no way to increase the consumer surplus further by lowering the procurement price. As explained in Chapter 3, to do so would only reduce the quantity of marketed grain supplied by farmers and jeopardize social welfare. When a higher procurement price is offered to farmers for a given quota, producer surplus increases at the expense of consumer surplus resulting in a redistribution of income downward along AW. The most favourable income distribution possible for farmers is represented by point W, which corresponds to the free market equilibrium. Without a producer price subsidy financed by fiscal outlay, the government cannot pay anything higher than the equilibrium market price to farmers.

In this analysis, I assume that the policy makers' utility does not increase with the size of the procurement quota, which is compatible with the actual situation around the time of China's accession to WTO when domestic supply has surpassed the demand for grain. Guided by their preferences regarding income distribution, policy makers set the procurement price at a level that maximizes their utility for a given quota. The more favourable their preferences are towards grain users, the closer is the procurement price to the MPP. The more the policy makers are in favour of farmers' welfare, the closer will be the procurement price to the market equilibrium level.

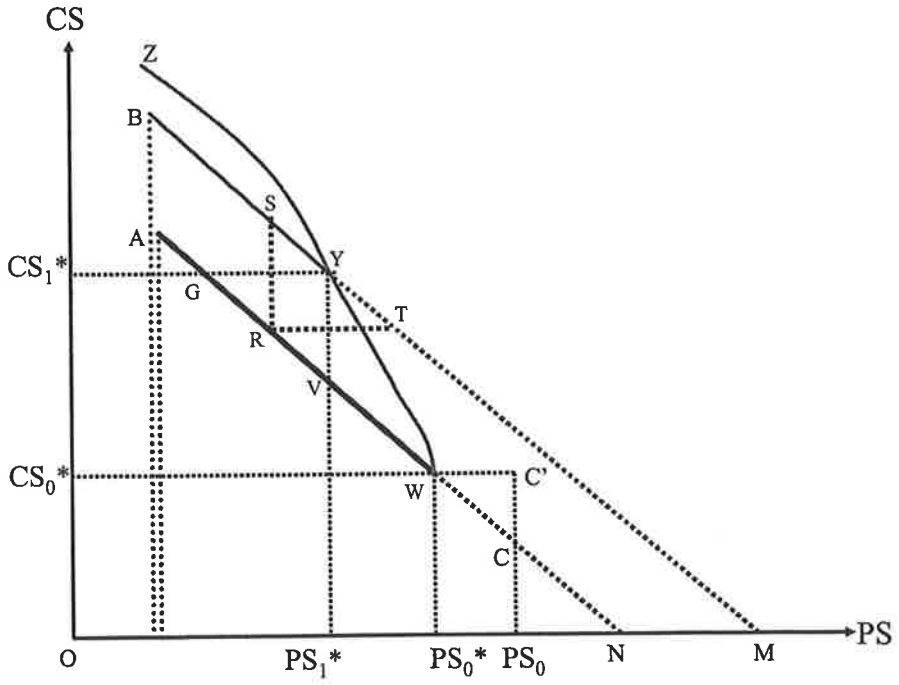

FIGURE 6.2 IS PRICE SUBSIDY NECESSARY?

When imported grain enters the Chinese market, the efficient welfare trade-off between PS and CS shifts upwards. Each import level gives rise to a different welfare trade-off. The higher the level of grain imports, the higher will the trade-off lie. BY in Figure 6.2 represents such a trade-off for a particular import level. Again, point B gives the highest possible level of CS when farmers are only paid the MPP and point Y corresponds to the free market income distribution. Note that point Y is associated with a larger consumer surplus (CS_1*) but a smaller producer surplus (PS_1*) compared with point W. Joining all such points as W and Y of the welfare trade-offs that corresponds to different import volumes resulting from different levels of TRQ, ceteris paribus, we have a locus depicted by WYZ. This locus gives the combinations of PS and CS for different TRQs while domestic grain marketing is free of any government intervention. The slope of WYZ is steeper than 45° because there is gain from trade.[54] The negative

[54] However, the net gain will decrease with further expansion of the TRQ beyond a certain extent as the excessive increase in grain imports would drive up the world price so much that it would result in an adverse terms-of-trade effect. In this case the locus WYZ will bend downward to the left

slope reflects the fact that while trade increases the size of the pie to be divided between grain producers and grain users, grain users gain from an increase in imports at the expense of grain producers.

Under the quota procurement system, however, income distribution can be manipulated by the government's choice of procurement price and quota. Since international trade has increased the size of the pie, it is possible to divide the gain from trade between grain producers and grain users by means of the procurement system such that both groups benefit. To safeguard China's farmers from any detrimental effect of grain imports, the procurement price must be revised upward. Without such an adjustment, domestic producers will definitely suffer as the increase in imports reduces the market price and the quantity of surplus grain they sell on the market. The government must make some upward adjustment in the procurement price if it is to compensate grain farmers for their loss. If the adjusted procurement price rises above the new market equilibrium price, the government will need to provide a producer price subsidy. The possibility of having to incur a huge fiscal outlay is the concern of China's policy makers.

As will be shown in the following analysis, the fear may be unnecessary. In particular, I will show that although the government has to raise the procurement price following its accession to WTO, it may not have to incur any fiscal outlay. I will analyse the issue of fiscal outlay in two different scenarios. In the first scenario, I assume that the amount of grain imports is exogenously given. This simplifying assumption makes the analysis more straightforward and helps to bring out the essence of the fiscal issue. In the second scenario, I assume that China can choose the import level. This is a more realistic assumption as China still maintains significant control

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reflecting a reduction in social surplus. I do not consider this case because it is highly unlikely for China to allow such a large amount of grain imports.

over the volume of grain imports. I will show that in the second scenario, the Chinese government need not incur any fiscal outlay.

Exogenously determined grain import level and fiscal outlay

Suppose the amount of grain imports is exogenously given and it shifts the efficient welfare trade-off from AW to BY in Figure 6.2. To safeguard farmers' income, the government must increase the procurement price to compensate farmers for their loss due to the depressed market price and the contracted sales resulting from the grain imports. But there is more to my findings. Suppose point R represents the income distribution under autarky. To ensure that no one is harmed by the imports of grain, the income distribution after trade must lie on ST. There are two possible cases. First, if the income distribution after trade is given by a point on SY, the procurement price is still below the market price. In this case, the state grain enterprises can sell what they procure from domestic farmers to grain users at the procurement price. On the one hand, grain users are happy to buy from the state grain stores at below-market price. On the other hand, the government does not have to incur any fiscal outlay. In the second case where the after-trade income distribution is given by a point along YT, the procurement price must exceed the market price. Note that such an income distribution requires that grain users are willing to pay the higher-than-market procurement price. If grain users will not pay anything more than the market price, then the government will have to provide a subsidy to fill the price wedge and incur a fiscal outlay. (I will discuss a little later how the presence of the price subsidy affects income distribution.) This case illustrates the kind of problem China may run into after its accession to WTO. Which of these two cases will occur after trade hinges on where the procurement price lies relative to the market price under autarky.

Proposition 6.1: For a given amount of imports, to ensure that post-trade income distribution is Pareto superior to that under autarky, the Chinese government must incur a fiscal outlay if the procurement price exceeds the market price under autarky. However, fiscal outlay may or may not be required if the procurement price is less than the market price under autarky.

Proof:

Consider the case where the procurement price under autarky is lower than the market price. There are three different situations with reference to Figure 6.2. First, if the autarkic income distribution lies on the segment GV, which is the case explained earlier with reference to point R, the government may or may not incur fiscal outlay in its attempt to prevent anyone from being injured. Second, if the pre-trade income distribution is given by a point along VW, the new procurement price must be higher than the market price. It requires government subsidy to safeguard grain farmers' income. Third, if the income distribution under autarky is given by a point along AG, the post-trade procurement price must be lower than the market price to have Pareto superior income distribution. There is no need to tap government resources.

Now consider the situation in which the procurement price under autarky already exceeds the market price. Theoretically there are two possible cases. First, if the grain users are willing to pay the higher-than-market procurement price, the autarkic income distribution is given by a point on WN in Figure 6.2. In practice, however, it is unlikely to occur. Therefore I only consider the second case where the grain users are not willing to pay anything higher than the market price for the grain they buy from the state grain stores. The government has to provide subsidy to fill the wedge between the procurement price and the market price under autarky. In this case, the pre-trade income distribution is given by a point above WN. Point C' depicts one such case

where the consumer surplus is CS_0* and producer surplus is PS_0 while the government has to incur an outlay of CC', which is equal to $PS_0 - PS_0$*. To safeguard farmers' income after trade, the government must raise the procurement price and provide a larger amount of subsidy. ♦

Proposition 6.1 highlights the possibility that after its accession to WTO, China may have to incur a fiscal outlay to safeguard the welfare of grain producers. Note that the amount of fiscal outlay varies with the initial income distribution under autarky. It can be easily verified that the fiscal burden is less likely to emerge if grain farmers are exploited severely under autarky.

Proposition 6.2: With a given amount of grain imports, no fiscal outlay will be required to achieve a Pareto-superior income distribution after trade if farmers receive a very low price from government under autarky.

Proof:

For any autarkic income distribution along AG in Figure 6.2, it is always possible to have a Pareto-superior post-trade income distribution with the new procurement price below the market price. No fiscal outlay is necessary in such a case. ♦

Proposition 6.2 may appear counter-intuitive. It does not make sense under the market system, where a surge in imports injures producers of the import-competing industry. If these producers are already very poor, the imports will jeopardise their situation further. Under the procurement system, however, the story is different. Suppose grain farmers in China have been very poor under autarky due to the heavy exploitation of the procurement system and the procurement price is very much below the market price. When China offers market access to imported grain, the government must raise the procurement price to safeguard farmers' income. The larger the gap

between the procurement price and domestic market price, the less likely for the upward-adjusted procurement price to exceed the market price and hence the less likely any government subsidy is required.

Variable import level and fiscal outlay

Proposition 6.1 suggests that China may have to mobilise its fiscal reserves to safeguard the welfare of grain producers and grain users following its accession to WTO. Apparently it could be a cause of concern if it would create a substantial fiscal burden. In the following analysis, I will show that such concern is unwarranted, as what is feared does not necessarily occur. The reason for such a surprising result is that, rather than being restricted by a given volume of grain imports as assumed in Proposition 6.1, China has room to manoeuvre the import level to avoid the fiscal burden. The idea is summarized in the following proposition.

Proposition 6.3:

(a) Suppose the procurement price is below the market price under autarky. If the level of imports is less than a specific maximum level, there exist some procurement prices that make the post-trade income distribution Pareto superior to that under autarky without having to incur any fiscal outlay.

(b) The lower the procurement price grain producers receive under autarky, the larger is the maximum import level mentioned in (a).

Proof:

Refer to Figure 6.3, which is a reproduction of Figure 6.2. Given that the procurement price is below the market price under autarky, income distribution must be given by a point along AW in Figure 6.3. Take any arbitrary point on AW, say point U, as the income distribution under autarky. Draw a vertical line up from U to cut the free-

market locus WYZ at point X. Let M_U be the amount of grain imports that corresponds to a welfare trade-off that goes through point X. For any import volume less than M_U, the new efficient trade-off between consumer surplus and producer surplus will cut the locus WYZ somewhere along the segment WX. Suppose JDEL is one of such trade-offs. If the government sets the procurement price such that the post-trade income distribution is given by a point on DE, the resulting income distribution is Pareto superior to that under autarky and the new procurement price is below the market price such that no fiscal outlay is required. The same argument holds for other import levels as long as they are less than M_U. To summarize, given an autarkic income distribution at point U, for any import level less than M_U, there are some procurement prices that make the post-trade income distribution Pareto superior to that under autarky without the support of fiscal resources.

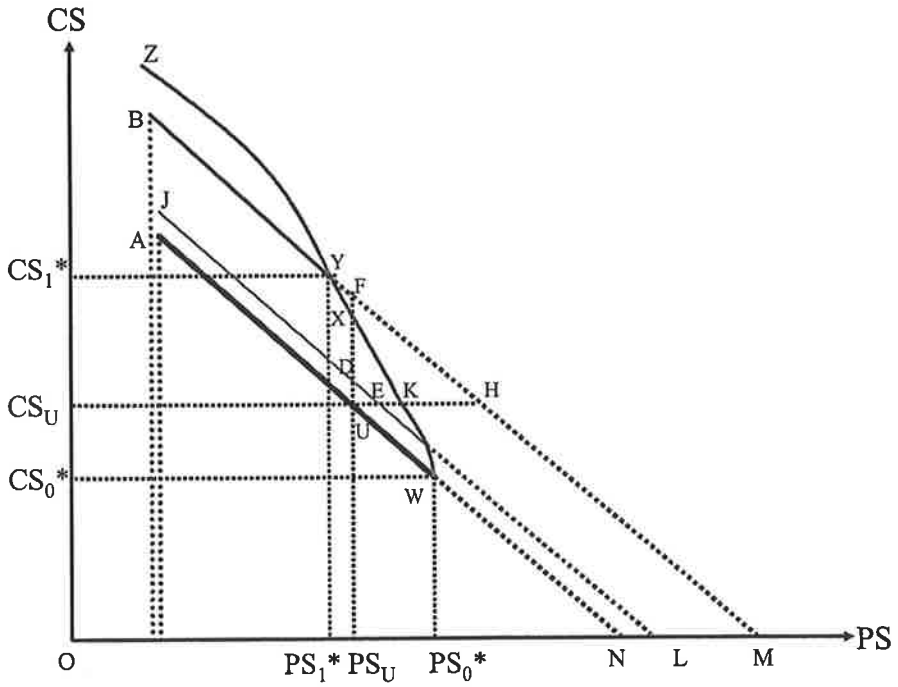

FIGURE 6.3 IMPORT LEVEL AND FISCAL OUTLAY

Repeat the same analysis for other points on AW. Note that the maximum import level derived above varies along AW. In particular, as the autarkic income distribution

moves towards point A, the corresponding maximum import level increases. Similarly, it can be shown that as long as the import volume is below this level, there exist some procurement prices that make post-trade income distribution Pareto superior to that under autarky without creating any fiscal burden. ♦

The intuitive reason for Proposition 6.3 is as follows. Imports of grain will increase social welfare and enlarge the pie that can be shared between grain producers and users. For small amount of imports, both groups can be made better off without having any trade adjustment assistance from the government. But this result does not hold for large amount of imports. For larger influx of imports, it requires a larger upward adjustment in the procurement price to safeguard grain producers' income. When the import volume exceeds a certain level, the market price will be so low and the required upward adjustment in the procurement price will be so large that the procurement price will be above the market price making fiscal outlay necessary. This explains why there is a maximum level that the grain import volume must not exceed to avoid any fiscal burden on the Chinese government.

An implication of Proposition 6.3 is that if the procurement price was close to or exceeded the market price prior to WTO accession, it will be unlikely for China to attain a Pareto superior post-accession income distribution without having to tap fiscal resources. Empirical findings quoted earlier appear to imply such an outcome. However, to have an accurate assessment of the pre-accession situation of China's grain sector, one must examine the income redistribution effect of the quota procurement system thoroughly. Recent estimates indicate that local agricultural taxes and fees amount to 20 to 30 percent of farmers' net income in China (Liang, 1999, p.50; Fang et al., 2002, p.31) regardless of the 5% upper bound stipulated by the State Council in 1991 and reinstated in 1999. Therefore, despite the implementation of

support price since 1997, I believe at present grain farmers in China are still heavily exploited and receive a net procurement price well below the market level. A study conducted by Lin et al. (2002a & b) on China's household taxation appears to lend support to this conjecture.

Based on a panel data set compiled by the Ministry of Agriculture, Lin et al. establish a positive relationship between the share of government procured grain in total grain output and the burden of agricultural taxes and levies on rural households. Their interpretation of the result is that higher degree of government procurement of grain leads to higher total local government expenditure in terms of administrative fees and cadre payrolls as well as higher corruption. In other words, the tax burden on farm households increases with the size of their grain procurement quota. Taking into account the tax burden associated with grain procurement, we have reason to believe that the net procurement prices are actually below the market prices. In such a case, Proposition 6.3 shows that if China can maintain its import level within a certain range, grain imports will lead to Pareto improvement in income distribution without creating any fiscal burden. In other words, no trade adjustment assistance is necessary if the import volume and procurement price are chosen appropriately. This result contradicts the view that China will run into fiscal problem if it attempts to protect grain farmers from the injury inflicted by the accession to WTO.

WTO accession and liberalisation of the grain distribution system

There has been increasing evidence of the Chinese leaders' diminishing resistance against free markets. We have witnessed the state-owned enterprises going private and the stock markets flourishing in China. The liberalization move has extended to grain procurement and marketing since 2001 in selected regions, as already mentioned in Chapter 2. One cannot help but wonder if it is the right time to

completely liberalise China's grain distribution and abolish the current procurement system. The answer hinges on many factors. A major concern is whether a full liberalisation can benefit both grain producers and users. It is less likely to succeed if one of the parties gets hurt in the process. I set out to show in this section that China's accession to WTO offers a golden opportunity of embracing a free market and abolishing the quota procurement system, and thereby freeing the government from the burden of financing the deficits of the inefficient state grain enterprises.

Proposition 6.4: Suppose the procurement price is below the market price under autarky. There exist an upper bound and a lower bound on the import levels within which importation and complete liberalisation of the grain distribution system together can benefit grain producers and grain users at the same time.

Proof:

Given that the procurement price is below the market price under autarky, income distribution must be at a point along AW in Figure 6.3. Take any arbitrary point on AW, say point U, as the autarkic income distribution. Let M_U and M_L denote the amount of grain imports that correspond to the welfare trade-offs that go through point X and point K respectively on the free-market locus WYZ. For any import volume between M_U and M_L, the new efficient trade-off between producer surplus and 'consumer surplus' will cut the locus somewhere along the segment KX. Suppose the government admits an import volume between M_U and M_L and liberalises domestic grain marketing completely. The post-trade income distribution will be given by the point at which the new welfare trade-off cuts the segment KX. Either producer surplus or consumer surplus will increase without reducing the other following the liberalisation of grain distribution. ♦

The idea behind Proposition 6.4 is simple. To have a successful liberalisation of the grain distribution system, the government may have to avoid making anybody worse off. With importation alone, China can have a larger pie to be shared between grain producers and users. However, it has been shown in Proposition 6.3 that there is an upper bound on the import level above which it requires government subsidies to prevent hurting grain producers. The upper bound on import level also applies in the case where importation is combined with the complete liberalisation of the grain distribution system as the latter rules out government intervention. In addition, the liberalisation imposes a lower bound on the import level. As opposed to the situation analysed in Proposition 6.3, where the government can safeguard both grain producers and users by manipulating the procurement price, now the grain prices are determined in the market. It is up to the importation to safeguard grain users' welfare. The amount of imports must exceed a certain threshold to allow grain users to derive sufficient surplus from the larger supply of grain at lower market price to compensate for the dissipation of economic surplus that the procurement system used to bestow to them.

Proposition 6.5: The lower the procurement price grain farmers receive under autarky, the higher will be the upper and lower bounds on the import levels within which importation and complete liberalisation of the grain distribution system together can benefit grain producers and grain users at the same time.

Proof:

It can easily be verified in Figure 6.3 that as the initial income distribution under autarky moves up along AW towards point A representing lower income of grain farmers, both the upper bound and lower bound on the import level rise. ♦

The analyses in this section have revealed the fallacy of the prevailing bleak outlook of China's domestic grain sector subsequent to WTO accession. In particular, it

has been shown that China's grain sector will benefit from the WTO accession as long as the import volume stays below an upper bound under the procurement system or within an upper bound (M_U) and a lower bound (M_L) in a completely liberalised grain market. From now on I refer to these bounds as the 'successful bounds'. In the next section, we will look at another set of bounds relating to China's grain imports.

6.3 Determination of China's grain import level

The validity of the results derived in the previous section hinges on the assumption that the Chinese government has control over the level of net grain imports. An evitable question is: "Are there any constraints on China's choice of import volume?" In particular, it is illuminating to find out if there are any upper bound and lower bound on the permissible import level and if yes, what determines these bounds. Based on the result of this analysis, this section assesses how China's grain sector is going to fare following WTO accession.

Upper and lower bounds on the permissible level of grain imports

Among all the constraints on the permissible level of grain imports, the first and foremost is the self-sufficiency target rate the Chinese policy makers adopt for grain production. It imposes an upper bound on China's grain imports. The 95% self-sufficiency target specified explicitly in 1996 (IOSC, 1996) implies a 5% upper bound on the amount of imported grain relative to total consumption. The scheduled expansion of TRQs for wheat, rice, and corn up to 2004 will keep China's grain imports well within the 5% threshold. However, it appears inevitable that China has to expand the TRQs further after 2004. How much more market access China will offer to overseas grain producers in the next round of WTO negotiations depends largely on policy makers' interpretation of food security and what they perceive to be the

acceptable means to that end. While it is stated in a white paper prepared for the 2002 World Food Summit that China will appropriately increase grain imports to alleviate the pressure from domestic resource constraints (People's Daily Online, 11 June 2002), Huang (2001, p.14) alleges that "any changes (including the trade liberalization) that might lower the grain self-sufficiency level below 95 percent in the long term would get little support from current leadership." A likely policy option is to maintain high self-sufficiency rate for food grain only and relax the restrictions on the imports of feed grain if the latter is regarded as less crucial for food security purpose. If the Chinese leaders redefine the concept of food security to cover food grain only, the overall grain self-sufficiency rate could be lowered and thereby raising the upper bound on grain imports in the future.

All in all, the government-adopted target rate of grain self-sufficiency puts an overriding upper bound on the permissible level of grain imports in the relevant period. Let $\overline{M}$ denote the upper bound Chinese policy makers set for the amount of grain imports on the basis of the self-sufficiency goal. On the other end, China's commitment to an annual expansion of TRQs under its WTO Protocol of Accession may become a lower bound on the level of grain imports. There are two possible scenarios: (i) the TRQs are filled and impose a lower bound on the level of grain imports, and (ii) the TRQs are not filled. Which of these two scenarios actually occurs depends on the demand and supply of grain in China and the rest of the world. Notwithstanding the disciplines laid down in China's accession schedule to reallocate unused TRQs of state trading enterprises to non-state trading enterprises, it was estimated that these TRQs would not be filled in 2002, the first year after China's accession to WTO (Gale, 2002; Huang and Rozelle, 2002b).[55] Although the unexpected drop in world grain supply in

[55] Gale (2002) explains that the Chinese government has been using the differentiating application of the value-added tax (VAT) on domestic and imported grain and other measures to elevate the cost of imported grain to prevent a significant surge in grain imports after WTO entry.

2002 helped fulfil this prediction, the situation is likely to change over time. In the following analysis, I first consider scenario (i) assuming that TRQs become the lower bound on China's grain imports. Then I will look at scenario (ii) where the TRQs need not be filled.

Let $\underline{M}$ denote the lower bound on import volume that China must observe under its commitment to increasing market access to foreign grain supplies. The next section examines different scenarios based on the sizes of $\overline{M}$ and $\underline{M}$ relative to M_U and M_L defined in Section 6.2 and draws some implications. For easier reference, I refer to $\overline{M}$ and $\underline{M}$ as the 'permissible bounds'. It should be noted that the size of the 'successful bounds' M_U and M_L depends on the income distribution under autarky.

The choice of grain import level and its implication

As explained in Proposition 6.3, for any import volume smaller than M_U, there exist some procurement prices that make the post-trade income distribution Pareto superior to that under autarky without having to incur any fiscal outlay. If the import volume falls between M_U and M_L, Proposition 6.4 shows that importation and complete liberalisation of the grain distribution system together can benefit farmers and grain users at the same time. The relative sizes of the permissible bounds, $\overline{M}$ and $\underline{M}$, and the successful bounds, M_U and M_L, determine whether China can successfully liberalize the grain distribution system and safeguard grain producers and users' welfare without having to incur any fiscal outlay after WTO accession.

Proposition 6.6:

(a) Suppose $\underline{M} < \overline{M} < M_L < M_U$. *China's accession to WTO can benefit both grain producers and users without creating any fiscal burden. But the attempt to completely liberalise grain marketing will not succeed.*

(b) Suppose $M_L < M_U < \underline{M} < \overline{M}$. China will incur a fiscal outlay following its accession to WTO if it attempts to safeguard both grain producers and users' welfare. The attempt to completely liberalise grain marketing will not succeed.

(c) For all other possible relationships between $\underline{M}$, $\overline{M}$, M_L, and M_U, there are import levels that make both grain producers and users better off after China's accession to WTO without creating any fiscal burden for the government. And complete liberalisation of grain marketing can be successful.

Proof:

Consider case (a) where $\underline{M} < \overline{M} < M_L < M_U$. If the Chinese government maintains the import level within the permissible bounds, the amount of imports will be less than M_U. According to Proposition 6.3, joining WTO will not create any fiscal burden but can increase the welfare of both grain producers and users. However, the import level will lie below M_L. Proposition 6.4 implies that the attempt to liberalise the grain distribution system completely will not succeed.

In case (b) where $M_L < M_U < \underline{M} < \overline{M}$, both the permissible bounds are above the successful bounds. China will encounter fiscal problem following its accession to WTO if it attempts to safeguard both grain producers and users' welfare. The attempt to liberalise the grain distribution system completely will not succeed either, as it will make either grain producers or grain users worse off.

Case (c) encompasses the following four sub-cases:

1. $M_L < \underline{M} < \overline{M} < M_U$: The permissible bounds lie within the successful bounds.

   Based on Proposition 6.3, as long as China can maintain its import level within the permissible bounds, joining WTO can increase the welfare of both grain producers

and users without creating any fiscal burden. According to proposition 6.4, complete liberalisation of grain distribution can be successful.

2. $\underline{M} < M_L < M_U < \overline{M}$: The successful bounds lie within the permissible bounds.

   In this case, if the Chinese government can maintain the import level within the successful bounds, Proportion 6.3 implies that it need not incur any fiscal outlay following its WTO accession, which can make both grain producers and users better off. Again, Proposition 6.4 suggests that complete liberalisation of the grain system can be successful.

3. $\underline{M} < M_L < \overline{M} < M_U$: The outcome is the same as in Case 2.

4. $M_L < \underline{M} < M_U < \overline{M}$: The outcome is the same as in Case 2. ♦

Proposition 6.6 gives a list of all possible outcomes based on the relative sizes of the four bounds on import level of grain. China will encounter some problems in case (a) and case (b) but not in case (c). In case (a), joining WTO will not create any fiscal burden for the Chinese government but the attempt to completely liberalise grain distribution will not succeed. Case (b) is worse. Not only will the liberalisation attempt fail, but the Chinese government will also have to incur a fiscal outlay if it tries to safeguard both grain producers and users' welfare after trade. To evaluate the likely impacts of China's accession to WTO on its domestic economy, we have to gauge the likelihood of the occurrence of these two cases.

For case (b) to occur, we need $M_L < M_U < \underline{M} < \overline{M}$, which is more likely if M_L and M_U are small. But Proposition 6.5 implies that if China's grain farmers receive a low procurement price under autarky, the values of M_L and M_U will be relatively large. While it is an empirical question where exactly did the income distribution lie prior to China's accession to WTO, we have cited evidence in Section 6.2 that grain farmers in

China were still heavily exploited around that time. It is therefore reasonable to expect that the values of the successful bounds M_L and M_U are relatively high. On the other hand, we expect the value of $\overline{M}$ to be small because of the high self-sufficiency target rate. These two considerations make it a justified conjecture that the condition $M_L < M_U < \underline{M} < \overline{M}$ is not likely to prevail in China today. We can therefore safely rule out the possibility of case (b), which implies that China's accession to WTO can benefit both grain producers and users without creating any fiscal burden for the government. But the attempt to completely liberalise grain marketing may still fail.

To ensure a successful liberalisation of the grain distribution system, we have to rule out case (a) as well. The condition for case (a) to occur is that $\underline{M} < \overline{M} < M_L < M_U$. As explained before, we expect that M_L and M_U to be relatively large. If China's policy makers set a low value for $\overline{M}$ due to food security reason, then case (a) will occur. In this case, although both grain producers and users in China can benefit from the WTO accession without any adjustment assistance from the government, China will not succeed in its attempt to liberalise the grain distribution. The reason behind it is very simple. There must be a sufficiently large amount of imports to enable grain users to derive economic surplus to compensate for the loss due to the abolition of the procurement system. If the import volume is too small, there will not be sufficient gain from trade that can make both grain producers and users better off. And the market liberalisation will fail. If the Chinese leaders become less concerned about the self-sufficiency issue and admit more imports of grain such that $\overline{M} > M_L$, China's accession to WTO will not only benefit both grain producers and users without creating any fiscal burden, but also provide a golden opportunity for the government to liberalise the grain distribution system completely.

Now let us consider scenario (ii) where TRQs do not impose a lower bound on China's grain imports. In this case, the lower permissible bound $\underline{M}$ disappears from the previous analysis. It can be easily seen that this scenario does not alter the findings derived so far. Without $\underline{M}$, case (b) listed in Proposition 6.6 is no longer different from case (c). Therefore, when it is not imperative to fill the TRQs, it will be easier for China to liberalize the state grain system while grain producers and consumers alike benefit from the accession to WTO without requiring the government to incur any fiscal outlay.

The analyses in this section have shown that the Chinese government is not likely to encounter any fiscal problem after joining WTO. But how unlikely it is depends on where exactly is the pre-accession income distribution on the welfare trade-off, which remains an empirical question. Furthermore, the relative sizes of the permissible bounds and the successful bounds are not going to stay the same all the time. Therefore one cannot rule out the possibility, however slight it is, that the Chinese government may have to provide a certain amount of trade adjustment assistance to safeguard grain producers' welfare, as in case (b) in Proposition 6.6 where $M_U < \underline{M}$. This is the case where the committed TRQ is filled and exceeds the maximum level of grain imports that does not require government subsidies to compensate farmers' loss of income after WTO accession. Can China afford such a fiscal outlay? As noted in Chapter 5, some economists believe that the fiscal capacity of the Chinese government is likely to be a binding constraint on the amount of producer subsidies that it can offer to farmers (Fang et al., 2002). Nevertheless, the financial resources available for trade adjustment assistance will increase if the Chinese government can mobilise additional resources from the tariff revenues. The next section will investigate how tariffying TRQs can increase this alternative source of finance.

6.4 Tariffication of TRQs

Tariffyication of TRQs is to replace the in-quota and out-of-quota tariff rates with a single tariff rate that has equivalent trade restriction effect. It is a possible way to increase fiscal resources for the Chinese government. Let us find out what difference it makes to the current system of TRQs.

The purpose of establishing TRQs under URAA is to ensure the provision of a certain level of import opportunity at low tariffs in the transition process of tariffication, which converts non-tariff trade barriers such as quotas into tariffs with supposedly equivalent effect of trade restrictions. In the case of China's imports of wheat, rice, and corn, the combination of close-to-zero in-quota tariffs and prohibitive above-quota tariffs has virtually the same trade restriction effect as an import quota. While the mechanism of TRQs complies with the WTO agreements, it cannot bring much tariff revenue to the Chinese government. Although there are quota rents, they will be shared by all domestic and foreign entities that have trading rights and hence there will be less proceeds at the government's disposal.[56] By tariffying the TRQs, the Chinese government can capture the part of quota rent that would otherwise be reaped by non-state trading enterprises. The resulting increase in tariff revenue will add to the resources available for managing the situation described in case (b) in Proposition 6.6 in which it is necessary to provide trade adjustment assistance to grain producers following a surge in imports.

Compared to an equal amount of subsidies financed by fiscal reserves, the advantage of this alternative source of funds is that domestic non-grain sectors do not have to bear any opportunity costs. The significantly lower collection costs of tariff

[56] It can be seen in Table 2.7 that under the current TRQ commitments, non-state trading enterprises will capture an increasing amount of quota rents as the shares of grain trade allocated to these domestic and foreign entities increase over time and reach 50 percent for short and medium grain rice and 40 percent for corn in 2004.

revenues further enhance the attractiveness of this source of finance. Given the small amount of grain imports relative to the total consumption of China and its policy goal of maintaining a specific self-sufficiency rate, the partial equilibrium analysis conducted by Nettle et al. (1987) on a small-country case can also shed light on China's choice of trade policy. Nettle et al. conclude that the optimal policy to achieve a specific self-sufficiency ratio is to combine a tariff with a production subsidy financed exactly by the government's tariff revenue. Tariffying TRQs and financing any necessary trade adjustment assistance with the increased proceeds can be the most efficient way of achieving Pareto improvement in China's grain sector following the WTO accession.

It should be noted that while the adoption of a single tariff rate is more efficient than the current TRQ mechanism, the former has less control over the quantities of grain imports. In particular, as noted by Deardorff (1987), depending on how the world price changes, "a tariff may turn out to be too small to prevent harm to the import-competing group, or so large that it causes harm to the rest of the population" whereas a quota "may be able to prevent harm to both groups" (p.30). In terms of the findings in Section 6.3, a tariff may result in an import volume outside the successful bounds, that is, exceeding M_U or falling short of M_L. Other than the Pareto principle, there are more important considerations to the Chinese government, such as the self-sufficiency goal, in the formulation of trade policy. In this regard, quantity restrictions appear to be a more reliable means to prevent any significant deviation from the target rate. Therefore, despite the apparent advantage of a single tariff rate system, the Chinese government may not wish to tariffy the TRQs until the time when it is enforced by WTO across the board. Nevertheless, the availability of this option may still take some pressure off the Chinese policy makers as far as the issue of fiscal outlay is concerned.

Based on the revised model that accommodates grain trade, this chapter has shown that China's accession to WTO can benefit all parties concerned and may provide the golden opportunity to liberalize the grain distribution system. The conclusion about the win-win situation hinges on the assumption of zero handling cost of the state grain system, as specified in the basic model constructed in Chapter 3. In reality, however, the grain transactions conducted by the Grain Bureau incur substantial costs and the majority of these costs are the benefits to those who are either on the payroll or have special interests involved. And they are the ones who are most likely to be harmed by the liberalization of the grain distribution system that is hastened by China's accession to WTO. The next chapter that examines the implementation problems of the grain procurement system will give this group of agents their due attention.

CHAPTER 7

PROBLEMS WITH CHINA'S GRAIN POLICY IN PRACTICE

In the theoretical analyses in the previous four chapters, I have shown how the policy makers in China adjust the grain procurement policy to changing economic conditions that affect their objective function as well as the constraints on their choice of instruments. The results of the optimization model are based on the assumption of no information or implementation cost. The abstraction from such costs helps us to focus on the most important elements that determine the policy formulation. To understand the policy outcomes, however, one must incorporate these practical aspects in the analysis. In this chapter, we look at the problems China has encountered in the formulation and implementation of its grain procurement policy and why some policies have failed to achieve the intended results.

Problems emerge in two situations. The first one is when policy makers have no access to the necessary information to set the optimal procurement price level and quota volume. The second one is when there is no effective supervisory mechanism within the government to ensure strict adherence to the stipulated policy. It has occurred numerous times in the Chinese history that the actual policy outcomes diverge from the intended ones. Due to the difficulties encountered in the collection of information necessary for policy formulation and in the supervision of policy implementation, the Chinese government has to struggle from time to time to meet the procurement targets, which were at times infeasible prior to the mid-1990s, and to contain the fiscal outlay within acceptable limits.

It should be noted that policy failure tends to be caused jointly by problems stemming from the formulation and implementation process. Strictly speaking, a policy that fails to envisage and tackle the associated implementation problems is not well-formulated in the first place. However, for the sake of simplicity, I adopt a dichotomized approach in this chapter. In the discussion of formulation problems, implementation cost is assumed to be zero. In the discussion of implementation problems, no account is taken of the appropriateness of the stipulated policy. The two types of problems will be illustrated with individual events drawn from the history of China's grain policy.

This chapter is structured as follows. Section 7.1 discusses the problem of formulating appropriate policies in the absence of perfect information. Section 7.2 looks at the various reasons that lead to the non-compliance of implementers in the lower-level governments. The problems arising from the lack of well-coordinated policies in the areas of domestic marketing and international trade are examined in Section 7.3. Section 7.4 concludes the chapter with a discussion of the difficulties to liberalise the grain distribution system, which may be the last resort to tackling the implementation problems inherent in the quota procurement system.

7.1 Problems in setting procurement quota and price

The theoretical analyses in Chapter 3 have arrived at a conclusion that the government can achieve its income distribution target while maintaining efficiency under the quota procurement system. Such a result is based on the assumption that policy makers command perfect information. Given that perfect information is never available, they are bound to make less-than-ideal policy choices.

Information problem

Instead of possessing perfect information that enables them to accurately assess the potential responses of other economic agents to any grain policy changes and thereby select the optimal policy mix accordingly, the best that policy makers can do is to estimate demand and supply using available data. Reliable estimation needs accurate data. But accurate data are not easy to come by for at least two reasons. First, the anti-market policy stance adopted in the central planning era obstructed the acquisition of necessary information to gauge the economic situation and formulate appropriate policy. Second, the emphasis on target fulfilment induced government officials at lower levels to disguise the actual data to please the higher-level authorities. After passing through several levels up the bureaucratic hierarchy, the information that eventually reaches the top-level policy makers may present a very different picture from the actual situation.[57]

One particular consequence of the information problem, as noted by Sicular (1993, p.81), was that policy makers' insufficient understanding of the strength and timing of farm supply response had led to non-delivery of the intended outcome. Generally speaking, Chinese policy makers very often fail to keep pace with the rapidly changing economy and hence misjudge the responses of other economic agents to the policy change. In terms of the model of grain policy formulation in Chapter 3, while they know very well what their preferences are regarding different policy objectives, they do not have an accurate picture of the trade-off they face. The resulting policy choice will inevitably be far from effective.

[57] After over two decades of reforms, the collection of accurate information is still difficult. Huang et al. (1999, p.743) point out the problems of estimating the behavioural parameters, which makes the evaluation of policy effects difficult. There is no doubt that the Chinese policy makers face more or less the same problem. In addition, they may not have sufficiently expert staffs to process the information available.

Aggregation problem

While it is assumed in the theoretical model that grain is a homogeneous commodity, in reality there are different grain types for which there are separate markets. Together with the differences in regional resource endowment, the heterogeneity of the commodity gives rise to different demand and supply curves for individual grain types and varieties in different regions. Once we accommodate all these variations, the condition for economic efficiency becomes much more stringent.

Aggregation problem arises from the production as well as the consumption of grain. On the production side, first consider the case where there are many regions but only one type of grain. Given the differences in comparative advantage, each region has a different marginal cost schedule. To achieve efficiency in resource allocation, procurement quota should be assigned to individual regions according to their respective comparative advantages in grain production. And it requires information on all regions. However, as explained earlier, the information cost could be prohibitive under the central planning system. As a result, the state resorted to the policy stance of local grain self-sufficiency. While the increased emphasis on local self-sufficiency was triggered by political consideration in 1958, the persistence of this policy throughout the central planning period was due to the administrative convenience in the absence of markets. But it further exacerbated the misallocation of procurement quotas to individual regions.

In particular, regions poorly endowed with arable land were forced to reclaim land from ponds and forests and use unsuitable lands including those on steep slope to grow grain. Quota fulfilment in these regions had incurred very high costs in terms of loss of alternative outputs and environmental damage. Production cost also increased unduly as a result of the centrally directed application of production technology such as

cropping pattern that was incompatible with the local conditions. In the reform period, while the problem of production inefficiency has been alleviated due to the improved incentives and reduced direct interventions, allocative inefficiency still persists due to the misallocation of procurement quotas which prevents the equalisation of marginal cost of grain production across regions. I will discuss the issue of quota allocation again in the next section on inter-regional grain transfers.

Another aggregation problem on the production side stems from the differences in grain type and variety. Suppose there are no regional differences in demand and supply. To achieve allocative efficiency, procurement policy has to be formulated separately for wheat, rice, corn, etc. Chinese policy makers have accommodated the differences of individual grain types in the setting of procurement quota volume and price level although how well it is done depends on the accuracy of the information. But they have not given due attention to the quality differences within the same grain type. In particular, the procurement prices have failed to reflect the differences in production cost and consumers' demand of individual grain varieties. Ever since the adoption of the unified procurement system, price regulations had substantially reduced the price premiums paid for high-quality varieties. Coupled with the emphasis on quantity targets, the lack of incentives to produce the more costly high-quality grain has created an increasing bias toward high-yield low-quality varieties. In the mean time, there has been an increase in demand for feed grain and premium-grade food grain since the late 1980s due to the substantial rise in urban incomes. The unaccounted quality difference in the setting of procurement prices has led to an excess supply of low-quality grain but an excess demand for high-quality grain even when demand and supply of grain in China are balanced overall. In terms of the model constructed in Chapter 3, the combination of procurement price ($\overline{P}$) and quota ($\overline{Q}$) set for high-quality varieties lies below the minimum procurement price (MPP) curve resulting in

underproduction whereas the $\overline{P}, \overline{Q}$ combination set for low-quality varieties lies well above the MPP curve. For the latter, $\overline{P}$ may even be higher than the equilibrium market price inducing overproduction. These imbalances have become more serious since the 1990s. In particular, under the price support program implemented between 1997 and early 2000, the government ended up with a stockpile of low-quality grain that it has yet to sell.[58]

On the consumption side, aggregation problem arose from the rationed grain sales system that was installed between 1955 and 1992. It is assumed in the model of grain policy formulation that rationed grain was only allocated to those urban users whose marginal value of grain was at least as high as the market price. In reality, however, the assumption would be hard to satisfy due to the undifferentiated allocation of grain coupons to all eligible urban consumers who had a residence permit. Despite the black markets that enabled such consumers to sell their surplus grain coupons to those illegible consumers who did not have a residence permit, the lower-than-market rationed sales price resulted in over-consumption and wastage of grain in urban areas. As oppose to a free market where the pricing mechanism would guarantee that the available quantity of a commodity would only go to those users with the highest marginal value, the absence of such an ideal mechanism in the grain ration system ended up with higher market price and larger total supply of marketed grain than the efficient level. Unused coupons increased in the second half of the 1980s and early 1990s as urban incomes increased and the better-off households switched from grain to other superior food items such as meat (Zhang, 1996, p.292).

[58] For example, until 1999, the support price for rice did not discriminate between indica and japonica varieties (Hsu and Liu, 2001, p.26) and the grain enterprises ended up procuring mainly lower-quality indica rice.

The above analysis gives a general picture of the difficulties Chinese policy makers encounter in the setting of procurement quotas and prices as well as in the allocation of rationed grain to consumers. To further illustrate the nature of their problems, let us examine three historical incidences in which China's grain policy failed to bring about the intended results due to policy makers' inaccurate assessment of the economic situation.

Excess grain supply in 1984

Since the economic reform that began in late 1979, Chinese policy makers had adjusted the procurement prices, especially the above-quota prices, upward to improve grain farmers' production incentives. Due to the excessive adjustment, however, the above-quota prices ended up inducing an over supply of grain in 1984 causing storage and budget problems.[59] The demand and supply imbalance was due mainly to two reasons. The first one was the unanticipated good harvest in the early 1980s, which no government could accurately predict. The second one was the underestimation of farmers' price elasticity of supply. As reported in various findings, the incentive effect of the Household Responsibility System had boosted grain production substantially (McMillan et al., 1989; Lin, 1992). It is plausible that improved efficiency in production and allocation in the first few years of the economic reforms had increased the supply elasticity beyond policy makers' expectation. As a result, the state's commitment to procuring surplus grain at the above-quota prices not only induced over-supply, but also led to procurement beyond storage capacity and budget problems. In terms of the model in Chapter 3, the unanticipated rightward shift in the supply curve of marketed grain resulted in the above-quota procurement price lying above the equilibrium market price.

[59] Lardy (1983, p.199) alleges that both the quota and above-quota prices were set too high relative to what would be necessary to induce quota fulfilment in that period.

Stagnant grain supply in the second half of the 1980s

In the second half of the 1980s, prices of agricultural inputs and other non-grain produce were liberalised.[60] At the same time, rural industries developed quickly and offered much more attractive returns than grain production. These developments outside the grain sector diverted resources away from grain production and exerted an adverse effect on its output. Despite some upward adjustments, the procurement prices in 1988 were at best comparable to the pre-1984 above-quota price levels. It was inadequate compared with the inflation and rising market prices in this period (Oi, 1996, p.182). The result was a stagnant output that remained below its 1984 record level until 1989. In terms of the model in Chapter 3, policy makers underestimated the extent of the increase in costs and the resultant upward shift in the MPP curve. Although they adjusted the $\overline{P}, \overline{Q}$ combination upward, the adjustment fell short of the constantly shifting MPP curve in that period.

Market shortages in late 1993 due to expectation of future price surge

In the absence of a functional stabilization mechanism for grain prices in China, the pricing policy has sometimes triggered speculative behaviour on the part of grain farmers, grain users as well as policy implementers, resulting in disruptive outcomes and policy failure. For example, the announcement in October 1993 of the government's decision to raise procurement price in 1994 led to the expectation of further price increases in the near future. In response to this announcement, grain farmers held on to their stocks to take advantage of better prices later on whereas grain users and state grain enterprises were compelled to stock up. The immediate increase in demand and decrease in supply gave rise to a price hike in late 1993. Panic buying

[60] As noted by Rozelle (1996, pp.205-207), due to the absence of necessary marketing infrastructure, liberalisation of China's fertilizer markets in 1986-87 ended up in chaos. The resulted surge in prices of chemical fertilizer in that period was a major reason for the rising costs of grain production. This is another example of policy makers' lack of understanding of the economic situation.

originated from the grain deficit regions in the south and spread quickly to the surplus regions in the north. The market turmoil was surprising to the government because the output in 1993 actually increased by 3 percent relative to the previous year due to a good harvest (Watson and Findlay, 1999, p.29).[61] This incidence was a result of the policy makers' failure to correctly anticipate the responses of other agents to the policy change, which translated into the unexpected shifts in demand and supply. It also exposed the deficiency of the grain price stabilization mechanism and prompted the establishment of local grain reserves in conjunction with the grain risk fund in 1994.

As the market reform proceeds in China, the central government has grown increasingly aware of its limitation in formulating policies that suit local conditions. However, it is not yet ready to allow the market to take over grain distribution completely. One way to get around the information problem in policy formulation is to delegate some of the responsibility to local governments, who have far better knowledge of their own situations. Starting from 1994, additional upward adjustments in procurement prices by local governments at their own expense were becoming very common among the coastal regions where the opportunity costs of grain production had risen faster due to their more rapid economic development. Seeing the beneficial outcomes of such locally initiated modifications of the stipulated policies, the central government has in many instances sanctioned these autonomous 'reforms' and gradually introduced more flexibility in the grain policy since the mid-1990s.

[61] According to the *Green Paper on Rural Economy* (CASS-RDI, 1997, p.40), the price surge was further aggravated by the 40-50% devaluation of yuan against the US dollar in 1994. Coupled with a tighter world grain market in 1994-95 resulting in a 25-30% increase in world prices, the adjustment in exchange rate led to an export drive especially of rice. And China happened to import a large tonnage of grain in 1995 (see Table 2.2a). The much higher import prices in turn drove up domestic prices further.

7.2 Problems in implementing China's grain policy

Even if the policy makers had access to the necessary information for setting the optimal procurement prices and quotas, success for the procurement policy would still hinge on its implementation. In the theoretical model I assume costless policy implementation. Borrowing Watson and Findlay's (1999, p.8) words, I have assumed that "the state was a monolithic entity", but in fact there were "divisions and conflicts among the different levels and administrative units of the state". After the central government has formulated a policy, it has to rely on administrative units at lower levels to implement it. However, as noted by Rodrik (1996, p.25), "principal-agent problem prevents the leadership from internalizing in full the interests of the rank-and-file." This problem has been a major source of inefficiency in the formulation and implementation of grain policy in China.

Since the fiscal reforms in the 1980s and 1994, dispersion of interests between the central and local governments has become more acute. In particular, the central government has cast onto local governments an increasing financial burden through the fiscal responsibility system adopted since 1987. At the same time, in relinquishing control and devolving decision-making to lower levels of governments in the reform process, the central government has less control and less knowledge of what happens at the local level. In other words, policy makers in the central government have no longer been able to closely monitor the behaviour of the policy implementers. After being filtered down through China's administrative bureaucracy, policies are often severely distorted by local government officials who are promoting their own objectives (Rozelle and Boisvert, 1993, p.339).

The decision making of the government agents involved in the implementation of China's grain policy can be analysed using an optimization model similar to the one

constructed for the policy makers. They derive benefits from competing objectives. The most important ones are (i) promotion prospect in the political hierarchy, which improves with their ability to successfully meet the procurement targets assigned by higher-level authorities; and (ii) pecuniary rewards that can be reaped by deviating from the stipulated policy, for example, through the misappropriation of earmarked procurement funds for unauthorized uses. Since the emergence of rural industries in the 1980s, local leaders have been playing the dual role as managers of agriculture and industry in their jurisdiction (Oi, 1989). Their adherence to stipulated policies incurs high opportunity costs in terms of pecuniary benefits they could otherwise derive from non-compliance. The regional branches of the Grain Bureau, which work in collaboration with local governments, face a similar dilemma. Balancing the benefits and costs, these policy implementers decide on the degree of adherence to or deviation from central policies.

It is beyond the scope of this thesis to model the behaviour of these policy implementers.[62] I will only describe, using some actual cases, how their behaviour leads to implementation problems of China's grain policies. Many of the policy failures can be explained by the conflicts of interests between these agents and the central government and among themselves, especially under the two-track system in the post-reform period. To put it simply, a policy may fail to deliver the intended outcome because the implementers refuse to comply. The reasons for their non-compliance can be grouped under two headings. First, the implementation costs that they have to incur discourage them from adhering strictly to the stipulated policies. Second, the rent-seeking opportunities lure them to deviate from the central directives. The more difficult it is for the higher-level authorities to monitor their behaviour, the more likely

[62] Rozelle and Boisvert (1993) give an insightful analysis of the trade-off among competing objectives of village leaders, who are the implementers of China's grain policy at the lowest level of the bureaucratic hierarchy.

the implementers will pursue their own interests at the expense of the national welfare.[63]

Implementation costs

The first reason for implementers to deviate from the stipulated policy is that their adherence will add to their financial burden or jeopardize their pecuniary rewards. Section 4.1 has examined the case of policy disequilibrium where incompatible policy objectives create fiscal problem for the central government. If it cannot come up with sufficient financial resources, it may pass some of the burden onto implementers. Since the fiscal reforms that began in the 1980s, the central government has limited its commitment to financing the 'grain bureau policy losses' only to a fixed amount. Local governments have since borne increasing current expenditure obligations. In particular, local budgets have to incur over 70 percent of urban food subsidies for grain, oil and meat, which become the largest single burden.[64] As noted by Wong (1991), the partial and uncoordinated fiscal reforms passed the fiscal crisis to the local level and worsened the relations between the central and local governments, and among local governments. Both the central government's attempts to contain the budget outlay incurred in grain marketing and the local governments' devotion to industrial expansion reduced the availability of procurement funds. The tightening resource constraint inevitably impeded the implementation of the grain procurement policy.

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[63] Oi (1999b) notes that the leeway that allows local officials to deviate from central policies varies with time and with level of administration. Full compliance would be the best strategy during a campaign in the central planning era when "all levels were under increased pressure to ensure the correct implementation of policy (p.140)". At lower levels that are further removed from the centre, monitoring would be more difficult and local officials would be less inclined to adhere strictly to the central policy.

[64] These expenditures are recorded partly under the budgetary item of 'price subsidies' and partly under enterprise losses that are subtracted from revenue income (Wong, 1991). Some of the subsidies involve the purchase of grain at negotiated prices but sold at rationed prices. In addition to price subsidies, local governments also have to bear the costs of handling, transporting, storing and processing urban food grain, which "have long been (since 1971) counted as losses by commercial and grain enterprises and are covered by local budgets (p.705)."

The shortage of financial resources also affected the operations of the state grain enterprises. Delay in disbursement of procurement funds from the governments created difficulties for these agents. Under the fiscal responsibility system, although the central and local governments reimbursed the 'grain bureau policy losses' arising from the price reversal, the subsidies often arrived with time lags, creating liquidity problems for these enterprises.[65] It was reported that 80 percent of their operating deficits in 1990 was the outstanding subsidies due from local governments (Zhang, 1996, p.287). Local governments' failure to fulfil their obligation was blamed for the mounting unpaid subsidies to the Grain Bureau branches and their near bankruptcy in the late 1980s (Cheng, 1999, p.109). The following cases illustrate how the central government's attempts to reduce its budget commitments have created difficulties for the policy implementers.

Tied sales of agricultural inputs (san gua gou) in 1987

Following the price liberalisation of cash crops and agricultural inputs, especially chemical fertilisers, the opportunity costs of grain production surged in the second half of the 1980s. Instead of relying solely on raising procurement prices to induce quota fulfilment, policy makers put forward in 1987 a complementary policy of tied sales of chemical fertiliser and diesel fuel at subsidised prices, and the provision of 20% cash advances to farmers for their grain delivery. Theoretically speaking, given unchanged sales prices, it would require the same amount of subsidies to induce quota fulfilment by either increasing procurement prices or providing input subsidies to farmers according to the quantity of grain they delivered to the state. In practice, however, these two policies had different implications for the financial burden on the central government.

[65] Case studies that contain detailed description of the problems faced by state grain enterprises in delayed reimbursement of policy deficits, accumulating outstanding loans from ABC and ADBC, and

As already explained in Chapter 2, while the central government would have to bear all the costs of upward adjustments in the state procurement prices, the costs of tied sales would be shared equally between central and local governments. Adopting this policy of input subsidies might release some of the pressure of raising grain procurement prices further. But to do so would only shift the burden of the implementation costs to the local governments and the state grain enterprises. The 'unclaimed policy losses', for which neither the central government nor the local government was committed to take responsibility, resulted in insufficient provision of inputs to meet the tied sales obligations and the drastic cut back in credit allocation in 1988 and 1989 (Sicular, 1993; Cheng, 1999). The issue of IOUs to grain farmers in lieu of cash was virtually a reduction in procurement prices, which discouraged farmers to produce and deliver grain to the state.

Illegal suppression of grain prices

As noted earlier, the central government has been financing only part of the grain subsidies since the fiscal reforms in the 1980s. The grain enterprises, together with the local governments, have to make up for the shortfall and bear the market risk. Already weighed down by heavy losses due to inefficiency and policy obligations, these enterprises cannot afford to adhere to the price support policy. A common practice of the officials in the grain stations is to downgrade the grain delivered by farmers and offer the price of lower-quality grain for their higher-quality varieties (*ya ji ya jia*), or to refuse to procure all the grain they deliver (Sicular, 1992, p.42; Yuan, 1994, p.41). Such deviation from the pricing policy would undoubtedly hampered farmers' incentives. The problem of insufficient financial resources has become even more acute since 1997 when the central government launched a price support program

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the 'triangular debts' among grain enterprises are available in Wang (1993).

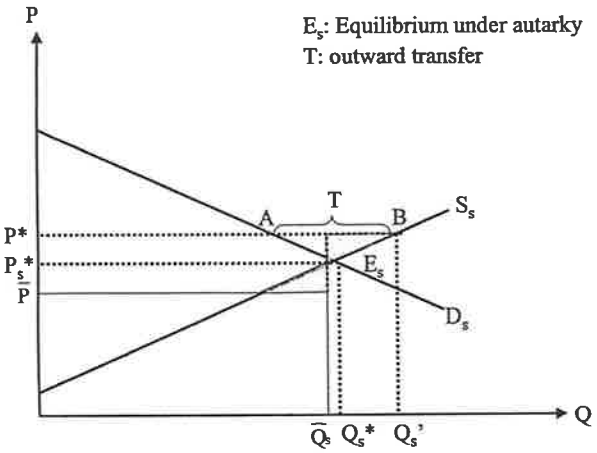
to safeguard grain farmers' income. I will discuss the problem again with reference to that program in the next section on inter-regional conflicts of interests.

Collection of ad hoc levies from grain farmers

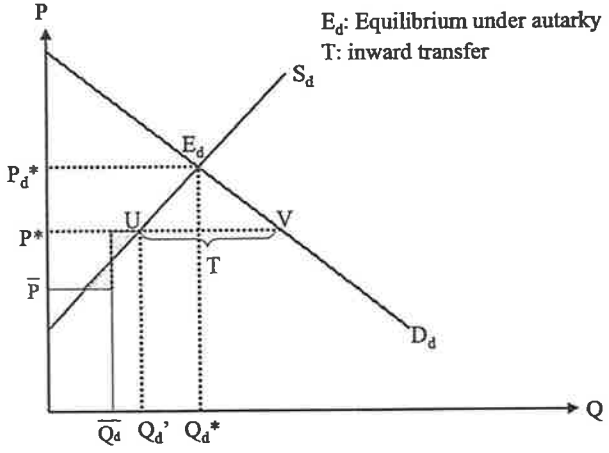
After the tax reform in 1994 where the central government attempted to recapture a larger share of the fiscal revenues, local governments, especially those at lower levels in the rural areas, suffered from a shortfall of expendable resources and had to explore alternative sources of revenues. The result was a proliferation of ad hoc levies and fees imposed on farmers. In addition to the state tax, which is an agricultural tax assessed on the basis of 'normal yield' and the land size, farmers also have to pay township pooling funds (*wu tongchou*), village levies (*san tiliu*), as well as miscellaneous levies, fees and fines to various government institutions at different hierarchical levels (OECD, 2000, pp.122-23; Lin, et al., 2002a).

These levies are usually collected by the state-owned grain stations on behalf of local governments from the payments due to farmers for their grain deliveries. Although the state has made such practice illegal in recent years, the collection of ad hoc levies still carry on under the coercions of local government officials. It is reported that one threat used by the cadres of local governments is to replace the grain bureau officials with someone else (*China's Agricultural Development Report '98*). The excessive rural levies have been widely reported as one of the major factors leading to rural out-migration and abandoned farmland (*China Daily*, 18 January 2000; MoA Information Centre, 21 April 2000; *Foodec.com*, 17 September 2001). Although the levies also apply to farmers growing other crops, the study by Lin et al. (2002a & b) has revealed that the rural tax burden on farm households increases with their obligation to deliver grain to the state. It is reasonable to expect these levies to have the same adverse effect on grain farmers' incentives as suppressed procurement prices.

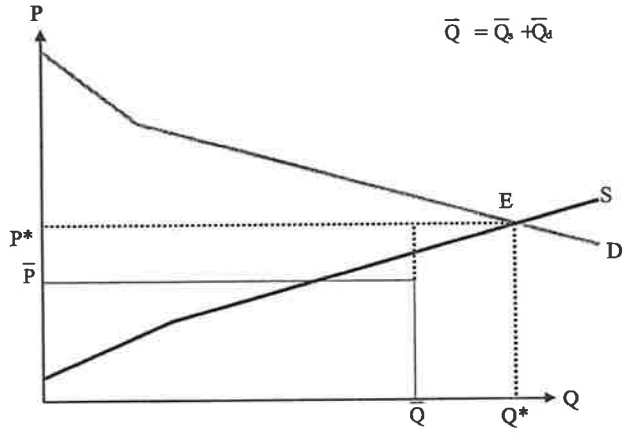
(a) Surplus region



(b) Deficit region



(c) The whole nation



Having to bear the costs of implementing the grain procurement policy but constrained by a shortage of financial resources, the local governments and state grain enterprises have no alternative but to deviate from the central directives. The above three cases illustrate how the central government's attempts to reduce its fiscal burden have created conflicts between itself and the local governments, between the local governments and the state grain enterprises, and between these policy implementers and farmers.

Uneven distribution of benefits and costs among regions

The second reason for implementers' non-compliance is the incompatibility between central policies and local interests due to the uneven distribution of benefits and costs among regions. Even if policy makers in the central government managed to formulate appropriate procurement policies in line with regional differences in comparative advantage, their objective regarding income redistribution might not be compatible with the interests of local governments. Strict adherence to the stipulated policy might harm the general welfare of certain localities while benefiting others. Such discrepancy between the national and local interests arises mostly in three areas, namely, inter-regional grain transfers, the price support program adopted in 1997, and the management of local grain stocks. The excessive burdens on grain surplus regions discourage their governments from adhering to the stipulated policies.

Inter-regional grain transfers

Grain surplus regions, including provinces, prefectures, and counties, that have comparative advantages in grain production have been producing more grain than they need for own consumption whereas grain deficit regions that have comparative disadvantages have to rely on additional supply from outside. If inter-regional grain trade had been guided by market forces, it would have benefited all parties concerned.

Unfortunately, most of the time the Chinese government has been regulating the quantities and prices of such grain transfers. Under the unified procurement system, inter-regional grain transfers between surplus and deficit regions were carried out at transfer price set on the basis of the quota procurement price and hence was lower than the market price. It created a disincentive effect on the surplus regions to follow the central policy, which can be illustrated with Figure 7.1. To analyse the welfare impacts of inter-regional grain transfer on different localities, I disaggregate the economy analysed in Chapter 3 into one surplus region and one deficit region. Panels (a) and (b) of Figure 7.1 depict the individual demand and supply curves of the surplus region and the deficit region denoted by subscripts s and d respectively. Their horizontal summations give the demand and supply curves of the whole economy as depicted in Panel (c). When the regions adopt self-sufficiency policy, their respective market equilibrium is at E_s and E_d. If free inter-regional trade exists with zero transaction cost, then the equilibrium price will be at P*. At this price, the surplus region will export T amount of grain to the deficit region. Both regions can enjoy a larger social surplus compared with the case under regional self-sufficiency. In terms of Figure 7.1, the social surplus of the surplus region and the deficit region will increase by the areas of ABE_s and UVE_d respectively.

Now consider the setting of procurement price and quota by the central government. Suppose the procurement price is set at $\overline{P}$ nationwide, and any inter-regional grain transfer is carried out at the price of $\overline{P}$. Let $\overline{Q}_s$ and $\overline{Q}_d$ denote the corresponding quotas on the respective MPP curves of the surplus region and deficit region. It can be shown that if the central government instructs the surplus region to transfer T units of grain to the deficit regions, the market equilibrium price in each region will also be P*, at which the national social surplus will be maximized just as in

the free market situation. But will the surplus region have any incentive to follow the stipulated policy?

It can be easily verified that an amount of social surplus equal to $(P^*-\overline{P})\times T$ will be redistributed from the surplus region to the deficit region through the grain transfer at price $\overline{P}$. The net change in social surplus for the surplus region compared to the case of regional self-sufficiency depends on the relative magnitude of area ABE_s and $(P^*-\overline{P})\times T$. The lower the procurement price relative to the equilibrium price, other things being equal, the more likely will the surplus region incur a net loss from the outward transfer of grain. On the other hand, the deficit region will always benefit from the inward grain transfer.

Given the unequal distribution of benefit from inter-regional grain transfer, it is reasonable to expect the two regions to react differently to the policy. While the deficit region will be more than happy to comply, the surplus region will be less eager to adhere strictly to the stipulated policy. In most cases the local governments of surplus regions would negotiate with the central government for a smaller quota or ask for compensation in terms of other economic and political benefits (Guo and Wang, 1998, p.22). In the face of these conflicts of interests, the central policy makers gradually decentralised the inter-regional grain transfer in the reform period and allowed local governments of surplus and deficit regions to negotiate with one another. With the more flexible arrangements under the two-track system, deficit regions might procure directly from farmers in surplus regions at negotiated prices. But then their procurement would compete directly with that of local grain bureau within the surplus region. As long as the procurement price or the transfer price is below the market price, exporting grain to deficit regions incurs a cost to surplus regions compared with interregional trade at market price. The loss is especially substantial amidst serious

grain shortages when surplus regions themselves have difficulty meeting their procurement targets. Such inter-regional conflicts of interests explain why 'grain wars' erupted in 1986 and 1988, where surplus regions erected barriers to prevent the outflow of grain.

Price support program adopted in 1997

Another instance of incompatibility between central directives and local interests was the price support program stipulated in November 1996 and implemented since 1997 to safeguard grain farmers' income against falling market prices. Under this program, local governments were instructed to buy surplus grain at protective prices from farmers whenever market prices fell below the fixed procurement prices. The protective price levels were set at a level more than 20 percent above the market prices (Huang, 1998; Lu, 1999). As described in Chapter 2, the policy losses arising from the difference between the protective prices and the sales prices (market prices) would be financed by the grain risk fund established using the central and local fiscal resources.

The implementation problem arises from the fact that such protective procurement would be necessary only in grain surplus regions. On the one hand, due to the lack of development of other more profitable production activities such as cash crops and rural non-farm industries, surplus regions in China that specialise in grain production are usually subject to a tighter fiscal constraint. On the other hand, some of these local governments could not see why they had to bear the responsibility of stabilising grain prices for the whole nation. Therefore they were hesitant to implement this price support policy (*Price Yearbook of China 1997*, p.21).

The following case sheds light on the dilemma faced by local governments concerning the price support policy. In 1999, when market prices of grain were below the fixed procurement prices, many counties in Jiangxi Province did not carry out the

policy of protective procurement. Instead, they reduced the procurement prices below the protective prices. As Nanfeng County adhered to the price support policy, it attracted inflow of grain from neighbouring regions. It ended up procuring more grain than expected. However, under the 1998 directive of selling grain at higher than procurement prices (*shunjia xiaoshou*), Nanfeng County found itself having difficulties selling its grain because its prices were higher than in other regions that procured grain at lower prices (Zhang and Liu, 2000).

Defiance from the price support program became more significant and widespread towards the end of the 1990s. It is reported in the *Almanac of China's Agriculture 2001* (p.111) that the national average procurement price in 1999 was 4 to 6 yuan below the protective price per 50kg of grain and the gap widened to around 10 yuan in 2000 compared with the stipulated protective prices of 57-59 yuan for winter wheat in the northern region in 2000 and 54-60 yuan for mid- and late indica rice and japonica rice in 1999 and 2000. The suppression of procurement prices would be more severe in surplus regions.

Management of local grain stocks

Non-compliance due to the divergence between local and national interests also occurs in the administration of grain stocks, which in some cases complements the price support program. Since the establishment of grain risk fund in 1994 to finance the building of local grain stocks, local governments have been instructed to stabilize grain prices by buying grain from the market when there is a surplus and selling from their stocks to the market when there is a shortage. To guard their own interests, however, local governments allow the regional branches of the Grain Bureau to take actions contrary to the central directives. They hoard grain in shortages and sell from their stocks at falling market prices (Guo and Wang, 1998, p.25).

Such local-interest-oriented behaviour was most obvious in the two years between the end of 1993 and 1995 when there was a severe grain shortage in China. While the state sold from the central grain stock several times in an attempt to halt the surge in grain prices, various local governments accumulated more stocks instead. In 1994 and 1995, the local grain stocks increased from 10 to 15m.m.t. in Guangdong Province, and from 3.3 to 8m.m.t. in Hebei Province. When there is a market glut, as the one prevailing since 1996, local governments rely on the central government to absorb surplus grain from the market but refuse to reach the target level of local grain stocks stipulated by the state (ibid.). Their deviation from the central directives has aggravated the volatility of grain prices rather than stabilising them.

Rent-seeking behaviour of local authorities

While the first two reasons for non-compliance on the part of policy implementers are related to the implementation costs they have to bear, the third reason stems from the rent-seeking behaviour. The distortions of the regulated grain prices have created rent-seeking opportunities for the local authorities involved in grain distribution. Their attempts to increase their own benefits, sometimes even at the expense of their localities, have resulted in their non-compliance. Self-serving behaviour falls into mainly three areas, namely, deviations in procurement policies, deviations in sales policies, and misappropriations of procurement funds, where the first two quite often coincide with the last one.

Deviations in procurement policies

A common self-serving behaviour of local governments in the shortage period was to impose additional quotas for grain delivery and sell the extra amount of grain on the market to reap profits. In some cases they could add on 5 to 10 percent of the original quota (Ke, 1995, p.46). Another common practice for the state grain

enterprises to seek rent in collaboration with the local government is to suppress procurement prices. To take advantage of the central government's commitment to offering subsidy to fill the wedge between the higher procurement price and the lower rationed sales price, some of these policy implementers suppressed the procurement price and pocketed a portion of the subsidy they claimed from the central government for fixed-quota procurement. Such behaviour ended up extracting excessive producer surplus from farmers aggravating the problem of income inequality, and also undermining farmers' production incentives. One disclosed incidence was the grain bureau in Laohekou City in Hubei Province, which illegally reduced the procurement prices of wheat and rice in 1997. By falsifying these procurements as at protective prices, the officials pocketed the price differentials of over 1.6 million yuan (*People's Daily*, 19 July 1998).

Some grain authorities suppressed the procurement price in a more roundabout way. It was reported in *People's Daily* (8 June 1998) that a grain bureau allowed its subsidiaries (private traders) to procure directly from farmers at low prices and then reap a profit from reselling to grain stands at protective prices. Some grain stands provided layoff employees with 5,000 to 10,000 yuan of capital so that they could operate as private grain traders procuring from farmers. Then the grain stands and these former employees shared the proceeds from the price differentials. All these rent-seeking behaviour invariably redistributes income from grain farmers to the government agents involved in grain distribution.

Deviations in sales policies

While deviations in procurement policies harm grain farmers, deviations in sales policies harm the state budget mostly and they usually coincide with misappropriation of procurement funds. The latter often takes the form of unreported sales by grain surplus regions to deficit regions. One disclosed case was the grain

bureau in Xuhua City in Heilongjiang Province. It transferred 120 million yuan's worth of grain to Dalian in September 1996 without properly recording this outward transfer. It then sold the grain at low price and deposited the proceeds of 96 million yuan into a newly created bank account. An amount of over 91 million yuan was misappropriated for the construction of guesthouses, offices, staff quarters, purchases of vehicles, and loans to subsidiaries (*People's Daily*, 19 July 1998).

Despite the reform of China's grain distribution system since 1998 that commands grain bureaus to sell grain at higher-than-procurement price, some of them ignored the instruction but sold the procured grain at low prices to private traders getting kickbacks in return. Sometimes the grain authorities in surplus regions disguised these illegal sales as relocation of excess grain stock to be stored in neighbouring grain deficit regions. All the expenses on transportation, rent, etc. were reported as operating deficits to be financed by policy loans from ADBC (*People's Daily*, 8 June 1998).

Misappropriations of procurement funds

There were two reasons for the failure of the local governments in the late 1980s to pay farmers in full for their grain delivery and to deliver subsidised inputs under the tied sales program. The first one was the insufficient resources provided by the central government, which has been discussed earlier in this chapter. The second reason was the implementers' misappropriation of the designated resources. In particular, it was quite common for local governments to divert the procurement funds and concession loans earmarked for grain procurement to investments in rural industries.

The dual role of state grain enterprises under the two-track system has also induced misappropriation of procurement funds. They were motivated to reallocate

resources to the profit-making negotiated transactions at the expense of the loss-bearing policy transactions. In the second half of the 1980s, branches of the Grain Bureau in some regions diverted the concession loans from ABC designated for fixed-quota procurement to negotiated procurement instead (Cheng, 1999). The problem deteriorated further in the 1990s. It was reported that the total amount of misappropriated bank loans was up to 80 billion yuans at the end of 1997 (*Jingji Cankao Bao (Economic Reference News)*, 15 June 1998). Together with the operating deficits of 48 billion yuan in 1997 (*People's Daily*, 8 June 1998), this undue burden on the financial system prompted the state to launch the grain distribution reform in 1998. The following cases reported in the Chinese media would shed more light on the nature and magnitude of the problem.

The grain bureau in Zhengyang County in Henan Province over-reported the amount of procurement and grain stocks in 1997. It claimed over 3 million yuan of fiscal subsidies for falsified excessive grain stock and over 40 million yuan of procurement loans from the ADBC (*People's Daily*, 19 July 1998). In another case, the grain enterprise Shanghai Pudong Cereal and Oil Corporation diverted more than 80 percent out of a total of almost one billion yuan of procurement loans to the construction of a hotel, apartments and other real property developments, as well as non-grain transactions (*People's Daily*, 21 July 1998).

The decentralisation of administration in the reform process has deprived the central government of a significant amount of control at the local level. The asymmetric information has made it very difficult for the central government to prevent rent-seeking behaviour that usually involves collusion between state grain enterprises and local governments. Under the pressure of local governments, officials of ADBC that are charged with the duty to monitor the use of procurement funds have often failed to do their job. For example, regarding the falsified claim of procurement loans

by the grain bureau in Zhengyang County, the local branch of ADBC was blamed for the lack of supervision over this grain enterprise (*People's Daily*, 19 July 1998).

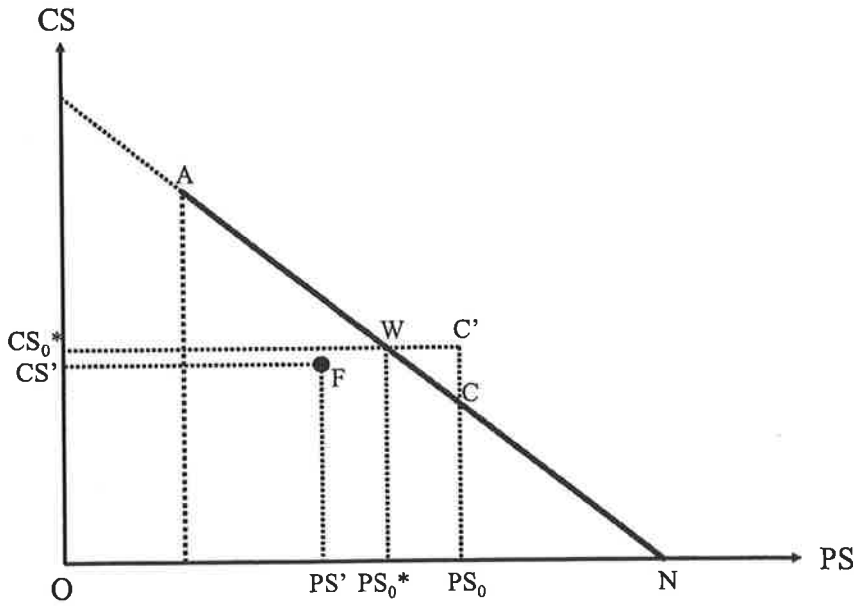


FIGURE 7.2 EXPLOITATION OF FARMER'S WELFARE

The rent-seeking behaviour of government agents has seriously harmed farmers' welfare and reduced their incentives to produce grain. It has also created a mounting burden on the fiscal and financial system of China. In particular, the policy implementers somehow managed to exploit the protective price policy to their own advantage. Watson and Findlay (1999, p.28) point out that the state grain enterprises were "able to use the interaction of (protective) prices, market prices, input subsidies and quality variations to maximize (their) profits and to capture transfers intended for the producers".[66] Regardless of the grain distribution reform implemented in 1998, exploitation of farmers still prevails today through similar manipulation of procurement policies and illegal collection of ad hoc levies at local level. In terms of the model of grain policy formulation, the actual welfare distribution between grain producers and

[66] Although Watson and Findlay's remark referred to the 'guaranteed' prices set in 1993, it applies equally to the protective prices implemented later in 1997.

users is not on the welfare frontier but below it. The situation can be illustrated with Figure 7.2.

Figure 7.2 is a reproduction of Figure 6.2 in which the welfare trade-off AWN shows the combinations of producer surplus of grain farmers and the consumer surplus of grain users when the grain distribution system is functioning efficiently with government agents involved deriving a return compatible with their services provided. Suppose the state has stipulated a price support program to maintain grain farmers' welfare at the level of PS_0. The analysis in Chapter 6 concludes that the welfare distribution will be at point C', where a government subsidy of CC' will be required if grain users are not willing to pay anything higher than the market price. Incorporating all the problems analysed in this chapter into the model, we will see a very different picture. With all sorts of rent-seeking activities conducted by the local governments in collaboration with the state grain enterprises, the subsidies end up in the pockets of these officials instead of going to grain farmers. Worse still, the excessive agricultural levies imposed by local governments erode their welfare further. The actual welfare distribution of grain producers and grain users will be given by a point such as F in Figure 7.2, at which producer surplus is only at PS'. The level of consumer surplus is lower than the free market level of CS_0* because of the inefficiency of the state grain distribution system. The inefficiency and rent-seeking activities of the system have deprived the grain producers and users of a combined welfare of $(CS_0^* - CS') + (PS_0 - PS')$.[67]

By examining various problems China has encountered in the implementation of its grain policy, Sections 7.1 and 7.2 explain why the state grain distribution system has not been working smoothly. The next section looks at another type of problem, that

[67] It should be noted that the income distribution at point C' in Figure 7.2 is supported by a government subsidy of $PS_0 - PS_0^*$, which is equal to CC'.

is, the unsatisfactory coordination between domestic grain marketing and grain trade policies.

7.3 Coordination problems between domestic and trade policies

Despite the adherence to the grain self-sufficiency policy stance, international trade is an indispensable element of grain policy formulation in China. While imports of grain have been the last resort to fill domestic shortages, grain exports was once an important source of foreign exchange earnings to the Chinese government in the central planning era. Since the central planning era, policy decisions regarding grain trade have been made in conjunction with those of domestic production and distribution at the highest level within the central government. The quantities of grain imports and exports are determined by the State Council in collaboration with the State Planning and Development Commission on the basis of the projected imbalance between domestic production and use as well as the planned accumulation or release of grain stocks. Then the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) allocates the specified amounts of trade quotas by issuing import and export licences to China's foreign trade corporations, most of the time COFCO only, and supervises their operations. The operations of these foreign trade corporations are supposed to complement those of the local grain authorities to balance domestic demand and supply. Unfortunately, the complexity and the lack of coordination in the policy formulation have sometimes led to incompatible domestic and external grain policies.

As noted by OECD (2000, p.127), "the sheer number of agencies involved in grain trade and their complicated matrix of responsibilities make the system far too slow to deal efficiently with swift changes in international markets." For example, when world prices for corn increased and the domestic price declined in May and June 1996, the north-eastern provinces in China could have reaped large windfall profits by

exporting to world markets. But the rigid planning procedure took all the ministries and agencies a long time to arrive at a consensus to change the annual export plan. By that time world prices had dropped back below domestic prices and the opportunity was missed.

Coordination problems between domestic and trade policies also arise from the distortions created by price regulations. A more detailed description of the price determination mechanism helps to clarify the nature of the problems. While the import and export prices are negotiated between COFCO and the foreign exporters or importers, the transfer prices between COFCO and the Grain Bureau are fixed by the state independent of what COFCO has paid or received for these traded grains. Imported grains are transferred from COFCO to the provincial grain bureaus at the 'government fixed imported grain transfer prices'.[68] Grains to be exported are transferred from provincial grain bureaus that procure the grain to COFCO at the 'government fixed exported grain transfer prices'.[69] As a result, the transfer price that COFCO pays for domestically procured grain may not reflect its opportunity cost, that is, the domestic market price. For example, in 1994 COFCO exported corn at a price of around US$85 per ton whereas this corn was procured at quota price of US$65 and could have been sold on domestic market at US$120 (Tuan and Cheng, 1999, p.15). Although COFCO made a good profit for the state from the sales of corn on the world market, the exported corn should have been retained for domestic consumption to maximise social surplus in China. Coupled with price distortions, the lack of

[68] The 'government fixed imported grain transfer prices' are generally based on the average procurement prices for the same type of grain procured in nine cities: Dalian, Qinghuangdao, Tianjin, Qingdao, Lianyungang, Shanghai, Xiamen, Zhanjiang, and Guangzhou (Crook, 1999b).

[69] The 'government fixed exported grain transfer prices' are the sum of the fixed procurement price paid for the export grain in the relevant province, and a price differential that reflects quality variations and additional grain processing costs required to meet export standards and contract requirements (Crook, 1999b).

coordination between COFCO and the grain authorities is yet another reason for misallocation of resources.

7.4 Hurdles to reform of China's grain distribution system

Despite policy makers' attempts to rectify China's grain distribution system, prevailing problems stemming from the formulation and implementation of grain policies have hindered welfare maximization. The inefficient operations of state grain enterprises have made grain distribution unnecessarily costly.[70] The persistent rent-seeking activities conducted by the local governments and the state grain enterprises reveal the absence of an effective supervisory mechanism to monitor the behaviour of these policy implementers, which has turned these government agents into the major beneficiaries of various policy changes. Due to the distorted incentives inherent in the quota procurement system and the prohibitive monitoring costs of its operations, it is not a cost-effective tool for the government to safeguard farmers' welfare and maintain their incentives to carry on producing grain. While the installation of such a system in the central planning era was understandable under the Chinese government's pursuit of its heavy industry-oriented development strategy, its continuous existence is harder to justify given the drastic changes in economic circumstances and national goals. The abolition of the system may be the last resort to tackling the implementation problems.

The analyses in Chapter 6 have shown that China's accession to WTO may have created a golden opportunity for the Chinese government to liberalise the grain distribution system and allow the market a full play. Under certain conditions as specified in Section 6.3, the abolition of the quota procurement system will benefit both

[70] Despite the attempt to reform the distribution system, it was estimated that the operating deficits of the state grain enterprises would amount to 34.8 billion yuan in 1998. Together with an estimated fiscal subsidy of 30 billion yuan for inter-regional grain transfers and an interest subsidy of 1.35 billion for procurement loans, the financial burden would add up to a total of over 66 billion yuan (Huang, 1998).

farmers and grain users. However, it is apparent that such a change will badly hurt the government agents whose welfare hinges on the existence of this distribution mechanism. Although the Chinese government will not strictly abide by the Pareto criteria when it comes to making policy adjustments, it cannot afford to push for some exceedingly abrupt changes that will displease a large group of people for fear of arousing social and political disruptions. The difficulties China's policy makers face in their attempts to reform the state grain system is no different from those associated with the reforms of the state-owned enterprises. And it is a widely held view that China's accession to WTO will help to overcome the persistent obstacles to rectifying these inefficient and loss-ridden enterprises.

In reforming the grain distribution system, the Chinese leaders have to balance the benefits of various interest groups represented by different departments within the government including the Grain Bureau, the Ministry of Agriculture, the Ministry of Finance, etc. The strongest resistance to the dismantling of the state grain system comes from the Grain Bureau for obvious reasons. Local governments that still have a heavy stake in the agricultural sector are not ready to relinquish their control over grain distribution either.[71] It is believed that the external political forces exerted by other WTO members on China's domestic and trade policies have helped to overcome this barrier. That may be why grain distribution reform has taken on increased momentum since August 2001. However, as already pointed out in Chapter 2, the absence of a well-integrated marketing network, coupled with the backward development in the necessary transportation infrastructure and financial system to facilitate regional specialization, hinders the realization of the potential gain from the reform. It is extremely difficult to predict accurately whether China will forge ahead with the

[71] Personal interview in July 2000 with Han Jun, CASS-RDI.

current liberalization move or if there will be policy retrenchment as has occurred numerous times in the past when serious problems emerged.

One crucial determinant of the future development of China's grain policy is the position of the new leaders regarding the grain self-sufficiency policy stance. The adherence to a high self-sufficiency rate will necessitate either an increased provision of assistance to grain farmers or the rectification of the rural levy system that has been illegally exploiting them. Both of these options require complementary adjustments in the current fiscal system.[72] While the quota procurement system can be a channel for the government to give out assistance to grain farmers, its abolition and the consequent removal of the channel for collecting ad hoc levies from farmers may ease the implementation of the rural tax reform. On the other hand, if the Chinese leaders relax the grain self-sufficiency policy by, for example, confining it to food grain only, then the subsequent reallocation of rural resources may help improve farmers' income by allowing them to switch to other higher-return crops or non-agricultural production. The smaller need to assist grain farmers implies less pressure on the government budget. It should be noted that efficient resource reallocation requires complementary institutional changes. Reforms in the *hukou* system and the land tenure system are required to facilitate the necessary relocation of labour between regions and sectors. However, the removal of these long-standing barriers to factor movements, especially the *hukou* system, may not be deemed desirable by the governments of largely urban and more industrialised jurisdictions.

In this chapter, we have seen that the prohibitive costs of collecting necessary information for the formulation of optimal procurement policy and the lack of an

[72] Regarding the safeguard of rural incomes, it has been specified in the 2002 Finance Minister Reports that the experimental reform of taxes and administrative charges will be extended to all rural areas in 2003. According to the 2003 Budget, a total of 30.5 billion yuan will be designated in the central budget for funding this reform.

effective monitoring mechanism within the Chinese government to ensure policy compliance have rendered the quota procurement system far from effective. However, reforming the grain distribution system in China is an extremely complex issue with far-reaching implications for various sectors of the economy. Despite the benefits it can bring to the economy as a whole, strong resistance is bound to emerge in those sectors and regions that will be hurt by the related adjustments. Whether the policy makers will forge ahead with the reform depends on the size of the net benefit of such an endeavour and their ability to compensate those losers sufficiently. Even if the liberalization of the grain distribution system is deemed necessary, policy makers' perception of the current economic circumstances and the prevailing political configurations, and the subsequent adjustment in their priority of competing national goals will determine the pace of the reform.

CHAPTER 8
CONCLUSION

The purpose of this thesis is to develop a coherent theoretical framework to analyse the formulation of grain procurement policy for the entire history of the PRC. An optimization model is constructed to capture the preferences of China's policy makers regarding the competing objectives of sectoral income distribution and food security, as well as the factors governing the trade-off between these two objectives and the choice of policy instruments. While the model is built upon a two-track system that has prevailed only since 1985, this analytical tool can still be applied to the pre-reform period when market transactions were prohibited most of the time. In this concluding chapter I first summarize the major findings of this thesis. Section 8.2 then discusses some policy instruments that are going to be increasingly important in China's pursuit of its national goals of grain self-sufficiency and sectoral income distribution. Section 8.3 identifies areas for further research.

8.1 Major findings of the thesis

The optimization model developed in this thesis to analyse China's grain policy formulation in the context of a closed economy has generated a number of interesting results. First of all, similar to the conclusion of Sicular (1988) and Lau et al. (2000) that the two-track system can achieve efficient resource allocation, this thesis shows that the quota procurement system that allows farmers to sell surplus grain on the market after delivering their quota can redistribute income from grain producers to grain users without any distorting effect on the total output of grain. With the procurement price set at a level sufficient to induce quota fulfilment, the system can achieve the same social

welfare as that under a free grain market. Under the central planning system where market transactions were forbidden from time to time, however, there was a lack of incentive for farmers to sell more grain than the assigned quota. Coupled with the lack of necessary information for the policy makers to set appropriate procurement price and quota, the deficient incentive system would render efficient resource allocation impossible.

The rest of the results derived from the optimization model shed light on the impacts of the various factors governing the trade-off between policy objectives and the choice of instruments on the formulation of the procurement policy. The study of the policy makers' preferences regarding the size of the procurement quota gives rise to the second interesting result. When their utility increases with the procurement quota, which would be the case where food security is perceived as a pressing problem, it is found that the grain procurement price will always be set at its minimum level that is required to induce quota fulfilment, whether government subsidies are available or not. This finding solves the puzzling observation of suppressed procurement prices prevailing prior to 1997 despite the pronounced intention of the central government to safeguard grain farmers' welfare since the early 1990s. On the other hand, when policy makers are indifferent to an increase in the procurement quota, as in the case where grain shortage has ceased to be a threat towards the end of the 1990s, grain farmers may be paid more than the minimum price. Depending on policy makers' preferences regarding sectoral income distribution, farmers can be paid more than the market price in the presence of government subsidies.

The third major finding of this thesis, regarding the impact of the fiscal constraint on grain policy formulation, is rather straightforward. If policy makers prefer a larger procurement quota, then a tighter constraint will result in a smaller procurement quota and a lower procurement price. If policy makers are indifferent to

an increase in procurement quota, then a reduction in fiscal outlay will lead to downward adjustment in the procurement price and upward adjustment in the sales price while leaving the quota unchanged.

Fourthly, depending on whether the farmers are paid the minimum procurement price or something better, an increase in costs may or may not affect the procurement price. In the case where policy makers prefer a larger procurement quota, higher production costs will cause a downward adjustment in the quota size whereas the procurement price may remain unchanged for small increases in costs but rise with larger increases in costs.

Lastly, based on the political-economy literature on agricultural and trade policies, I make a conjecture that Chinese policy makers' preferences have become increasingly in favour of grain farmers at least in recent years. The policy implication of such a change in preferences is that both the procurement price and sales price will rise, other things being equal. Procurement quota will be unaffected if policy makers are indifferent to a change in the quota size. If they prefer a larger quota, then the procurement quota will be adjusted upward together with the prices.

With some modifications to accommodate international trade, the model also sheds light on the impacts of China's accession to WTO on its grain sector. Contrary to the widely held view that the grain sector will be among those badly injured by China's commitments to market access expansion, this thesis shows that China's WTO accession may produce Pareto superior results that benefit grain users and grain producers alike. Depending on the pre-trade welfare distribution and the amount of grain imports, WTO accession may not hurt grain farmers at all if it is accompanied by a complete liberalization of the domestic grain distribution system. In particular, the poorer the grain farmers are, or the more income has been redistributed from them to

grain users, the more likely China's accession to WTO can also benefit grain farmers. An important policy implication is that the WTO accession provides China with a golden opportunity to abolish the state grain procurement system and rid the state of the heavy fiscal burden.

Another conclusion of the analysis of China's accession to WTO is that the Chinese government's attempt to safeguard grain producers' welfare from the influx of imports need not drain fiscal resources, which is contrary to the assertion that the supply of agricultural assistance will be constrained by the fiscal capacity of the Chinese government (see, for example, Fang et al., 2002, p.33). The reason for the difference between the above results and the common wisdom is that the analyses in this thesis are based on China's current quota procurement system whereas the other studies may not have given this special feature its due attention. Conclusions derived in a free market context may be wide off the mark as China's grain distribution is still tightly regulated.

Despite the fact that the above results are derived from the optimization model abstract from information and implementation costs, they appear to be consistent with the observed evolution of China's grain policy. To explain the numerous policy failures, this thesis also conduct a systematic analysis of the problems arising in the process of formulating and implementing grain policies in China. The first type of problems stems from the lack of information that is required to set the 'right' procurement quotas or prices to achieve the policy objectives without jeopardizing allocative efficiency. The second type of problems arises from the deficient monitoring mechanism within the government that fails to ensure strict adherence to the stipulated policy. It should be noted that the discrepancies between the actual outcomes and the policy implications derived in the optimization model due to the lack of perfect information and the implementation problems do not nullify the theoretical findings in

this thesis. The model remains to be a valid framework to analyse how policy makers in China formulates grain policy on the basis of the perceived behaviour of other agents involved.

By highlighting the conflicts between the policy targets of sectoral income distribution and grain self-sufficiency, which emerged in the central planning era when the Chinese government adopted heavy industrialization as the over-riding national goal, this thesis provides a systematic analysis of the dilemma faced by the policy makers in the setting of grain procurement prices. The ideological belief of the Chinese leadership has not only dominated the setting of national goals but also always governed the choice of policy instruments. It explains why the quota procurement system was installed in the central planning era. It was because the political leaders' ideological considerations had ruled out alternative policies that rely more on the market mechanism and international trade, which were perceived to create much higher political costs. As noted by Perkins and Yusuf (1984, p.76), "political objectives (have enjoyed) primacy over economic ones." To China's leaders, the high economic costs of the quantity-based planning system could be justified by its political benefits. In particular, the sacrifice that the agricultural sector had to make under the quota procurement system for the national goal of heavy industrialization was worthwhile.

However, the economic circumstances and the political configurations in China have changed drastically in recent years. The plight of grain farmers in terms of their lagging incomes amid rapid growth in other sectors has increased policy makers' concern for their welfare. In their discussion of the former Soviet Union, Sah and Stiglitz (1992, p.88) assert that a higher concern for farmers would correspond to a lower tax. The same applies to China in the reform period. Since the implementation of protective procurement in 1997, the pricing policy has even switched from taxing to supporting grain production, eliminating the conflict between the two national goals.

While the 95% grain self-sufficiency target may still persist, the goal of sectoral income distribution has been reversed.[73] Now both of them call for higher grain prices.

This thesis shows that the extent to which the Chinese government can offer price support to grain farmers depends on its fiscal capacity and the external political constraint imposed by WTO. This international intergovernmental organization has exerted increasing influences not only on China's trade policies but also on its domestic marketing policies. These changing circumstances may catalyse a fundamental reinvention of China's grain distribution system. To maintain grain farmers' production incentives subject to the constraints of the WTO agreements, it is now imperative for the Chinese government to rectify the rudimentary problems of the state-regulated grain distribution system, that is, the distorting incentives and the inefficient operations of the grain bureaus. The ultimate solution may be the complete dismantling of the quota procurement system, which has been exploited by the government agents as a means to capture transfers intended for grain farmers.

While the analysis in this thesis has identified the conditions under which WTO accession accompanied by a complete liberalization of the grain distribution system will be beneficial to both grain farmers and users without having to tap fiscal resources, the success of this ultimate grain distribution reform would hinge on the implementation costs. The 'economic losers', namely the government agents involved in the state grain distribution, would pose the greatest obstacles. China's policy makers may find it extremely costly to compensate these agents for their losses, or the government has to bear the risk of political turmoil. The perceived problems may be so overwhelming that they weaken the political leaders' determination to reform and result in policy retrenchment, as has happened numerous times in the past. As this thesis

[73] Huang et al. (1999, p.756) allege that the self-sufficiency policy is likely to remain as "(n)ational defense, pride, and ideology will necessarily put a premium on maintaining a rough balance

adopts a positive approach to the analyses of the formulation and implementation of China's grain policy, it is beyond its scope to make suggestions as to how the current grain distribution system should be rectified or how to overcome the impediments to the abolition of the system. A voluminous literature has been devoted to these important issues (see, for example, CASS-RDI, 2000a & 2000b; Huang et al, 1999; Huang and Rozelle, 2002a; Nyberg and Rozelle, 1999; Wang, 2002; Zhu et al, 1999).

8.2 Alternatives after the quota procurement system

Based on the analyses in this thesis, we have reasons to believe that the formulation of China's grain policy from now on will be largely guided by the national goal of grain self-sufficiency. The attempts to safeguard farmers' incomes in recent years are not mainly for income distribution consideration but to offer farm households incentives to remain in grain production. To boost farmers' income for the sake of income equity or social and political stability, it will be far more effective to allow them to switch to other higher-return activities than to keep them in the grain sector. If China's adherence to a high self-sufficiency rate necessitates agricultural assistance to grain farmers, then one must also consider other alternative measures that may be more cost-effective in boosting farmers' income than implementing protective procurement.

To achieve self-sufficiency in grain production at affordable costs, it takes more than pricing, income or trade policies that protect grain farmers' welfare. The analysis of China's grain policy will not be complete without any discussion of the alternative economic measures that are likely to replace protective procurement to raise grain farmers' incomes and thereby maintain their production incentives although such measures are not the focus of this thesis. Given the distortionary effects of price subsidies and the financial and external political constraints on domestic supports and

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between domestic demand and supply".

trade protections under the WTO agreements, lowering the cost of grain production may be a more feasible measure. Putting political costs aside, the most economical way to reduce production costs is to remove the distorting institutions. China needs complementary institutional changes to improve the overall efficiency of its resource allocation. Another effective way to reduce the production costs is to adopt long-term productivity-enhancing policies such as the investments in agricultural infrastructure, R&D, and human capital of rural residents. Yet these non-distorting 'green-box policies' also require substantial fiscal outlays from the central government budget to win political support from local officials. And the amount incurred in their implementation is not exempted from the 8.5% *de minimis* constraint on the Aggregate Measurement of Support (AMS). Nevertheless, their growth-enhancing nature would give a much higher economic payoff than an equal amount spent on price or income support to grain farmers.

Institutional and structural changes to improve efficiency

After more than two decades of reforms, some distortions bequeathed from the former centrally planned economy still persist in China. The most notable example is the *hukou* system. Despite the fact that more than 100 million rural workers found employment in the urban sector in the late 1990s (de Brauw et al., 2002), the prevailing discriminations against these migrant workers under the *hukou* system, which exclude them from the urban social welfare benefits such as housing, education and health care, still to a certain extent obstruct geographical and inter-sectoral labour movements. Some institutions established since the economic reform have also impeded efficient resource reallocation. In particular, the equalitarian distribution of fragmented land under the Household Responsibility System has inhibited the realization of scale economies. Together with the *hukou* system, this land tenure system has hindered the

developments of factor markets, which in turns obstructs the equalization of marginal products of factors among sectors.

Apart from the above institutional constraints on resource reallocation, distorted incentives have been created in the reform process. As already discussed in the previous chapter, fiscal decentralisation has resulted in regional protectionism and under-investment in agriculture. All these distortions are impediments to efficiency improvements in China unduly raising the cost of grain production. Interestingly, China's WTO accession is becoming an external force that helps to overcome the resistance from policy makers and implementers to remove these distortions as these government agents come to realize the disadvantages of the existing economic structure under the increasing threat of imports.

Institutional changes require complementary developments in the economic structure. However, the absence of a well-integrated marketing network for grain will obstruct the realization of the potential gain from a full-fledged grain distribution reform. Regarding the extent of market integration in China, different researchers have conflicting views. Some of them identify the lack of integration in grain markets and attribute such a backward development to regional protectionism and poor infrastructure resulting from the decentralized fiscal system (Young, 2000; Zhou et al., 2000). Other researchers allege that grain prices have moved together across regions within China since the 1990s (Yu and Huang, 1998; Huang and Rozelle, 2002b). The discrepancies in their findings may be due to differences in data and estimation methods. Adopting a new approach to measure the multiple aspects of market outcomes, Park et al. (2002) explain the apparent lack of growth in grain market integration between 1988 and 1995 with infrastructure bottlenecks, lagging managerial incentive reforms for the grain officials and backward market reforms in interior regions in China. Although they disagree with Young's (2000) allegation that trade

barriers have obstructed price co-movements in different regions,[74] they share the same view with those researchers who identify a lack of market integration that infrastructural developments are crucial to improving grain market performance.

Despite the lack of consensus regarding the degree of market integration, it is likely that grain markets in China have grown more integrated over time since the economic reforms.[75] However, it remains a question whether the impediments to inter-regional trade have now been eradicated sufficiently to foster efficient resource allocation. To have regional specialization in line with comparative advantage, it is necessary to develop an integrated nation-wide marketing network and improve the transport system and communication system to facilitate the formation and dissemination of market information and the distribution of grain. To what extent and how quickly these desirable changes can be realized hinges on the effectiveness of the fiscal system in mobilizing budgetary resources to the production of these public goods that generate high economic payoffs for the whole nation but not necessarily for individual localities. Undoubtedly China needs a comprehensive and well-coordinated reform of the fiscal system to foster sustainable growth in agriculture in general and grain production in particular.[76]

The development of factor markets is also crucial to agricultural growth. In particular, while private ownership of land is still infeasible due to ideological and

[74] The data of Park et al. (2002) end in 1995 and hence cannot reflect the changes since the adoption of the Provincial Governor Responsibility System, which is believed to have created more regional trade barriers (see Chapter 2).

[75] Another study conducted by Carter and Lohmar (2002) on the extent of regional specialization in China for 1981-1999 produces results that are contrary to the allegation of increase in market integration. Based on eighteen agricultural commodities including meats, grains, cotton, etc., Carter and Lohmar compile the index of regional specialization and find that it fell over the period under study with a notable downward shift occurring around 1994.

[76] Some of the difficulties involved in the fiscal reform have surfaced in the recent experience of Anhui province in its experiment of 'converting levies to taxes'. While rural households' burden has reduced and their grievances subsided, the fall in local revenues has aggravated local governments' fiscal deficits and constrained their ability to finance public goods such as education, health services and basic infrastructure maintenance (Huang and Rozelle, 2002a, p.16).

other considerations (Kung, 2002a), the land tenure reform that legalises land rental transactions will help break several constraints on rural productivity (Zhao, 1999). Ironically, it is noted that grain delivery quotas attached to land use rights have a dampening effect on land rental transactions (Kung, 2002b). Thus the abolition of the quota procurement system may complement rural land tenure reform to help improve allocative efficiency and reduce the cost of maintaining high grain self-sufficiency in China. In addition to encouraging private investments in agriculture and realizing scale economies, some researchers believe that the land tenure reform may also increase labour mobility by freeing rural surplus labourers from the tie to their land allotment (Rawski and Mead, 1998; Lohmar, 2001).

Various findings show that rural labour markets have emerged in China providing off-farm job opportunities to rural workers (Parish, et al., 1995; de Brauw et al, 2002; Zhang et al., 2002b). It is believed that such a development that shifts labour from rural to urban areas and from agriculture to industry is not only important in raising rural incomes, but also crucial to the modernisation of China (de Brauw et al, 2002). However, it is also noted that rural labour markets remain imperfect due to the persistent institutional and administrative barriers (Parish, et al., 1995). To facilitate efficient labour reallocation, the *hukou* system is undoubtedly an obstacle that needs to be removed. The study of Anderson et al. (2002) of the impact of China's WTO accession on the income inequality between the farm and non-farm sectors sheds light on this issue. Applying the Global Trade Analysis Project (GTAP) model, they estimate that the abolition of the *hukou* system will increase farm out-migration by threefold and that farmers' overall post-accession earnings from agriculture will significantly improve over the alternative scenarios in which the *hukou* system is still in place. Their results suggest that WTO accession accompanied by labour market reform will not only

increase the aggregate welfare gain, but also reduce income inequality and poverty in China.

Investments in agricultural infrastructure, R&D, and human capital

Investments in a country's agricultural sector have the potential to stabilize the domestic food economy and enhance food security. Timmer (1998, p.204) points out that this potential is greater in large countries that affect world prices when they import and in rice-based economies because the world rice market is very thin and unstable. Along this line of argument, investments that help raise labour productivity in the grain sector would be a cost-effective way for the Chinese government to safeguard farmers' incomes. Based on the contrasting experiences of South and Southeast Asia between 1960 and the 1980s, Timmer (1991, p.25) concludes that agricultural investments will be a successful measure to boost farm incomes only in the context of well-functioning factor markets, urban-rural links, and a competitive industrial sector. And rural poverty will not be eradicated until agricultural labour productivity rises significantly, which requires an effective development strategy in both agriculture and industry to raise real wages for unskilled workers. Timmer's assertion reinforces the importance of first rectifying the distorting institutions and deficient economic structures in the Chinese economy.

Recent studies on the rural economy of China also draw similar policy implications regarding the importance of investments in agricultural public goods including infrastructure, R&D, education and health care in maintaining agricultural growth (Jin et al., 2002; Rozelle and Huang, 2000, Zhang et al., 2002a). Investments in rural education and health care that boost human capital are crucial to the rural economy in two ways. First, enhanced human capital increases one's ability to make efficient adjustments in resource allocation to the changing economic environment.

Second, better education and health increase the productivity of those who choose to remain in the farming sector (Schultz, 1975). Increasing investments in rural human capital is an effective way to safeguard farmers from the shocks that come with domestic reforms and WTO accession. While various studies on rural incomes in China show that the rates of returns to years of schooling may be modest, especially prior to the mid-1990s, education is found to increase significantly rural workers' chance of getting non-farm jobs (Parish, et al., 1995; Zhang et al., 2002b). These empirical findings verify the importance of the 'allocative effects' of education to the rural economy.

However, while improved access to non-farm employment is found to be an effective way to reduce poverty and inequality in China's rural areas (Zhang et al. (2002a), it may not serve the purpose of maintaining grain self-sufficiency. Based on the past development of China's rural sector, Rozelle and Huang (2000) predict that carefully managed investments in agricultural research and other infrastructure will give the sector its biggest boost if self-sufficiency in grain remains a priority. Various researchers point out that raising grain prices further is not a practical way of improving farmers' income as many land-intensive products including wheat and corn are already sold at prices near or higher than the world market levels. They recommend the use of AMS in agricultural infrastructure instead (CASS-RDI, 2000b, p.2; Huang and Rozelle, 2002a, p.17). Fan (2000) estimates that the annual rates of returns to agricultural research investments ranged from 36 to 90 percent in 1997 in China and expects the high return to rise further if investment funds can be maintained and used efficiently.

The above studies have made important impacts on China's policy making in recent years to speed up agricultural development. It is reported that a total of 189.7 billion yuan, accounting for 28.7 per cent of the total treasury bonds issued between

1998 and 2001, was invested in agricultural infrastructure (*China Information News*, 23 April 2003). The central government has also committed to allocating a larger share of its future public investment funds to agriculture related projects such as water recovery, storage, and delivery infrastructure, as well as the research and extension of water-saving irrigation technology, high-yielding, high-quality, and technologically advanced seed varieties. Complementary credit policy has been stipulated to provide China's farmers more access to credit (Lohmar, 2001, p.4).

Following an increased commitment of the 2002 central budget to comprehensive agricultural development, agricultural science and technology and anti-poverty programs to adapt to changes emerging after China's accession to WTO (Xiang, 2002), China is set to develop its rural sector in the same direction in the coming year. Increased budgetary funds and treasury bond funds have been committed in the 2003 Budget for the following areas: (i) the extension of rural taxation reforms to increase transfers to the local rural governments; (ii) construction of infrastructural, educational, medical and health facilities in the countryside; (iii) ecological improvement; (iv) rural anti-poverty programs; (v) extension of improved strains of crops; and (vi) establishment of a quality and safety standard system and an inspection system for agricultural products (*People's Daily Online*, 6 March 2003).

Again, whether these budget outlays will bring the intended results that can justify the costs depends on the formulation as well as the implementation of the policies. It is very plausible that inappropriately formulated measures fail to tackle the problem but enable the implementers to divert transfers to themselves, repeating the same old problems discussed in Chapter 7. One concern raised by Zhang et al. (2002a) is that the continued funnelling of funds to activities without properly addressing the fundamentals problems of the fiscal revenue shortages of poor areas may distort resource allocation decisions rather than promote growth. The ambitious south-north

water diversion project launched in October 2002 may be another example of sub-optimal use of fiscal resources in the presence of distorted incentives. Many argue that increasing the prices of water and charging the use of water by volume rather than by the area of irrigated land can resolve the existing bad resource management and are more cost-effective ways to tackle the water shortage problem (Lohmar et al., 2003). Due to the huge economic and social costs of the water diversion project, (while the total cost of the project is estimated at US$60 billion, the environmental impact is harder to assess,) some doubt whether it is the best policy to tackle the water shortage problem in the northern region.

However, the more efficient solutions could be politically less viable than the massive project as the former require improved public governance especially at the local level, which may involve closing down polluting factories and promoting new types of agriculture. As noted by Binswanger and Deininger (1997) regarding the resistance to institutional changes, policy makers usually find it less costly to administer politically motivated transfers of resources within existing institutional mechanism than by creating new ones. All in all, domestic institutional and political structures will remain as the primary factors governing the formulation and implementation of agricultural and grain policies in China and may continue to obstruct the adoption of efficient measures.

Biotechnology in China

Biotechnology in China's food production deserves a separate discussion due to its tremendous potential contribution to food security in China. The Chinese government has enthusiastically backed biotechnology research since the mid-1980s and has developed the largest public plant biotechnology capacity outside of North America (Huang et al., 2002a). Technologies of genetically modified organisms

(GMOs) have been applied to rice, wheat and corn, as well as cotton and other food crops. Some researchers indicate that the allocation of a large share of China's biotech research funds to increasing yield and pest resistance in rice and other food crops reflects the government's concerns about food security (Gale et al., 2002). Yet China seems to be taking a cautious approach to the commercialization of the major transgenic food crops. GM varieties of most of China's major crops have been developed, but only a few have been approved for commercial use. Some researchers attribute the more cautious approach taken by China since 1998 to the influence of the global debate on GM crops (Huang et al., 2002b). Apparently the responses of EU and other East Asian countries to GM products will have an important impact on China's policy making regarding GM commercialization.

It is beyond the scope of this thesis to include a detailed discussion of the impacts of the commercialization of GM food products in China. I would only quote some of the studies conducted by other researchers and briefly discuss the implications of GMO technology for the grain policy in China, especially with reference to the national goal of grain self-sufficiency. To assess how the advent of GMO technology would alter the political economy of grain policy in China, one need to answer the following questions under two different circumstances. First, when the importing countries do not ban GM foods from China, will China specialise more and export GM foods while at the same time worry less about importing some other agricultural items including certain grain crops? In particular, now that the commercialization of various GM rice is technically ready (Huang et al., 2002b), will China export more GM rice and import more wheat and corn with the increased foreign exchange earnings? Second, if other countries ban the imports of GM foods, will GM technology enable China to maintain self-sufficiency in grain production at an affordable cost?

Some simulation studies using the GTAP model to estimate the productivity, welfare and trade impacts of GM adoption on the Chinese economy can help shed light on the above questions. Assuming a Hicks-neutral technological shift resulting from GM application to rice, cotton, corn and soybean, Anderson and Yao (2001) conclude that the welfare effects on China are tremendous but the actual gains depend on the policy stance regarding GM foods of the importing countries, especially China's Northeast Asian neighbours. Based on a land and labour-saving GM technology for rice and cotton, Huang et al. (2002b) estimate that the macro economic gains will far exceed the public expenditures on biotech research. Their findings show that the majority of the gain from adopting GM rice is realized within China, which will be unaffected by the potential ban on GM food products imposed by its trade partners such as the enlarged EU, Japan, Korea and Southeast Asia. Huang et al. suggest that China should continue to promote its biotechnology and commercialize its GM food crops.

While these simulation studies are important steps towards the formulation of appropriate policy regarding GM adoption, one must interpret their findings with caution especially with reference to the various assumptions implicit in the GTAP model such as full employment and perfect mobility of labour and capital across domestic sectors. The bias in the simulation results due to these assumptions cannot be eliminated completely although the researchers are also aware of the potential pitfalls and hence modify the model whenever possible with updated data from GTAP and other sources to better reflect the behaviour of the subject under study. Even after making allowance for inaccuracy in the simulation results of the GTAP models, however, one cannot deny the significant potential contribution of GM adoption to China's productivity in grain. The commercialisation of GM foods is likely to alleviate the political tensions within China resulting from the WTO-induced structural transformation.

To reflect China's enactment in 2002 of three new regulations on biosafety management, trade and labelling of GM farm products, Huang et al. (2002b) also study the scenario in which China exercises labelling requirement for imported GM soybeans and domestically produced GM rice. The installation of the labelling system for both imported and domestic crops is to comply with the GATT principle of 'national treatment'. Despite the welfare cost of labelling, Huang et al. still observe a substantial welfare gain from the adoption of GM crops. While they consider the impact of labelling on the production side, they have not incorporated the impact of labelling on the demand for GM foods. Based on an experimental auction to elicit consumers' willingness to pay for GM-labelled and standard-labelled foods, Tegene et al. (2003) show that consumers are willing to pay less for a food items produced with biotechnology. Such negative consumer attitude will discount the gain from GM commercialization. One option for China to reduce consumers' resistance is to focus on the development of the traits such as drought, cold, and salinity tolerance with naturally occurring substances like sugar in the re-engineering process. Such transgenic food crops are likely to be more palatable to critics of GM foods. For the low-income households in China, biosafety and labelling may be less of a concern. They may embrace GM foods for their low prices. As accessibility and affordability are two important elements of food security, GM technology can no doubt help improve China's food security.

Although Huang et al. (2002b) suggest that the Chinese government should put less weight on the international dimension in their decision making regarding biotechnology development, earlier discussions in this thesis have already highlighted the importance of external or international constraints on China's policy making. The policy stance regarding GM food development is no exception. In response to international consumer resistance to GM foods, the Chinese government announced in

April 2001 the temporary freeze on new GM commercial releases. Some observers assert that commercial calculations may lead China to adopt a GM-free policy to protect its grain exports to its Northeast Asian neighbours where anti-GM preferences prevail (Paarlberg, 2002). China's concern for its exports is likely to impede the commercialization of GM food crops.

Regarding domestic consumption, GM technology can be a two-edged sword to China. While its application to food crop production can be a potent solution to China's food security problem, the obligation to offer national treatment to other WTO members implies that China cannot use the technical barriers to trade to blockade GM food imports from its trade partners, most notably the US. Although the welfare impact of GM food development is definitely positive for all countries concerned (putting aside the biosafety concerns), the implication for China's grain self-sufficiency rate is uncertain. The commercialization of GM crops may undermine China's grain self-sufficiency if it does not boost China's food exports sufficiently to compensate for the possible surge in GM food imports from the US, which may continue to have a cost advantage over China due to its more advanced stage of development in GM technology. Again, political considerations that favour self-sufficiency may enjoy primacy over economic ones preventing the achievement of food security by the low-cost option of GM application.

8.3 Future research priorities

The contribution of this thesis is the coherent framework it develops to analyse how China's grain policy has evolved over time under the influences of the most crucial factors governing the policy formulation. Such a framework facilitates the correct understanding of the current situation in China's grain economy, which is necessary for guiding future policy making. Yet it takes empirical studies to conduct an

accurate assessment of the situation. In particular, it is important to ascertain if the implementation of protective procurement since 1997 really represents a switch from taxing to supporting grain farmers, or if it reflects only a reduction in the magnitude of the negative support.

While different researchers have estimated the nominal rate as well as the effective rate of protection using the state procurement prices and protective prices of grain and conclude that the rates of protection for wheat and corn are positive (Huang, 2001; Huang and Rozelle, 2002b), their estimates may not be an accurate indicator of the redistribution effect of the current procurement policy in China because of the rent-seeking behaviour of the grain officials and the illegal excessive levies that local cadres collect from farmers who sell grain through the state channel. It will be illuminating to assess the actual rate of protection distinguishing the prices stipulated by the state from what farmers actually receive. Such estimates are important to ascertain the income distribution prior to WTO accession and decide whether it requires substantial increases in budget outlays to safeguard grain farmers' incomes, or simply abolishing the quota procurement system and thereby blocking the channel that diverts government subsidies to grain officials.

The study conducted by Lin et al. (2002a & b) on China's household taxation suggests that while tax rates are in general higher for rural households than urban households, the actual burden on the former would be even heavier if the implicit tax associated with compulsory grain procurement at below-market prices could be accounted for. However, their survey data contain no information on this additional burden on rural households. Nevertheless, as already mentioned in Chapter 6, their empirical findings on the explicit taxes substantiate my conjecture that grain farmers in China are more heavily taxed than what is suggested by the state-set procurement prices. To gauge the overall income redistribution effect of the quota procurement

system, it will be illuminating to conduct household surveys on the implicit taxes and thereby estimate the total burden on farm households that are assigned grain procurement quotas.

In this thesis the welfare impact of WTO accession on China's grain economy is analysed on an aggregate basis. To draw implications for appropriate policy making, it is necessary to conduct an empirical analysis separately for each grain type. The level of domestic prices relative to world prices and the size of the committed tariff rate quotas relative to domestic production and consumption vary significantly from one grain type to another. In particular, various studies have estimated a negative rate of protection for rice implying that China's accession to WTO is not likely to harm rice producers but rather may improve their incomes.[77] On the other hand, Chinese producers of corn, whose production was supported by export subsidies prior to WTO accession, may be hard hit. Such disaggregate analyses are also important to the assessment of fiscal implications for different regions that specialise in different grain types.

Lastly, it will be a worthy endeavour to estimate the objective function of China's grain policy regarding income distribution and food security in similar manner as Branstetter and Feenstra's (2002) application of Grossman and Helpman's (1994) political-economy model to analyse China's trade-off of the gain from trade and FDI against the protection of state-owned enterprises. However, the lack of data that can accurately reflect the benefits and costs of grain consumption and production, especially in the central planning period, makes it an extremely difficult task to estimate the changes in Chinese policy makers' preferences throughout the history of the PRC. Nevertheless, it may be more feasible to restrict the study to the 1990s and the

[77] The negative rate of protection to China's rice farmers should have been understated due to the failure to take into account the adverse effect of the illegal collection of levies on their incomes.

early 2000s for which less distorted and more accurate price data are available. In particular, it will be interesting to test if there was a significant change in Chinese policy makers' preference in favour of grain farmers' welfare and whether their utility ceased to increase with the size of the procurement quota around 1997 when protective price procurement was first implemented.

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