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Political macroeconomy of agricultural policy: Rice policy adjustments in Korea

Kwon, Yong Dae, Ph.D.

University of Hawaii, 1989
POLITICAL MACROECONOMY OF AGRICULTURAL POLICY:
RICE POLICY ADJUSTMENTS IN KOREA

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ABSTRACT

Agricultural policies are likely to respond to political economic interactions rather than to the necessity for correcting market failures. Political economic approaches have gone beyond the horizons of traditional market analyses to explore why and how agricultural policies have evolved to their present forms. Meanwhile, in the formal modeling for policy analysis, it has gradually been recognized that the political economic forces associated with macroeconomic changes are sources of primary influences of government actions in the agricultural sector.

In this context, this study attempts to provide a political macroeconomic analytical framework to address how agricultural policies are functionally adjusted to the changes in the macroeconomy. Two working hypotheses guide the study: 1) agricultural policy decisions are endogenous responses to political influences of relevant interest groups rather than exogenous actions of government, and 2) macroeconomic changes affect the variation of political influences by interest groups which are transmitted to the agricultural policy making process.

The Korean rice price policy from 1961 to 1985 is modeled to specify empirically testable hypotheses, and three major interest groups (consumers, producers, and government) are assumed to exert political influences on rice policy making.

A political preference function is specified for testing the first hypothesis. The results successfully confirm the existence of differentiated political influences on rice policy making among the three interest groups. Korean policy maker in the rice sector, accommodating the aggressive pressure from the farmers, shows more favorable political preference toward the rice producers than to the other groups.
In order to test the second hypothesis concerning the relationship between agricultural policy and the macroeconomy, an econometric model consisting of 12 simultaneous equations is constructed. The major empirical findings are summarized as follows:

1) Increasing deficits in both the Grain Management Fund and the general government budget represent a reduced political position of the government in rice policy making.

2) The parity price ratio and the rural-urban income ratio are positively related with the policy maker's rising political preference toward rice producers, while declining agricultural share to total output causes rice producers to exert political efforts to influence rice policy.

3) As per capita income increases, consumers are found to make less political efforts to influence the process of rice policy making.

4) Through a simulation of the macroeconomic impact experiments, rice policy in favor of farmers is expected to remain as long as the Korean economy continues to advance.
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CHAPTER I

INTRODUCTION

1.1 Statement of the Problem

Most governments intervene in agricultural systems, yet market failures in agriculture still persist. Various types of market failures - immobility of farm resources, instability, low returns for invested capital, and so on - have been identified. Agricultural policy prescriptions for market failures has concentrated on improving efficiency based on traditional welfare analysis. In this analysis, government intervention in agriculture has been described as corrective of undesirable market performances. Along this line of thinking, pure transfers such as lump-sum taxes has been suggested as one of policy instruments for any equity problems based on the efficient calculus of traditional analysis.

As government intervention in agriculture seems not to coincide with what the traditional welfare analysis explains, economists have questioned about the dichotomous treatment of resource allocation and wealth distribution on which traditional analysis has focused (Tullock, 1967). They have argued that efficiency criteria alone can not explain in whole government intervention in agriculture. Rather, agricultural policies seem to be endogenous, and are likely to be manipulated by interest groups to their own welfare. Therefore, they started to be concerned with how the government regulation is influenced by the political economic interactions. In short, the government policies have been regarded as reflection of vested interests of the society.

For example, domestic farmgate price for rice in Korea has been more than twice the world price as a result of government intervention in rice economy. Traditional
Analyses have implicitly suggested policy prescriptions of reducing protection rates based on static welfare cost computations (Anderson, 1984). However, it has been realized that such prescriptions are not enough to provide the basis for policy reform unless the domestic political economic environments in the rice markets are fully understood.

As a result of such concerns, political economic approach, which is referred to as a system of economic and political relations that endogenously determine the values of economic variables as well as those of policy instruments, has emerged (Zusman and Amiad, 1977; Rausser, 1982; Balisacan, 1985). The implication of this new approach is that the government is an endogenous entity manipulated by powerful interest groups seeking to benefit themselves regardless of their effects on the economy as a whole. In this approach, it has been viewed that political and economic markets are not separable and simultaneously linked.

On the other hand, it has been recognized that there are increasing interdependence between the macroeconomic environment and agriculture (Penson, 1982; Gardner, 1981). Many econometric models evolved so as to capture many key linkages between the agricultural sector and the general economy (Chen, 1977; Rausser et al., 1986; Devadoss et al., 1988).

However, little attention has been paid to the fact that political economic system of agriculture, from which agricultural policies are determined endogenously, has been increasingly linked to the rest of economy. When the fact that agricultural policies responds to political economic markets, which in turn were linked to macroeconomic changes, is ignored, traditional methodology may be limited in explaining the causes of agricultural policy adjustments.

From the historical perspective of agricultural policies, as macroeconomic changes create unfavorable effects in the agricultural sector, agricultural policies have aroused more
intensive political concerns. This view provides the concept that macroeconomic changes are the sources of creating political influences on the formation of agricultural policies.

When macroeconomic variables are regarded to generate political economic markets in agriculture, it is important to know how they can impact on the mechanism by which political efforts among the interest groups to benefit from the agricultural policy are transmitted to the process of agricultural policy formation. For this purpose, a political macroeconomic approach, which focuses on the relationship between the macroeconomy and the pressures in the political economy of agricultural policy, is suggested. With this approach, we can provide the information on why and how the formulation of endogenous agricultural policy evolves in relation to the macroeconomic changes. Moreover, if the endogenized agricultural policies are successfully identified to be adjusted to the changing macroeconomic circumstances, they would provide the framework for the desired policy reforms.

This may imply that the analysis of political economic markets related to macroeconomy appropriately provides the basis for evaluating and reforming agricultural policies. Therefore, a model which accounts for political economic system of agriculture linked to macroeconomy would be needed to enlarge the positivistic knowledge about political economic approach, and provide the answers to questions on why and how endogenous agricultural policy evolves.

The rice economy in Korea may be selected as a possible case for modelling a political economic system with macroeconomic linkages. Government intervention in rice economy has been main political concerns since the dramatic changes in the structure of the macroeconomy during the past two decades. For example, since Korean government directly procured the considerable amount of rice from the farmers in 1961, there have been much political disputes on determining the government procurement price for rice, which could impact on the welfare of farmers as well as that of urban dwellers.
Accordingly, it can be inferred that, as the macroeconomic environments have changed, there have been changes in the political efforts among interest groups in the process of competing for their own benefits from the rice policy in Korea. Therefore, by examining the experiences of Korean rice industry, this study would contribute to the broadening of present knowledge on the conceptual framework of political economic system of agriculture as linked to the general economy.

1.2 Objectives of the Study

The purpose of this study is to develop a conceptual framework of political economy of agriculture linked to macroeconomy. For this purpose, an econometric model is constructed and tested, and can be applied to interpret the endogenous Korean rice policy as it adjusts to macroeconomic changes.

The main hypothesis is established as follows; macroeconomic variations have had effects on the determination of endogenous agricultural policy. To test this major hypothesis, this study suggests the following working hypotheses:

(1) Korean rice price policy has endogenously responded to the changing political pressures among relevant interest groups.

(2) Changes in Korea's macroeconomy have had effects on the relative political influences that are transmitted to rice price policies.

More specific purposes of the research are:

1) To identify the political economic system of the Korean rice industry, and to quantify the size of three interest group's (producers, consumers, and government) political influences by specifying a criterion function;
2) To construct an econometric model in which political economic system of the Korean rice industry are integrated with the macroeconomy, and validate this model;

3) To investigate macroeconomic variables affecting the endogenous rice policy in Korea and to run a simulation model to forecast the impacts of macroeconomic changes on the political economic system of rice economy.

1.3 Organization of the Study

The proposed research is organized into 6 chapters including the introduction. Chapter 2 reviews the literature which deals with the different frameworks in the political economic markets and then the nature of agriculture linked to macroeconomy. This review provides a perspective of linkages between political economic system of agriculture and the macroeconomy.

Chapter 3 describes the performance of the Korean rice economy and the macroeconomic development strategies. In the latter part of this chapter, the rice economy's political economic nature will be described.

Chapter 4 constructs the model of the political economy of the Korean rice industry linked to the general economy to test the research hypothesis mentioned in chapter 1.

In chapter 5, the results of the econometric model will be discussed. Finally, chapter 6 summarizes findings of this research, and suggests further policy implications, both at the conceptual and empirical level.
CHAPTER II

REVIEW OF THE LITERATURE

To address questions on why and how agricultural policies evolve, economists have been extending the analytical framework beyond that of traditional welfare economics, which tend to treat government actions as exogenous. Much of literature has applied the theories of political economy to explain endogenous agricultural policies.\(^1\) Also as the agriculture becomes more integrated to the general economy, economists have advanced theories to explain the interactions between the farm and non-farm sector and have attempted to establish their empirical relationships.

In the first section, we examine the theories of the political economy approach in an effort to view the government intervention in agriculture as the endogenous policy formation process in agricultural systems. In section 2, in order to shed light on the macroeconomic perspective of agriculture, materials on the macrolinkages between the agriculture sector and the rest of the economy are surveyed. Finally, since macroeconomic changes are asserted to be major sources of influences on the performances of agricultural policy variables, the concepts of political macroeconomy, incorporating the macroeconomic factors into the political economic systems of agriculture, will be introduced.

2.1 Frameworks of the Political Economic Approach

Traditional welfare analysis has attempted to explain the causes of governmental intervention to correct the market failures by viewing the government as an exogenous entity. Efficient notion of this analysis has led the policy prescriptions to the dichotomous
treatment between the resource allocation and the income distribution (Ippolito and Masson, 1978; Tweeten, 1985). But economists argued on the limitation of traditional analysis in describing the currently observed policy performances as they recognized that the governmental regulation seemed not to be positively related to the incidence of market failures. In other words, actual agricultural policies are likely to respond to political economic interactions rather than to the necessity of correcting market failures.

To answer the question of why and how the governmental policy evolves in a way that exhibits certain regularities beyond the horizons of traditional welfare analysis, much of the literature focuses on the integration of political and economic markets and the endogenization of governmental policy (Zusman and Amiad, 1977; Rausser, 1982; Balisacan, 1985; Anderson and Hayami, 1986).

The implication of this new approach called political economy is that government is endogenous entity manipulated by powerful interest groups seeking to benefit themselves regardless of their effects on the economy as a whole. The literature about political economy can broadly rely on such paradigms as liberal-pluralism (Downs, 1957; Buchanan and Tullock, 1962; Breton, 1974; Zeckhauser, 1974), Marxist Theory of the state (Morishima, 1973; Oakley, 1984; Perelman, 1987), theory of economic regulation (Stigler, 1971; Peltzman, 1976), theory of rent-seeking interest groups (Tullock, 1967; Krueger, 1974; Bhagwati, 1982; Zusman, 1976; Brock and Magee, 1978; Brock, 1979), ant the theory of efficient government redistribution (Rausser and Freebairn, 1974; Zusman, 1976; Becker, 1981; Gardner, 1981, 1987; Rausser and de Gorter, 1988), which are basically relied on the Rausser's classification (Rausser, et. al., 1982; Rausser, 1982).
2.1.1 Liberal-Plural Frameworks

The alternative formulations included in this framework are largely found in public finance literature and concentrate on the forces shaping the distribution of income and wealth in the private sector.

Basically these formulations include: the self-interest coalition (Downs, 1957; Buchanan and Tullock, 1962); self-interest median voter (Stigler, 1970); private insurance (Arrow, 1963; Pauly and Willet, 1972; Zeckhauser, 1974); social insurance (Musgrave, 1968); pareto-optimal income redistribution (Hochman and Rodgers, 1969); Relative income specification (Thurow, 1973, 1976).

Self-interest coalition models have the premise that individuals express the political demand for redistribution of income via voter coalitions. Hence, these formulations predict a continual improvement towards equality of income distribution because politicians respond to the political pressure of top 51 percent voters. Meanwhile, self-interest median frameworks focus on the presumption that income redistribute towards middle income groups.

Private and social insurance formulations assert that government intervenes in the private insurance markets in order to reduce the risk of low income families, which lead to worsening income distribution. On the other hand, pareto-optimal income redistribution suggests the concept of efficient income distribution in terms of utility function. Also Thurow (1973) suggests the relative income formulation based on the observations of the U.S. economy, in which predicts a relatively stable income distribution.

In general, liberal-pluralist models focus principally on the policy-setting process and on the relationship between policy maker and voters in particular. Accordingly, legislators are assumed to simply transmit voter preferences; their own interests are tended to be neglected. As a result, changes in income distribution is assumed to be influenced by the effects of voter's demand to politicians.
These frameworks viewed that endogenous government policy relates to only the income regardless of its source. However, as Rausser (1982) points out, income alone is not a valid criterion of interests in that income class does not necessarily reflect the wealth position of various social groupings. Actually, it is possible that some social groups may own the large wealth such as land, which cannot generate the high income.

2.1.2 The Marxist Theory of the State

These theoretical frameworks are originated from Marxian economists which are substantially different from the traditional contemporary economists (Morishima, 1973; Oakley, 1984; Perelman, 1987). The theory of the state confronted the liberal theorists of democracy with the facts about policy impacts on the distribution of income and wealth by focusing on the social background, personal ties and shared values of economic and political elites.

The production and reproduction of individuals are regarded, by the theory of the state, as an endogenous consequence of social development, while the developing society is regarded as the sum of atomistic individuals' production in traditional economics. This implies that, as the society develops, there emerges groups of agents called class-dominant capitalist class, working class, and petit bourgeois. In analyzing the role of government in public choices, government institutions are presumed to emerge as the result of the dominant capitalist class with significant monopoly power in a modern capitalist societies (Jessop, 1977; O'Connor, 1973; Roemer, 1978).

In a political framework for government policy analysis, the state is defined as the economic instrument of the dominant stratum of the ruling class—the owners and controllers of the large corporations, who have organized themselves along both interest groups and class lines. O'Connor (1974) argued that the chief aim of bourgeois class is to keep capitalism going indefinitely by concocting various recipes for economic planning and
reform. For this purpose, capitalist classes have appropriated numerous pieces of state power through a multiplicity of intimate contacts with the government.

As the observed distribution of income becomes more biased in favor of capitalist class, the working class may threaten to remove their support of the state and, hence, delegitimize the government. In the face of extreme social discontent, extreme opposition to the state and the threat of possible revolution, the government is presumed to respond by providing a range of social services and income supplements.

This means that state intervention is always subject to the inevitable influence of various class and popular-democratic struggles. It also means that the adequacy of particular policy instruments will vary not only with changes in economic structure but also with changes in the balance of political forces. The failure of specific policy measures may be due to the inadequacy of the forms of political representation with which they are linked, rather than to mistaken economic analysis.

Jessop (1977) argued that free elections provide the means to change government policies and ruling parties in response to such shifts in the balance of class forces, without threatening the smooth operation of the state apparatus as a whole. So in his view, the economic state apparatuses and their means of intervention are not neutral, but are integrated into the movement of capital and constitute a field of conflict between different interests.

Since the state has historically existed regardless of changing economic system, it seems to be inconsistent to focus on only the rigorous dominant role of specific class in describing the state. Rather, it may be proper not to explain the state as an instrument in the class struggle in the sense that the state represents a complex social relation and not a simple instrument manipulated by a single bourgeois class. Also it should be noted that contemporary capitalism exists neither in pure form nor in isolation, and that states in capitalist societies will necessarily differ from one another.
2.1.3 The Theory of Economic Regulation

The theory of economic regulation initially was established by Stigler (1970) and developed by Peltzman (1976). The focus of this theory is not on the political power but the government behavior under the stable power relationship. So government legislators and bureaucrats are not separately treated in the theory of economic regulation. Political leaders are assumed to adopt policies that will maximize their chances of remaining in office under the assumption that what is at stake in government regulation is a transfer of wealth.

In Pelzman's model the contending interest groups are supposed to be seeking wealth redistribution through the regulatory process. The regulator, taken as equivalent to an elected politician, arbitrates among the interest groups in seeking to maximize the political supports from his majority, that is, his probability of being elected. The probability of support from the beneficiary group is specified to be a function of per capita net benefit. This per capita net benefit is the total transfer to the beneficiary group from the wealth of those outside beneficiary group minus the cost spent by beneficiaries in campaign funds, lobbying, and the cost of organizing the group.

In a political market, the beneficiaries ask the former amount of total benefits and bid the latter amount of costs. Peltzman assumes that the regulator, who wants to maximize his probability of being elected, determines the size of the group to benefit, support amount from beneficiary group, and the transfer amount to the beneficiary group.

This framework demonstrates that the opposing group must be taxed less than the interest of the beneficiary group dictate. This means that the regulator seeks to balance the marginal political return from a transfer with the marginal political cost of the associated tax. Since the theory of economic regulation focus on the legislative behavior, its applicability becomes restricted to components of the election process rather than the legislative or bureaucratic process in analyzing the governmental behavior. Basically this
theory hypothesizes that government has no autonomy in implementation of policy instruments.3

2.1.4 The Theory of Rent-Seeking Interest Group

The rent-seeking framework originated with Tullock(1967). This framework was developed by Ann Krueger(1974), and its general equilibrium representation has been investigated by Brock and Magee(1978 and 1979). The basic and very simple idea of rent-seeking is explained by reference to consumer surplus as shown in figure 2.1.

At the figure 2.1, given a demand curve, DD, quantity Q would be sold at a price P. If a monopoly were organized, it would sell Q' units at a price P'. The shaded triangle represents the net loss to society. The dotted rectangle has traditionally been regarded simply as a transfer from the consumers to the monopolist.

Tullock and Krueger assume that rent-seeking group would be willing to use resources in an effort to obtain a rent, that is, the dotted rectangle, up to the point where the last dollar so invested exactly counterbalanced the improved probability of obtaining the rent. Accordingly it can be deduced that the entire dotted rectangle would be exhausted. This imply that rent-seeking activities may incur the social loss which comes from the fact that resources have been invested in unproductive rent-seeking activities. On the other hand, In Brock and Magee(1978) a noncooperative game theory framework is employed to analyze the interaction of political and economic markets, while a cooperative game formulation is advanced by Zusman(1976).
FIGURE 2.1 Consumers' Demand Curve
In the process of seeking rents among competing groups, this framework suggests both economic and political markets and a process for resolving conflicting interests. In economic markets, the desired quantities traded by buyers and sellers are equilibrated by the price mechanism, while in political markets the levels of powers exercised by conflicting groups are balanced through adjustment in the stock of social claims.

Rents are presumed to exist in both economic and political markets which may or may not be socially approved. So far, however, no one has been able to develop a method of measuring the costs of rent-seeking activities.

2.1.5 The Efficient Governmental Redistribution Framework

The origins of the efficient government redistribution framework appears in the work of Rausser and Freebairn (1974) and also Zusman (1976). Rausser and Freebairn recognized the bargaining nature of the political process but claimed that the outcome of the process can be predicted by maximizing an appropriate policy preference function. Their main contribution is in recognizing the role of pressure groups in the political process and in the corresponding formulation of the policy preference function in terms of the group's objectives.

Also a formal structure of a political economy was proposed by Zusman (1976). In his model, the political power of the various interest groups is explicitly recognized, and the resulting political economic equilibrium is presumed to be a solution to the corresponding bargaining game. Here, the emphasis is on the governing political preference function for a given set of policies. Revealed preference methodology is used empirically to infer the political weights associated with performance measures presenting the benefits of various interest groups from the selected policy choices.

Becker (1981) has employed this framework to model the political process assuming rational behavior by all participants. Also similar framework has been pursued by
Gardner (1981, 1983, 1987) and de Gorter (1982). More recently, the potential applicability of this approach to analyzing changes in agricultural policy has been demonstrated by Sarris and Freebairn (1983) and by Paarlberg and Abbott (1986), in both cases for the international wheat economy.

This efficient government redistribution approaches are concerned with how the government manages public policy with the assumption that government decision makers do rational behavior. If we suppose that underlying political process leads government decision-makers to act some form of rational behavior, there should be a criterion function or actual behavioral rules governing such behavior. Given the appropriate economic structures, the criterion dealing with a political problem may be needed to make policy choices.

In a efficient governmental redistribution, the resulting policies are presumed to be a political economic equilibrium reflecting the bargaining game among the interest groups. In other words, actual policy instrument choices can be viewed as the outcome of some bargaining process between government policy makers or bureaucrats, and the interest groups affected by particular decisions under the conditions of the economic structure, a policy objective function, and various constraints on the policy instruments. Therefore, along this line of welfare criteria, even distortionary policies such as Korean rice policy can be justified to be rationale in the sense that those policies reflect maximizing the welfare of related interest groups.

In that case, the criterion function will represent the form of social welfare function. Unfortunately, we have no way to prescribe the proper social welfare function. Modesty suggests accepting actual choices of governments as revealing the social welfare function.
2.1.5.1 *Specification of Political Preference Function*

Following the concept of efficient governmental redistribution, a modified welfare function approach called political preference function has been suggested as a methodology of dealing with endogenous policy behaviors (Sarris and Freebairn, 1983; Paarlberg and Abbott, 1986; Gardner, 1987). In this political preference function, it is assumed that there exist a policy maker whose objective is to select levels of policy instruments which maximize his welfare for a given political preference function. This implies that policy decisions are determined endogenously according to the pattern of political preference function.

Following function represents the example of the political preference function which consists of simply additive form of each interest group's welfare measure;

\[ W = WP \times PS + WC \times CS \]

where the PS and CS are the welfare measures of the two interest groups, WP and WC are the welfare weights of interest groups.

This criterion function has the relative welfare weights reflecting their power to influence policy makers to adopt a policy. If the marginal contribution of PS and CS to this welfare function is equally socially valuable, then the welfare weights of two groups would be same (WP/WC=1). But if the social attitudes toward the welfare measures of interest groups are differentiated, the welfare weights are not the same. This may reflect the fact that political motivation works by evaluating the economic values of the interest group's welfare and rank their values accordingly. Much of economic literature deals with quantifying the weights that might explain the plausible reasoning of revealed policy implements through various analytical tools (Rausser and Freebairn, 1974; Zusman, 1976; Sarris and Freebairn, 1983; Paarlberg and Abbott, 1986; Gardner, 1987).

In specifying the political preference function, the notion of interest groups become especially important and must be justified. Most of the literature dealing with endogenous
government behavior regards only the producers and consumers or the industrialists as the interest groups in agricultural policy making (Stigler, 1971; Peltzman, 1974; Balisacan, 1985). Accordingly, most theories are concerned only with the wealth redistribution process between these private groups and weighting objectives of each group when they presume a political preference function governing actual public choice.

Contrary to the above conceptual framework, actual governmental intervention may represent the implicit implements of economic efficiency, wealth distribution, or a mixture of both. It is plausible then for government to intervene somewhere in between these two behavioral extremes. Rausser (1982) suggests a well developed model of Political Economic Resource Transactions (PERTs), meaning lower transaction cost for efficiency, and Political Economic-Seeking Transfers (PESTs), which means wealth redistribution accompanied by efficiency losses to describe the actual endogenous government behavior.

In the case of agricultural policy, it has been realized that government has its own objectives as a separate interest group representing the national interest as a whole, e.g., self-sufficiency in production, lowering budget costs of farm programs. Such objectives are often directly or indirectly in conflicts with those of private groups tending to disregard the nationwide goals, as similar contradictory objectives were seen among the private groups.

If the purpose of endogenous governmental policy analysis is to make explicit the weightings used in different policy decisions so that the logic of alternative policy instrument is brought to light, we should allow the autonomy of government as a weighted interest group, along with the weights of the private interest groups, in endogenizing the governmental policy. If we can accept the hypothesis of government autonomy for the estimation of political weights parameters, this would imply rejection of the theory of economic regulation which presumes that only private groups matter (Rausser, 1982).
The weightings reflecting the government autonomy may be determined by the degree of power exerted through bureaucratic process in agricultural systems. Following Rausser's (1982) arguments, the greater government autonomy, the more likely PERT (lower transaction cost through efficiency improvement) activities will occur. This may also imply that the degree of governmental autonomy is proportionately related to the portion of government's share in the total weights of interest groups in the course of defining the political preference function.

If the governmental autonomy, viz., weights of governmental influence in public choices, relatively declines due to changing economic structures, then policy choice will gradually tend in the direction of income flow or surplus redistribution that leads to increasing dead weight loss arising from PEST-related activities more than offsetting PERT activities in terms of Rausser's terminology.

When the government provides direct or indirect economic benefits to specific interest groups along with the decision maker's political criteria, high costs of distortion policies may happen in favor of particular interest groups. For example, domestic producer price for rice in Korea has been more than 2 times world price as a result of government intervention in rice market. This high price for rice above the border price has been known to be due to the dual pricing policy and strict import control.

Traditional welfare analyses have implicitly suggested the policy prescriptions of reducing protection rates in agricultural trade based on static welfare cost computations (Cordon, 1971; Anderson, 1984). But, without understanding the domestic political and economic environments in agricultural markets, such prescriptions may not be enough to provide the basis for policy reform (Webb, 1984; McCalla, 1969). From this recognition, it should be noticed that domestic agricultural policies, which are largely determined by the political and economic factors, are main underlying grounds for understanding the roots of agricultural protectionism. Some economists have attempted to explain the increasing
agricultural protection on the basis of the theory of political economy, because of the limitations of the traditional welfare economics (Anderson and Hayami, 1986).

Political preference function approach may provide the useful answer to this distortionary policy. For example, in food importing countries, if there are no relative political power (or weight) differences among the interest groups, the optimal policy for such country will be a free-trade one in an open economy (Sarris and Freebairn, 1983; Otsuka and Hayami, 1985). As the political weight of farmers group increases, reflecting the changes in political economic institutions, there can be a growth of a protectionist policy in favor of farm producers.

2.2 Macrolinkages Between the Farm Sector and the Non-Farm Sector

This section provides an overview of literature on the macrolinkages between the general economy and the agricultural sector. During the 1950's and 1960's, the relative price stability of agricultural products and other raw materials caused most macro-modellers and policy makers to neglect the importance of agriculture and the food system (Freebairn, et al., 1982). Similarly, agricultural economists have constructed an impressive number of econometric models at the commodity level, although they have ignored any mutual interactive effects between the agricultural sector and the macroeconomy, thereby severely limiting their uses in practical work (Labys, 1975; King, 1975). This kind of modelling, for example, may be found in the works of Cromarty (1959), Egbert (1969), Quance (1972), Tweeten (1976), and Lamm (1980).

Given the increased awareness of economic interdependence among industrial sectors, the importance of agriculture, the growing demand for more detailed forecasts, and the growing elaboration of econometric models, both agricultural economists and macroeconomists were urged to direct more attention to making agricultural sectors of
macroeconomic models endogenous (Kost, 1981). So since the mid-1970s, a number of models have been developed to include the agricultural sector within the macro model from an agricultural sector perspective. These models are classified into first, second, or third-generation models according to the manner in which they recognize the linkages between agriculture and the rest of the general economy (Penson, 1982; Freebairn, et al., 1982; Devadoss, et al., 1988).

### 2.2.1 First-Generation Model

First generation models view agriculture as a separate entity. These models characterize agriculture as influenced by relatively few macroeconomic variables, such as disposable income and the implicit price deflator. Disturbances in agriculture were assumed to have no impact on the rest of the economy. These types of modelling may be found in Cromarty (1959), Egbert (1969), Quance and Tweeten (1972), and Lamm (1980). Models developed by Penson (1973), Ray and Richardson (1978), Melichar (1973), and Duoly and Norton (1973) are the representatives of first generation types. In these models, however, many of the transmission mechanisms between agriculture and other sectors are omitted.

### 2.2.2 Second-Generation Model

Some efforts were made to develop first generation models in a recursive framework. General macroeconomic models are first used to forecast a set of relevant variables that are used to solve the agricultural system. These types of modeling include that of Chen (1977) on the Wharton agricultural sector model and of Roop and Zeitner (1977), who tried to include most of the intersectoral relationships and policy instrument variables. However, in those models, there are neither feedbacks to other subcomponents nor links with other financial sectors of the macroeconomy. They also failed to include explicit variables to represent sector policies.
2.2.3 Third-Generation Model

Economists began to recognize that any significant change in one component alters the whole economy, and changes in the agricultural sector are frequently significant enough to affect national aggregates. In response to such recognition, several econometric models have been developed to determine the endogenous linkages between the agricultural sector and other sectors. Shei (1978) and Lamm (1981) are among the pioneers who developed models dealing with the autonomous interaction between the domestic macroeconomy and the international agricultural economy. Also Prentice (1981) built a model which consisted of more than 100 equations and provided greater details regarding many parts of the economy than were available in the models developed by Shei and Lamm. However, Prentice's model ignored the increasingly important financial linkages between agriculture and the rest of the economy.

Hughes and Penson (1980) generated a model based on a massive data collection. In their model, emphasis is on the financial linkages, but little attention was given to the determination of exchange rates. Freebairn, Rausser, and de Gorter (1982) established the model of forward and backward linkages between the agricultural and general economies to investigate their mutual interactions.

On the other hand, Schnittker (1973), Hathaway (1974), Cooper (1975) and Lawrence (1980), and Prentice and Schertz (1981) have investigated policy options for ameliorating the effects of volatility in the agricultural sector on general economy prices and macroeconomic performance.
2.3 The Political Macroeconomy of Agricultural Policy

In this section, the nature of interactions between the macroeconomy and political economic system of agriculture will be examined. Historically, macroeconomic changes have been found to provide grounds for major agricultural policy changes. If macroeconomic linkages have been singled out as primary sources of government intervention in agriculture, we should consider an alternative political macroeconomic analysis to advance our understanding of the nature of agricultural policy adjustments linked to changes in the macroeconomy.

Few studies attempted to investigate the interlinked effects of such endogenous agricultural policy changes arising from macroeconomic disturbances. Andrews and Rausser (1986) reported that, from a historical perspective of agricultural policies, political activities of farmers are bound to escalate to influence on the government policies as macroeconomic disturbances provoke unfavorable effects on farmers.

If government behaviors in agriculture are endogenized in the political economic systems where interest groups compete to influence policy determination, a policy equilibrium is defined as when there is no pressure for changing the mix of policy instruments or form of intervention from any interest group. This may imply a simultaneous solution to the economic system and the associated political conflict.

For example, when macroeconomic disturbances such as a change in the exchange rate occur, these disturbances will be transmitted to a political mechanism, which cause to change current policy instruments. The economic rationale underlying this process is that government policy is subject to the changing relative power of interest groups.

If we suppose that a policy maker has a political preference function, that governs his behavior, weights attached to the welfare measures of interest groups in that criterion function should reflect the changing political powers of interest groups, which can respond
to the variations of macroeconomic variables. Actually, it has been observed that there have been conflicts of political efforts among the interest groups in order to induce other groups to accept the policy choice in a way they would not otherwise do when macroeconomic circumstances change.

During the past decades, for example, economic structural changes in Korea provoked political and social concerns about the welfare indicators of farmers such as rural urban income ratio, parity price ratios, etc. This historical event may be the clear evidence that political economic systems of agriculture possibly have shown the causal interactions between the macroeconomic sector and government intervention in the agricultural sector.

Korean rice price policy may be the apparent case which shows the interlinkages between endogenous policy and macroeconomic changes. During the periods of economic development, Korean government has purchased a significant share of the total domestic rice output at a considerably high support price, which has resulted in raising producers' price, with tight official control over imports every year.

The level of price support for rice has been determined by political process rather than by economic principles, so as to promote self-sufficiency and to raise farm income to keep up with urban income. On the other hand, rice has been sold to consumers out of government stocks at prices substantially below government procurement price (Huh, 1980). However, there can be implicit limits to this difference between high support and low release price in the sense that there are political complaints from consumers or government because it damages their respective economic shares.

Having understood the Korean rice policy as discussed above, the hypothesis of political economic structure of agriculture with linkages to the general economy can be put forth and tested by capturing the important empirical linkages between them. By examining which factors have effects on the political weights, we can have knowledge on how much the macrovariables contribute to varying the political power of interest groups.
Based on these events, we might detect the plausible pattern of political economic behavior of government in agricultural policies, associated with the macroeconomic circumstances. A number of models have been constructed which recognize the linkages between the agricultural sector and the general economy. However, there has been no econometric model that explicitly deals with the political economy of agriculture linked with the general economy by regarding the agricultural policy as endogenous enforcement.

Since the effects of agricultural policy as influenced by macroeconomic environments, and the feedback effects of agricultural sector on the macroeconomy is the main focus of this study, we will confine our discussion to the econometric models. By doing so, we would understand the interactive process of political economic systems of the rice industry in relation to the macroeconomy. This means that the dynamic aspects of the model are emphasized in order to reflect the changing political economic system of the rice industry.

With this analysis, relevant criteria can be provided in evaluating agricultural policies. Also this approach would provide the proper prescriptions on what measure should be adopted for desired policy reforms. Therefore, this study would contribute to the general knowledge on the rationale behind government intervention in the agricultural sector.
2.4 Notes

1) The term "Political Economy" is quite diversely used in a broad variety of theories in the social science. See Staniland (1985) and Balisacan (1985) for detailed concepts.

2) In the U.S., it seems harder to explain the questions of why in the 1980s, when farmers account for 2.5% of the population and wealthier than the nonfarm population on the average, government interventions to aid farmers are even greater than they were in the 1930s (Gardner, 1987, p. 347). Similarly, in Japan, while the income of farm households exceeded that of urban households by more than 120 percent (1.2 times) since late 1960s, government continuously implemented high support price policy which resulted in more than 2 times international price for rice (Hayami, 1982).

3) Rausser (1982) argued that the issue of government autonomy can be investigated by statistical tests on the conditional weight associated with transaction costs in the governing criterion function.

4) For further details on these kinds of modeling examples, there are estimates of beef import control program effects by Freebairn and Rausser(1975), Arzac and Wilkinson(1979), dairy industry program by Salathe, Dobson, and Peterson(1977), Novakovil and Tompson(1977).

5) For example, U.S. government began to enforce agricultural price support through the provision of loans with the creation of the Commodity Credit Corporation after it recognized a farm crisis that had its origins in macroeconomic adjustments after World War 1. see Andrews and Rausser (1986) for details. Also the Korean government has not implemented the high price support policy for rice until the late 1960s when the income imbalances between the agricultural and the industrial sector was seriously recognized (Kim and Joo(1982)).

6) As a method of analysis of agricultural policy answering the above question, economists have developed the different types of economy-wide models - linear programming (Goreux and Mann, 1973), econometric (Rausser et. al., 1986), and computable general equilibrium (CGE) ( Adelman and Robinson, 1985; McCarthy and Taylor, 1980)- in order to analyze the plausible effects of agricultural price policy in relation to the complicated interaction of the whole economic system.

7) Andrew and Rausser( 1986) drew conceptual attention to the importance of the political economy aspects of macroeconomic linkages with agriculture in the U.S.
CHAPTER III

THE MACROECONOMY AND POLITICAL ECONOMY OF RICE IN KOREA

3.1 Macroeconomic Development and Rice Economy

3.1.1 Structural Change of Macroeconomy in Korea

At the early stage of economic development, agriculture occupies a dominant position in the general economy since most labor is employed in food production, and incomes are determined primarily by land endowment per capita. As economic development progresses, declining share of agriculture in terms of output and employment characterizes one of the changes in the economic structure.

However, the pattern of such structural change depends on which development strategy has been pursued in the course of economic development. From a modern perspective of economic development, there are three roads to industrialization: 1) agricultural commercialization and gradual industrialization; 2) agricultural collectivization and forced industrialization; 3) agricultural reform and rapid industrialization, featuring two diverging industrializations, that is, inward versus outward oriented development strategy (Ahn, 1986).

Korea, once an agricultural country, took the road to economic development through agricultural reform and rapid industrialization. It has successfully carried out rapid economic growth by opting for outward-looking development strategies particularly during the past two decades. As a result, real GNP growth averaged more than 8 percent per year in 1962-1987, leading to an increase in real per capita income by about 6 percent per year.
This dramatic growth of the Korean economy is largely based on the rapid expansion of exports as outward-looking strategies are adopted. Its exports growth averaged more than 20 percent annually from 1960 to 1985, which was very high compared to the standard growth of the world export market (Gillis, etc. 1987).

The typical signs of economic structural changes, associated with rapid growth of the Korean economy, have been clearly evident. Table 3.1 shows major indicators of economic development and structural changes in Korea during the period 1960-1985. During this period, income in terms of per capita GNP has increased more than 20 times, which indicates rapid economic growth. The manufacturing sector has been growing at more than 10 percent per year, doubling its share of GNP by the early 1980s, while that of agriculture fell more than 50 percent in the same period. This change in the relative shares of the two sectors has been mainly due to the difference in growth rates.

Accordingly, mass migration of rural population into the cities, induced from expanded job opportunities, has caused the manufacturing sector's share of labor force to increase from 4.4 percent in 1960 to 24.4 percent by 1985. On the other hand, agriculture's share of labor was drastically rapidly reduced from 60 percent in 1960 to less than 25 percent in 1985.

As shown in table 3.1, one clear pattern of changing economic structure in Korea is that, as per-capita income rises, the share of agriculture in output and employment declines. This phenomenon has been common in the process of economic development and has been analyzed in detail by many economists (Chenery and Syrquin, 1975; Hayami and Ruttan, 1985; Ercolani, 1986; Yamauchi, 1987; Anderson, 1987).
TABLE 3.1  Macroeconomic Development and Structural Adjustment in Korea  
(1960-1985)

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<tr>
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<tr>
<td>Total GNP</td>
<td>8.4</td>
<td>9.8</td>
<td>8.5</td>
</tr>
<tr>
<td>Manufacturing GNP</td>
<td>15.7</td>
<td>16.7</td>
<td>9.0</td>
</tr>
<tr>
<td>Agricultural GNP</td>
<td>4.4</td>
<td>4.3</td>
<td>4.8</td>
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<tr>
<td>Share of Manufacturing(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GNP</td>
<td>13.7</td>
<td>17.8</td>
<td>20.8</td>
<td>26.2</td>
<td>29.6</td>
</tr>
<tr>
<td>Labor force</td>
<td>4.4</td>
<td>9.4</td>
<td>13.2</td>
<td>18.6</td>
<td>21.7</td>
</tr>
<tr>
<td>Exports</td>
<td>13.8</td>
<td>61.0</td>
<td>77.3</td>
<td>81.9</td>
<td>90.5</td>
</tr>
</tbody>
</table>

| Share of agriculture(%) |
| GNP   | 36.5 | 37.6 | 26.8 | 24.9 | 14.6 | 13.5 |
| Labor force | 60.0 | 58.6 | 50.4 | 45.9 | 34.0 | 24.9 |
| Exports   | 30.9 | 16.6 | 9.6  | 13.2 | 7.3  | 3.8  |

<table>
<thead>
<tr>
<th>GNP per capita (US$)</th>
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<tbody>
<tr>
<td>82</td>
</tr>
<tr>
<td>105</td>
</tr>
<tr>
<td>248</td>
</tr>
<tr>
<td>590</td>
</tr>
<tr>
<td>1589</td>
</tr>
<tr>
<td>2047</td>
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</table>

Source: Economic Planning Board, Korea
3.1.2 Structural Adjustments in Agriculture

Korea has the arable land resource endowments. It has fewer than 60 hectares of arable land per 1000 people, compared with a global average of more than 300 hectares. Furthermore, population density is about 415 person per square Km in 1985, which was third highest in the world. In addition, rapid growth in population, which is already far beyond 40 million people by the early 1980s, has limited the expansion of farm land, which is currently about 17 persons per hectare.

Accordingly, it has been pointed out that poor land resources in Korea has been the main constraint to increasing domestic agricultural production and has led to chronic shortage of food. Despite a weak base for agriculture, Korea was traditionally agricultural in the sense that most of the population were engaged in agricultural production, and the share of agriculture in GNP makes up a large portion. As earlier mentioned, over 60 percent of the total labor force were employed in agriculture until the early 1960s.

Since the 1960's the Korean economy maintains very high economic growth rates by world standard, which resulted in rapid urbanization and industrialization. As a result of successful industrialization, agriculture's share in labor and output was dropped to 24.9 and 13.5 percent respectively in 1985. So Korea's experience in economic development seems to be consistent with theory -- that economic development should be accompanied by a diminishing role of agriculture.

Table 3.2 shows the major indicators of structural change in agriculture. Absolute farm population has increased until mid 1960s although its relative proportion of total population continued to decline since the early 1960s. After 1970, even farm population, in terms of absolute size, has constantly decreased to 9 million by 1985. Accordingly, farmland per household slightly expanded as a result of decreasing farm population. It was 0.88 hectares in 1961, and has expanded to 1.11 hectares by 1985. Utilization of crop land, however, gradually declined in relation to farm population.
Table 3.2 *Indicators of Structural Changes in Korean Agriculture (1961 - 1985)*

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<tbody>
<tr>
<td><strong>Total population (mil.)</strong></td>
<td>26</td>
<td>29</td>
<td>32</td>
<td>35</td>
<td>38</td>
<td>41</td>
</tr>
<tr>
<td><strong>Farm population (mil.)</strong></td>
<td>15</td>
<td>16</td>
<td>14</td>
<td>13</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td><strong>Ratio of Rural to Urban Income (%)</strong></td>
<td>98.1</td>
<td>99.7</td>
<td>67.1</td>
<td>101.6</td>
<td>84.0</td>
<td>99.9</td>
</tr>
<tr>
<td><strong>Utilization of Total Crop Land (1,000 ha)</strong></td>
<td>3,084</td>
<td>3,560</td>
<td>3,478</td>
<td>3,144</td>
<td>2,765</td>
<td>2,592</td>
</tr>
<tr>
<td><strong>Farmland per Farmhousehold (ha)</strong></td>
<td>0.88</td>
<td>0.91</td>
<td>0.93</td>
<td>0.94</td>
<td>1.02</td>
<td>1.11</td>
</tr>
<tr>
<td><strong>Engel Coefficient (%)</strong></td>
<td>54.2</td>
<td>56.7</td>
<td>46.5</td>
<td>48.9</td>
<td>42.6</td>
<td>36.8</td>
</tr>
<tr>
<td><strong>Food self-sufficiency (%)</strong></td>
<td>94.5</td>
<td>93.9</td>
<td>80.5</td>
<td>73.0</td>
<td>56.0</td>
<td>48.4</td>
</tr>
<tr>
<td><strong>Grain Imports (1,000T)</strong></td>
<td>396</td>
<td>570</td>
<td>2,115</td>
<td>3,012</td>
<td>5,051</td>
<td>7,336</td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture, Forestry and Fisheries, Korea
However, the slower growth rate in agriculture, compared to the growth rate of industrial sector and reducing rate of farm population, has been the chief constraint in raising farm labor productivity. The fundamental reason for low farm labor productivity is that the average farm size is only a little above one hectare, mainly due to a government regulation of restricting operational holdings of arable land to less than three hectares per farm household. As a result, farm household income is relatively lower compared to the urban households income as shown in the table 3.2.

On the other hand, structural changes in the Korean economy did not only create a large increase in the demand for agricultural products, but also caused substantial shifts in urban food consumption patterns toward higher-quality food. Although Korean farmers became more motivated to increase production in response to the changing demand, there has been a rapid decline in food self-sufficiency mainly due to the limited capacity of croplands to expand. Also excess demand for animal protein food, due to a remarkable growth in demand but limited supply capacity because of the lack of pasture lands, has made it inevitable for the Korean government to import considerable amounts of beef.

National food self-sufficiency rate was 94.5 percent in 1960, but it dropped significantly to less than 50 percent by 1985. Lower self-sufficiency rates imply that Korea has to rely on the food importation to meet demand requirements. In 1960, imported amount of major grains was 570,000 tons, which was enough to meet the demand, but in 1985 Korea has to import 7,336,000 tons which is a 10-fold increase to satisfy the demand.

Meanwhile, as per capita income increases, the proportion of food in total household expenditure declined from 54.2 percent to 36.8 percent in a span of two decades. This statistical indicator may be the evidence that the overall standard of living condition in Korea has considerably improved.
3.1.3 Performance of the Rice Economy

Among various agricultural products, in Korea rice has occupied a dominant place in terms of economic value and its potential socio-political influences. So the term agriculture has actually been synonymous with the rice industry. Accordingly the Korean government has been concerned with the performance of the rice industry and emphasized on development control for economic and political purposes. Traditionally, the rice industry have played an important role as a staple food in the Korean diet. As the structure of agriculture changed in the course of economic development, the rice industry have also had substantial structural adjustment. It has changed its role in the general economy especially since 1960s.

Table 3.3 indicates the major statistics reflecting structural changes in the rice industry. It marks up about 54.1 percent of the total value of crop receipts in 1961 and gradually dropped to less than half of it after the 1970s. Consequently, rice share of total agricultural production decreased from 59 percent in 1961 to 34 percent in 1985. However, share of paddy land to total planted acreage was reduced very slightly during this period although the absolute size of paddy land slightly increased. Considering the reduced proportion of rice in terms of farm income, this indicator may be the evidence that the role of the rice industry in agriculture has diminished. The supply of paddy land for rice production is almost completely inelastic due to the limited availability of land as well as to the low substitutability in land use between paddy and upland. Hence, the source of increased production comes mainly from growth in land productivity. Korea has attained the rapid growth in land productivity for rice during the past two decades. In 1961, rice yield per 10a was 304 kg, and that figure increased to 456 kg in 1985, which was much higher than the world average. This high yield has been achieved mainly through the introduction of high-yielding varieties and improvement of irrigation facilities, together
TABLE 3.3. Structural Change of Rice Industry In Korea

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<tr>
<td><strong>Share of Rice(%)</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Crop Receipts</td>
<td>54.1</td>
<td>53.3</td>
<td>50.4</td>
<td>47.1</td>
<td>48.7</td>
<td>48.0</td>
</tr>
<tr>
<td>Agriculture</td>
<td>59.0</td>
<td>39.0</td>
<td>37.0</td>
<td>41.0</td>
<td>33.0</td>
<td>34.0</td>
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<td>23.3</td>
<td>22.7</td>
<td>22.2</td>
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<td>Planted Acreage</td>
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<td></td>
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<td></td>
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<td>(1,000 ha)</td>
<td>1,297</td>
<td>1,293</td>
<td>1,273</td>
<td>1,277</td>
<td>1,307</td>
<td>1,325</td>
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<tr>
<td><strong>Supply &amp; Demand of Rice (mil/ton)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Consumption</td>
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<td>3,925</td>
<td>4,394</td>
<td>4,699</td>
<td>5,786</td>
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<td>4,090</td>
<td>4,445</td>
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<td>5,626</td>
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<td>-1</td>
<td>541</td>
<td>481</td>
<td>580</td>
<td>0</td>
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<tr>
<td><strong>Self-sufficiency(%)</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per capita</td>
<td>111.9</td>
<td>100.7</td>
<td>93.1</td>
<td>94.6</td>
<td>95.1</td>
<td>103.3</td>
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<tr>
<td>Productivity(kg/10 a)</td>
<td>304.0</td>
<td>289.0</td>
<td>330.0</td>
<td>386.0</td>
<td>289.0</td>
<td>456.0</td>
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</table>

Source: Ministry of Agriculture, Forestry and Fisheries, Korea
with high price incentives. Accordingly, total production of rice during the period 1960-85 has shown an upward annual trend averaging at more than 2 percent.

Despite increases in rice productivity, Korea had to import substantial amount of rice throughout most of the 1970's, as consumption outpaced production growth. Generally, the reason was rapid urbanization, which means greater demand for marketed rice. Increasing per capita rice consumption resulting from income growth has mainly contributed to the necessity of importing large amount of rice. However, as rice consumption per person drop since the late 1970s due to the shift in demand to high quality food such as meats and vegetables, Korea need not to import the rice since the 1980s except during the bad harvest of 1980.

As shown in table 3.3, per capita consumption of rice has declined since 1980. This implies that in the future Korea will have the surpluses of rice if the current pattern of production and consumption maintains. Following Anderson's analysis (1982), the income elasticity of demand for rice is expected to be -0.1 percent in case of projecting the future consumption.1

3.2 Review of Major Rice Policies in Korea

Along with changes in the macroeconomic environments, basic government policies for rice have also changed in accordance with the conditions of the rice economy as well as the underlying political social environments.

Figure 3.1 shows the chronicle of major rice policies implemented during the 1943-1985. Rice policies in Korea since 1945 can be classified into two major periods- 1945-1960, 1961-present.

In reviewing a historical perspective of rice policy, we focus on the the nature of political economy of its policy adjustments in relation to the changes in the macroeconomy.
Figure 3.1 Chronicle of Rice Policy and Institution (1943-85)

3.2.1 The First Period (1945-1960)

After Korea was liberated from Japanese Imperialism in 1945, US military forces, which governed South Korea for 3 years before the independent Korean government was established in 1948, changed rice policy by lifting the rice market control in 1945. But this free market policy for rice aggravated rice market conditions, and substantially contributed to hyper inflation because of lack of supply and an upsurge of demand suppressed during the Japanese rule.

So in early 1946, complete rice market control was again implemented by the US military forces to restrain rising rice price and inflation. As a control measure of rice market, US military authority enforced a price-ceiling system at the retail level for 11 major commodities, including rice. However, this price-ceiling system did not work because of farmer's complaints and resistances. Therefore, the US military government resorted to compulsory rice collections from farmers, and a complete ration system for consumers. It is known as the similar to the rice policy implemented by the Japanese government. Through the Rice Collection Decree, this policy continued to be in force until August 1948. These series of events may be one of the evidences that the rice industry in Korea had played a critical role in association with the economic and political environments.

After the US military government, the Korea government was established in 1948, and ruled by President Sung-Man Lee (1948-60). Lee's government, which tried to solidify his political base in the early days of the Republic, began to undertake land reform in 1950. Land reform in Korea contributed to the establishment of a system of independent owner operated small farms, although there is no evidence of increased agricultural production due to the land reform. At the same time, a measure to collect a land tax in kind, and a scheme to barter rice for fertilizer was initiated mainly in order to finance government expenditure.
Lee's government then abolished the old decree and came up with the Grain Purchase Law in November 1948. The main contents of this law is virtually the same as that of the old Rice Collection Decree. Grain Purchase Law ruled that rice producers are required to sell to the government all their harvest after provisions for home consumption, and free market transactions for rice were prohibited. However, the Grain Purchase Law did not become effective in achieving its objectives because of insufficient procurement, and lower than market price paid to farmers. During these periods farmers could be said to have suffered from benign neglect agricultural policy.

During and after the Korean War (1950-53), Korea faced chronically severe shortage of food grains due to devastated farmlands and mass refugees coming from North Korea. Instead of providing policy incentives to boost the rice production, the government tried to maintain rice prices as low as possible in order to alleviate the demand push inflation and to rehabilitate the war-damaged economy. In addition, the PL 480 food grain grants from the United States in the 1950s and 1960s had significantly contributed to maintaining the low price for rice.4

As a measure of maintaining the low rice price policy, the Grain Management Law was promulgated in 1950. Based on this law, the Lee government had the authority to purchase rice from the farm sector at a price lower than the estimated costs of production. It lasted until 1960. The Grain Management Law gave the government a wide-ranging budgetary and administrative authority to purchase, store, transport, and establish prices for agricultural products. Later in 1963, 1967 and again in 1970, the main provisions of the law were amended, but the basic direction remained the same until now.

Burmeister (1988) suggested that this agricultural policy against farmers could be possible due to the political weakness of farmers resulting from land reform. He argued that both political and economic atomization after land reform rendered the rural sector powerless in the face of concentrated national administrative pressures. Although it is
admitted that farmers had no political influence in the implementation of that policy, the reasons behind such policy should be re-examined in the sense that most farmers did not even recognize the discrimination policy. Above all it should be noticed that the income gap between the agricultural and urban sectors were not seriously recognized during this period.
TABLE 3.4. **Major Statistics of the Rice Price Policy in Korea**  
unit: Won/80 Kg

<table>
<thead>
<tr>
<th>Year</th>
<th>Gov't Purchase price</th>
<th>Gov't Release price</th>
<th>Procurement Ratio(%)</th>
<th>Production Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>1,550</td>
<td>1,792</td>
<td>8.9</td>
<td>1,377</td>
</tr>
<tr>
<td>1965</td>
<td>3,150</td>
<td>3,420</td>
<td>8.6</td>
<td>2,672</td>
</tr>
<tr>
<td>1966</td>
<td>3,306</td>
<td>3,350</td>
<td>9.0</td>
<td>2,495</td>
</tr>
<tr>
<td>1967</td>
<td>3,590</td>
<td>3,900</td>
<td>7.8</td>
<td>2,735</td>
</tr>
<tr>
<td>1968</td>
<td>4,200</td>
<td>4,100</td>
<td>4.1</td>
<td>3,403</td>
</tr>
<tr>
<td>1969</td>
<td>5,150</td>
<td>5,400</td>
<td>7.8</td>
<td>3,565</td>
</tr>
<tr>
<td>1970</td>
<td>7,000</td>
<td>6,500</td>
<td>8.9</td>
<td>4,642</td>
</tr>
<tr>
<td>1971</td>
<td>8,750</td>
<td>9,500</td>
<td>12.3</td>
<td>4,682</td>
</tr>
<tr>
<td>1972</td>
<td>9,888</td>
<td>10,680</td>
<td>12.8</td>
<td>6,115</td>
</tr>
<tr>
<td>1973</td>
<td>11,377</td>
<td>11,264</td>
<td>11.4</td>
<td>6,578</td>
</tr>
<tr>
<td>1974</td>
<td>15,760</td>
<td>13,000</td>
<td>16.5</td>
<td>8,683</td>
</tr>
<tr>
<td>1975</td>
<td>19,500</td>
<td>16,730</td>
<td>16.9</td>
<td>12,434</td>
</tr>
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<td>19,500</td>
<td>20.0</td>
<td>13,891</td>
</tr>
<tr>
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<td>26,000</td>
<td>22,420</td>
<td>23.4</td>
<td>15,171</td>
</tr>
<tr>
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<td>30,000</td>
<td>26,500</td>
<td>23.4</td>
<td>20,665</td>
</tr>
<tr>
<td>1979</td>
<td>36,600</td>
<td>32,000</td>
<td>23.4</td>
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<td>52,000</td>
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<td>1984</td>
<td>57,650</td>
<td>54,260</td>
<td>21.4</td>
<td>39,124</td>
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<tr>
<td>1985</td>
<td>60,530</td>
<td>49,000</td>
<td>19.4</td>
<td>41,675</td>
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</tbody>
</table>

Sources: Ministry of Agriculture, Forestry and Fisheries, Korea  
Food and Agriculture Organization note: based on the financial year
3.2.2 The Second Period (1961-present)

Park's government (1961-79) began to undertake successively the five year economic development plan which caused significant structural changes in the economy after President Park's ascent to power with the backing of the military power in 1961. At first, he promised to improve the agricultural terms of trade (lower prices for inputs and higher prices for products) mainly with the intention of drawing political support from the rural sector. But as the government placed the development priority on the industrial sector, his announced policy for farmers relatively degenerated.

Instead, Park's government reorganized agricultural research and extension operations by combining the activities of the Ministry of Agriculture, Forestry and Fisheries (MAF) into those of the Office of Rural Development (ORD). Also government programs in the area of agricultural input supplies, commodity marketing, and agricultural credit were consolidated in a National Agricultural Cooperative Federation (NACF).

Under the circumstances of high population growth and poor natural resource endowments in Korea, the industrial policy of Park's government was to promote labor intensive manufactured exports in which Korea has a comparative advantage. However, this development policy left agricultural development stagnant because prices of agricultural products have to be kept low, especially that of rice, in order to maintain the low wages in the industrial sector.

Table 3.4 indicates the contents of the rice price policy and other related indicators during 1961-1985. The Korean government began to purchase rice directly from farm household at more than the estimated production cost at the beginning 1961. In 1961, the government purchased 8.9 percent of domestic production at the price of 1,550 won per 80 Kg, which is over the rice production costs, 1,377 won per 80 Kg. This implies that the government has attempted to maintain rice prices at high levels through government
purchase and release in favor of rice producers. Although procurement price is enough to cover production cost, this price level is still below the market price.

Also the government has increased the procurement amount so as to substantially influence the private rice market. Government purchases increased from 8.9 percent of total rice production in 1961 up to 19.4 percent in 1985. However, until the late 1960s when high price policy began, agricultural policy may be viewed to have been implemented in favor of the urban sector in the sense that the procurement price of rice still remained lower than the market price.

The income gap between the rural and urban areas had become wide as a result of the higher productivity growth of the non-farm sector compared to the farm sector. Also Korea experienced increasing amounts of food imports to meet the growing demand resulting from population growth and industrialization. Furthermore, in the late 1960s, the United States started to decrease the PL 480 food grain grants. The deepening imbalance between agricultural and industrial sector in terms of income and output caused the Korean government to seriously consider its agricultural support policies in order to ameliorate this worsening structural imbalance.

As a means of increasing rice production and narrowing the income gap, in the Autumn of 1968, the Government's rice policy underwent a marked change by adopting a high price policy for rice in the real sense. In 1968, the Government raised the purchase price to 4,200 won, which was 17 percent higher than the previous year. In the succeeding years, the annual rate of price increase was 23, 36, 25, 13, 15, and 39 per cent respectively. This high price supporting policy is evaluated to have significantly achieved the policy goals of narrowing the income gap, and increasing production (Kim and Joo, 1982).

Since the objective of government procurement of rice is to subsidize rice producers without gaining an economic margin, it is natural for the government to bear the cost of
operating a high price support policy. Cost of government procurement and release for 1971 - 1985 are shown in table 3.5. It is shown that the unit net loss of implementing the rice price policy continually increased except for 1972.7

Escalating government deficit due to the high cost of high price support policies for rice and barley finally emerged as one of the serious constraints to the grain price policy itself. Deficit from operating Grain Management Fund continue to accumulate every year since 1972 because it has been financed through a long-term overdraft from the Central Bank.
<table>
<thead>
<tr>
<th>Year</th>
<th>Product Purchase Price (A)</th>
<th>Purchase Cost (B)</th>
<th>Handling Cost (C = A + B)</th>
<th>Total Release Price (D)</th>
<th>Net Price (D)</th>
<th>Loss (% D/A)</th>
<th>Profit (%)</th>
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</thead>
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<tr>
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<td>1,180</td>
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<td>11,292</td>
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<td>83.3</td>
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<td>73.4</td>
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Sources: Food Grain Policy Bureau, Ministry of Agriculture and Fisheries, Korea
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<th>Barley</th>
<th>Others</th>
<th>Wheat Flour</th>
<th>Total</th>
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<td>4</td>
<td>---</td>
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<td>219</td>
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<td>---</td>
<td>631</td>
</tr>
<tr>
<td>1978</td>
<td>1,540</td>
<td>145</td>
<td>-94</td>
<td>---</td>
<td>1,591</td>
</tr>
<tr>
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<td>1,851</td>
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<td>-49</td>
<td>---</td>
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<td>1,068</td>
<td>-51</td>
<td>---</td>
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<td>-421</td>
<td>1,280</td>
<td>27,074</td>
</tr>
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</table>

Source: Ministry of Agriculture, Forestry and Fisheries, Korea
Table 3.6 shows the aggravated deficits in the Grain Management Fund, caused by dual price system and the increase in the procurement volume. The reason is that the fund is mainly financed by the transfer from general budget and borrowing from the Bank of Korea. The accumulated deficit in the Grain Management Fund in 1986 amounted to 27,074 billion won (U$ 3,143), as shown in Table 3.6. In 1985 alone, the deficit amounted to about 345 billion won (U$ 388 million). These large amounts of deficits are the results of the net loss of dual price systems for rice and barley and increasing purchasing volume of those grains.

As the budget burden due to the accumulation of deficits in the Grain Management Fund increase, the government remedied the situation by slowing the increasing rate of government procurement prices. After 1976, the annual increase rate of rice purchase price began to fall behind inflation rate. At the same time, the free market price of rice was held up by the slowing growth in government purchase price through out the 1976-85 period. So, increasing rate of rice purchasing price was not enough to put a halt to the continuing adverse shift in the terms of trade between the agricultural and industrial sector.

Despite farmers' complaints, low level of purchase price for rice may imply that the objective of limiting the deficit for the government itself dominated over the objective of improving farmers' economic conditions in the process of policy decision making. This may also represent the implicit objective of the government to minimize its cost in setting the level of policy instruments.

Chun's government (1980-1987) followed a similar line to Park's government. The main problem in agriculture during this period is to reconcile the farm household income and the urban households rather than to increase agricultural productivity. So as a short-run measure, rice price support policy is preferred to maintain income parity between the agricultural and non-agricultural sectors. The reason is that rice, particularly, has been the main source of farm household income due to the little opportunity to earn off-farm
income. This price support policy has also been rationalized from a long-run perspective because the policy was expected to increase the self-sufficiency for rice. (Kim and Joo, 1982).

3.3 The Nature of Political Economy for Rice Policy in Korea

The brief historical perspective of the rice policy, mentioned in section 3.2, suggests that there is a systematic evolutionary process of policy adjustment to macroeconomic changes through the social and political interactions. Institutional changes reflected in these policy adjustments may be addressed within the political economic systems.

Development theory suggests that at the early stage of economic development, agricultural sector may be sacrificed in the process of capital accumulation in the industrial sector. In the political economic approach, this phenomenon may indicate that the political power of farmers is weal, dominated by the other sector's interest group.

However, in Korea farm sector's contribution to capital formation required for industrialization is limited because it has food production base not enough to provide the savings to the industrial sector. So Korea is a case where capital formation is not drawn from agriculture, but by borrowing the funds from abroad. This historical phenomenon may imply that, even at the early stage of development, the rice industry is considered as a beneficiary of macroeconomic development, rather than a sacrifice for the industrial growth.

As income growth of the industrial sector is higher than that of agricultural sector, farmers began to know that, without changing agricultural policies, it is difficult to keep up with the non-farm sector. Based on this perception, price policy for rice became the main political issue particularly since the late 1960s.
In 1967 presidential election, opposition presidential candidate Yun Po-Sun had campaigned for a policy of increased rice price and decreased fertilizer price, emphasizing a boost in the worsening farm income. A further decline in rural incomes 1971 estimates put rural per capita income levels at one-third that of urban levels (Kass, 1972) - was cited by opposition politician Kim Dae-Jung as the prime cause of growing regional inequalities between the rural and urban sectors in his 1971 presidency campaign. So Park's government became increasingly worried about the political repercussions of declining rural income largely due to the "industry first" policy.

This phenomenon may imply that the political power of farmers implicitly enters the policy maker's decision making function. Pressures on changing policy for rice may be based on the recognition of the imbalance between the rural and urban sector brought about by the economic development. Eventually it can be said that macroeconomic structural change may provide the basis for policy motivation to compensate the farmers. In the political macroeconomic approach, it suggests that farmers resorted to political efforts rather than to marketing systems to share the increasing economic pie that resulted from economic growth.

Responding to pressures from the farmers who want to benefit from economic development, the Korean government normally relied on the high price policy in favor of farmers. The government purchased considerable amount of rice from the farmers at the announced prices and sold them to urban dwellers at a much lower price especially since the late 1960's (see table 3.5). Also there is a tight control over the rice imports to maintain the high level of price for rice. This practice bid up the average farm gate price of rice.

The political economic nature of the rice economy in Korea has insulated the domestic rice market from the world market due to strict government control of rice imports. As a result, there has been no direct relationship between the domestic and international prices. Domestic producer and consumer prices for rice went up above the
border price even if it was released to consumers at price below the government's cost of acquisition.

As a result of government intervention in rice industry, domestic price for rice in Korea became toward the growth of protection. Table 3.7 shows the comparison of the domestic producers price with the border price, and the nominal protection rate. Estimated nominal protection rate in this study uses the c.i.f. prices of rice in Hong-Kong for border price. The consumers in both Hong Kong and Korea have shown a similar diet pattern and imported the same variety of rice.9

Nominal protection rate over the 100 percent indicates the protectionism of the rice industry. Table 3.7 shows that the Korean rice industry has been protected even at the early stage of economic development since nominal protection rate was already above 100 percent in 1961. Domestic producer price for rice has been constantly increased to reaching 3.1 times world price by the year 1985.
TABLE 3.7. Nominal Rate of Rice Protection In Korea

<table>
<thead>
<tr>
<th>Year</th>
<th>Price Received By Farmers (A)</th>
<th>Border Price (B)</th>
<th>Nominal Protection Rate (A/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>1,626</td>
<td>1,196</td>
<td>135.9</td>
</tr>
<tr>
<td>1965</td>
<td>3,210</td>
<td>2,829</td>
<td>113.5</td>
</tr>
<tr>
<td>1970</td>
<td>6,106</td>
<td>4,159</td>
<td>146.8</td>
</tr>
<tr>
<td>1975</td>
<td>18,653</td>
<td>14,985</td>
<td>124.5</td>
</tr>
<tr>
<td>1980</td>
<td>48,893</td>
<td>23,074</td>
<td>211.9</td>
</tr>
<tr>
<td>1981</td>
<td>55,564</td>
<td>27,928</td>
<td>198.9</td>
</tr>
<tr>
<td>1982</td>
<td>57,462</td>
<td>24,387</td>
<td>235.6</td>
</tr>
<tr>
<td>1983</td>
<td>58,827</td>
<td>23,816</td>
<td>247.0</td>
</tr>
<tr>
<td>1984</td>
<td>60,340</td>
<td>22,825</td>
<td>264.4</td>
</tr>
<tr>
<td>1985</td>
<td>66,971</td>
<td>21,574</td>
<td>310.4</td>
</tr>
</tbody>
</table>

Source: 1) Statistics on Prices in Rural Areas, NACF, Korea  
2) Annual Report, FAO
Anderson (1982) estimated the benefit of high price to farmers at 4 billion dollars per year in 1977-79 by using the consumer and producer's surplus approach. Also another study reports that the estimated efficiency loss in production and consumption due to the government intervention is 267 and 152 million dollars respectively in 1985 (Myung and Lee, 1988).

In explaining the political economic nature of a protectionist policy for rice, Anderson and Hayami (1986) applied the liberal-plural frameworks in which politicians are assumed to maximize their chances of remaining in office. These frameworks are largely found in public finance theory (Downs, 1957; Buchanan and Tullock, 1962; Breton, 1974; Zeckhauser, 1974).

According to their arguments, macroeconomic changes provide the grounds for the growth of protection rates. The reason is that, as macroeconomic development advances, the downward shift in the supply curve of protection due to declining comparative advantage, and shift out of demand curve due to the declining share of agriculture, decide the protection rate in the invisible political market. Consequently, they viewed that the rapid growth of macroeconomy accelerates the growth of protectionism through shifts in the supply and demand curves for protection policy in the political market.

However, even if macroeconomic structural changes take place, these changes may not necessarily lead to the growth of protectionism. There can always be offsetting factors to the growth of protection rates depending on the unique systems of the economy. For example, it is well known that land resource abundant countries such as the U.S.A., Canada, and Australia have continually maintained low agricultural protection rates even if these countries have already experienced structure changes enough to cause high protection rates.

On the other hand, we have found that developing countries such as Korea and Taiwan have maintained a considerably high rate of protection even at the early stage of
economic development, probably due to poor land resource endowment (World Bank, 1986). Table 3.7 apparently suggests that, although the economic stage of Korea was still premature in the early 1960s, domestic price for rice was already above the border price.

As long as resource-rich economies can maintain a strong comparative advantages in agriculture while changing the structure in the macroeconomy, their domestic agricultural support policies need not necessarily result to high protection rate, even if the non-agricultural sector shoulder the cost of supporting domestic agricultural producers from the declining share of agriculture. So it can be inferred that the declining share of agriculture, reflecting the structural change, need not be a necessary condition for increasing protection rate.

Actually, low protection rate have been found in resource abundant, developed countries although there are political arguments about the excessive support to domestic agriculture during the structural adjustment. Therefore, the political economic markets defined by the liberal-pluralism rationale may not be quite sufficient as framework of analyzing the political economy of agricultural policy. In a sense, agricultural protection rate can be the indicator to free trade in terms of the comparative advantage theory, rather than the result of changes in the political markets.

We need, at this point, an appropriate analytical framework that can utilize the relevant political economic paradigms and empirical models to explain domestic rice policies, which may provides underlying protectionist policies. Among the various frameworks mentioned in chapter 2, the efficient government redistribution approach is chosen to describe the political economic structural relations of the Korean rice economy.

In government intervention in rice economy, we must determine if such intervention focuses on the election process, the legislative process, the bureaucratic choice process or some combination. In setting rice policy, farmer's interest is considered to be too particular to affect the overall election of all politicians. So it seems logic that the
decision range of the rice policy would reach the level of bureaucratic behavior within the administration.

In such case, as a close approximation to the real political economy of rice, it seems plausible that the institution for rice policy decisions have the reduced form, or a governing criterion function in which the critical role of the special interest group in the formation of rice policy are recognized and taken into account. More recently, the potential applicability of such criterion function approach has been demonstrated as a methodology of analyzing the political economy of agricultural policy (Sarris and Freebairn, 1983, Paarlberg and Abbott, 1986).

In this approach, it is assumed that there exits a rice policy maker whose objective is to select levels of for a set of rice policy instruments which maximize his welfare for a given political preference function. This implies that policy decisions are determined endogenously according to the pattern of political preference function. The political preference function presumes that each interest group try to maximize its own objectives from the specific level of rice policy. It is assumed that there are three interest groups—consumers, producers, and government—in formulating the preference function.

Notion of interest groups put forward in this preference function is important in conceptualizing rice policy. As the structure of the general economy moves towards declining agricultural share, a common phenomenon may be the surging political pressures to change rice policy from the producers and consumers so as to benefit from it. In Korea, as substantial changes in economic structure occurred since the early 1960s, rice policy has focused on how rice policy are negotiated between the producers group and the consumers.

In addition, if it is accepted the hypothesis that the government has autonomy, government would have its own objectives as a separate interest group in the political effort to influence the rice policy. This suggests that the political preference function should include a welfare measure for the government as an argument of the function. Otsuka and
Hayami (1985), in their work on the rice policy in Japan, argued that the goal of the government is to minimize budget costs in achieving the target level of rice policy.

The higher nominal protection rate rooted on the domestic rice policy may indicate the increasing influence of farmers' group on the policy maker's perception of the farmer's political position. On the contrary, as the per capita income of people in the urban area rise, the consumer group demands less of maintaining low price for rice. In other words, the consumer group tend to reduce the political complaints on the increasing rice price as they recognize the decreasing share of food expenditure (Engel coefficient). Also it can be suggested that the government has its own political influences on rice policy as a representative of taxpayers bearing the cost of operation of the rice policy.

Therefore, it is assumed that the political preference function comprises of weighted welfare measures of the interest groups ascribed to their political powers. Conceptually, the resulting weights can be interpreted in terms of an equilibrium solution to a political economic bargaining game through the complicated political procedures.

Since macroeconomic changes are major sources of influence on the rice policy, it can be hypothesized that these changes have had effects on the political power of the interest groups in the process of formatting rice policy. By doing so, if the question on the relationship between the selected macroeconomic variables and the political economic system of rice policy is answered, the political macroeconomic approach suggested for rice policy may provide the possibility of developing more relevant criteria and information on the political economic nature of rice policy adjustments over time.
3.4 Notes

1) Past estimated income elasticities of rice, however, has been positive even if it is believed to show the negative elasticity as time elapses. The above estimation of negative price coefficient of rice consumption support Anderson's argument that the income elasticity has declined and will even be negative as per capita income continuously goes up. For details, see Huh(1982).

2) The price of rice was 1,000 Hwan in October 1945 and jumped to 6,000 Hwan in less than 2 years, while general prices shot skyward by more than ten times during the same period. Refer to Moon (1980) and Myoung and Lee (1988) for details.

3) For details, see Burmeister(1988) and Moon (1980).

4) PL 480 food grains were imported from the U.S.A. from 1956 to 1966 based on benevolent aids, and the total importing amount during this period was 6,879,000 tons. For its economic analysis, see Kim, Hyung-Hwa and Kim, Byung Taik (1984).

5) Refer to Kim, Hyung-Hwa and Kim, Byung-Taik (1984)

6) For detailed analysis, refer to Moon(1980).

7) The main component of handling cost has been justified to be the interest cost. In 1985, interest expense took about 60 percent of the total intermediate cost of rice released through the government channel. See Bureau of Grain Policy, Ministry of Agriculture, Forestry and Fisheries (1988) and Myoung and Lee (1988).

8) See Gillis, etc.(1987) for detailed discussion.


10) Gardner(1987) suggested the hypothesis of an increasing marginal political weight (preference) for producers' incomes as their relative incomes decreases.
CHAPTER IV

MODELING THE POLITICAL MACROECONOMY OF THE KOREAN RICE ECONOMY

The previous chapter describes the historical, political and social factors influencing the way rice price policy has been adjusted over the past two decades. The main political issue among interest groups has been how the government should set the price level. The Korean rice economy experienced systematic increases in the price of rice. Generally, farmers and pro-farmers groups cry for higher producers' price while consumers group often complain about rising price of rice. On the other hand, the government justifies its decision as to the level of price as a measure of improving the imbalance between the rural and urban sector.

This chapter presents a political macroeconomic approach to explain the rice policy and macroeconomic linkages. The focus is on the positive rather than normative aspects of political economy of Korean rice industry in the sense that the theory of efficient government's redistribution is empiricized. The conceptual and methodological approaches are emphasized to measure how policy makers accommodate the competing efforts of interest groups to influence rice price policy for their own benefits, and to measure the macroeconomic determinants of changes in their policy influencing efforts.

This model differentiates itself from the previous studies as followings:

First, previous studies that have attempted a 'political economy' approach to explain agricultural policy has relied on the liberal-pluralism paradigm (Balisacan, 1985; Anderson and Hayami, 1986). This framework focuses on the costs and benefits of investments in
political influences by various interest groups and how changes in the cost-benefit structure may lead to changes in agricultural policy. Investment in political influences may take the form of resources expended in political campaigns and lobbyings, the cultivation of bureaucrats and politicians, and in other ways. It views the generation of political pressure as being determined by the demand and supply for institutional changes in the political economic market.

Consequently, a major shortcoming of the previous studies is that it does not quantify the relative policy influencing powers among the interest groups. This is because of the difficulty in revealing the costs and benefits of investment in generating political influences.

Second, the studies did not pay much attention to the basic economic forces to generate the political pressures. Rather they attempt to utilize such factors as coalition cost, free rider problem, and voting power as a methodology of analyzing the political pressures. This study, on the other hand, focuses on the macroeconomic forces as a source of creating the political pressure.

Following this line of thinking, a conceptual political macroeconomic framework of Korean rice economy is mathematically modeled by three sets of equations categorized as follows; (1) structural equations of the Korean rice economy, (2) endogenous policy decision equations, (3) political macroeconomic system equations.

Section 1 deals with the structure of the domestic rice economy with simplified demand and supply equations. Section 2 describes the levels of policy instruments influenced by the political and economic forces. A political preference function is established to detect and measure the bargaining powers of interest groups that represent the policy influencing efforts. Section 3 specifies an econometric model, consisting of simultaneous equations, to investigate how macroeconomic forces are related to the policy
maker's political willingness to favor a group. Finally, section 4 specifies the data source for empirical estimation, and section 5 summarizes the structural model.

4.1 The Structure of the Domestic Rice Economy

In describing the structure of the domestic rice economy, supply and demand functions can be represented as the major components of rice economy. There are various kinds of functional forms in analyzing the parameters of supply and demand functions (Yoon and Sung, 1988). In this study, we focus on the linear form of supply and demand functions to conveniently estimate the later simultaneous econometric models. In addition, supply and demand are specified in terms of the domestic production and consumption level that clears the market equilibrium condition.

In this model, domestic production is supposed to be a function of the following variables: 1) domestic producers' price deflated by the index of prices paid by farmers in the previous year, 2) farm wage rate divided by the index of prices received by farmers, 3) one year lagged production, 4) dummy variable for poor harvest in 1980. Mathematically,

$$DP_t = F_1(PDP_{t-1}/PAI_{t-1}, FWI_t/SAI_t, DP_{t-1}, DUM_1) + u_{1t}$$  \hspace{1cm} (4.1)

where $DP_t$ and $DP_{t-1}$ are the domestic quantities supplied in year $t$ and $t-1$ respectively; $PDP_t$ is the current prices faced by domestic producers in year $t$; $PAI_t$ is the index of prices paid by farmers in year $t$; $FWI_t$ is the index of wages in the farm sector in year $t$; $SAI_t$ is the index of the prices received by farmers in year $t$; $DUM_1$ is a dummy variable for the year 1981; and $u_{1t}$ is the zero mean independent random variables.

Rice prices were set by the Korean government just after harvesting seasons. Thus, rice price in previous year may be a major factor in deciding the current year's planting.
Farmers are likely to respond to the real price received in the previous year through a geometric lag when they decide the size of planted area for rice production.

If one period lagged explanatory variable ($X_{t-1}$) affects the dependent variable ($Y_t$) through a geometric lag, the functional form is

$$Y_t = f(X_{t-1}, X_{t-2}, X_{t-3}, ....) + e_t \text{ or simply rewriting,}$$

$$Y_t = f(X_{t-1}, Y_{t-1}) + u_t$$

Following the theoretical model above mentioned, one year lagged real producers' price ($PDP_{t-1}/PAI_{t-1}$) and one year lagged domestic production ($DP_t$) are selected as a means of imposing lagged distribution effect on the domestic rice production.

The index of real farm wage rate ($FWI_t/SAI_t$) is used as a proxy for production cost because farm wage makes up a large portion of the agricultural management expenditures. The increasing production cost is expected to have an negative impact on the rice production. The dummy variable ($DUM_t$) for the particularly poor harvest in 1981 is chosen to explain the impact of bad weather on rice production.

Aggregate domestic consumption is assumed to have a functional relationship with the real consumer price for rice and the per capita income. General consumer theory suggests that these variables are relevant in analyzing consumption behavior. If we assume that rice consumption are gradually affected by the consumers' price through a geometric lag, theory would tell that we may select one year lagged domestic consumption variable ($DC_{t-1}$) and consumers' price ($CDP_t$) to impose a lagged distribution effect on the equation.

Domestic consumption of rice is assumed to have negative relationship with domestic consumers' price divided by the consumer price index ($CDP_t/CPI_t$), but positive relationship with per capita real income ($GNP_t/POP_t$) according to the general consumer theory. In functional form, we have,
\[ DC_t = F_2(CDP_t, CPI_t, GNP_t/POP_t, DC_{t-1}) + u_{2t} \]  

(4.2)

Where \( DC_t \) and \( DC_{t-1} \) are the quantities demanded in year \( t \) and year \( t-1 \) respectively; \( CDP_t \) is the current price faced by domestic consumers in year \( t \); \( GNP_t \) is the gross national product in real terms for year \( t \); \( POP_t \) is total population in year \( t \); and \( u_{2t} \) is the zero mean independent random variable in year \( t \).

In the equation 4.2, it is assumed that the government acts as if it buys all the domestic supply at \( PDP_t \), and satisfies domestic demand at \( CDP_t \). So \( PDP_t \) and \( CDP_t \) can be regarded as the results of government purchase and release operations at particular price levels. In other words, the producer price (\( PDP \)) and consumer price (\( CDP \)) may be represented as the price levels in the market which the government can maintain through various policy instruments, (e.g. monopolistic government procurement, and import restriction).

Since domestic rice production usually does not meet domestic demand for rice, Korea often had to import a considerable amount of rice. Considering the market clearing conditions which the rice economy faces, quantity flows are established by the following equation:

\[ DP_t = DC_t + ST_t - ST_{t-1} - NIM_t \]  

(4.3)

where \( NIM_t \) is net import of rice in year \( t \); \( ST_t, ST_{t-1} \) are rice stocks in year \( t \) and \( t-1 \) respectively.

Equation (4.3) shows that domestic production is equal to domestic consumption plus net changes in stock minus net imports.
4.2 System of Endogenous Policy Decisions

4.2.1 Political Preference Function for Policy Decisions

As described in chapter 3, the objective of Korean rice price policy is not necessarily to improve the economic efficiency of producers but to settle a social conflict among the interest groups. If we regard the Korean rice policy as a measure of solving the political bargaining game based on efforts of interest groups to influence rice policy, we need a relevant paradigm to analyze the nature of rice policy adjustments.

In this study, political pressure is regarded as a result of a zero sum bargaining game in the sense that many special interest groups compete for larger benefits from a given economic pie. In that case, each interest group would attempt to dominate the other conflicting groups so as to take advantage of the policy for its own benefit. Thus, agricultural policy may be regarded as a result of what interests of the groups are arbitrated in the process of competing for larger benefits from a given economic pie.

As mentioned in chapter 2, efficient government redistribution framework views policy decisions as the outcome of a political bargaining process. It claims that an appropriate political preference function can reveal the role of pressure groups in determining endogenous policies which leads to vary the policy maker's political willingness to redistribute income through policy adjustments. In this political preference function, it is assumed that there exists a rice policy maker who acts to arbitrate the conflicting objectives of interest groups who seek their own benefits from the rice policy. As an arbitration of competing efforts of interest groups to influence the rice policy, he is supposed to select the levels of a set of rice policy instruments so as to maximize his political preference function, consisting of the weighted additive welfare of each interest group.
Here, the policy influencing efforts of interest groups are reflected in the political willingness of policy maker to redistribute income through adjusting the rice policy because policy maker is assumed to act as an arbitrator rather than exert his own authority in policy decision making. With this assumption, the political preference function will capture the political willingness to redistribute income among interest groups in the course of setting the levels of rice policy instruments. This implies that policy decisions are determined endogenously according to the pattern of the political preference rate toward the interest groups. The potential applicability of this approach, based on the concept of social welfare function, has been demonstrated by other economists as a methodology in dealing with endogenous policy behaviors (Sarris and Freebairn, 1983; Paarlberg and Abbott, 1986; Gardner, 1987).

Basically, political preference functions originated from the welfare function. So political preference function can be expressed in various functional forms, namely, exponential, additive, logarithmic, and multiplicative forms. Here the political preference function ($W_t$) is assumed to have additive properties of the interest groups' welfare in order to focus on the essence of the political economic system, and to simplify the empirical analysis. The political preference function ($W_t$) for the policy maker in Korean rice economy is assumed to be expressed in weighted additive terms as follows:

$$W_t = WP_t \cdot UP_t + WC_t \cdot UC_t + WG_t \cdot UG_t$$  \hspace{1cm} (4.4)$$

where $WP_t$, $WC_t$, and $WG_t$ are the political weights attached to the producers, consumers, and government in year $t$ respectively; and $UP_t$, $UC_t$, and $UG_t$ are the welfare measures of the producers, consumers, and government in year $t$ respectively.

The results of bargaining powers among the interest groups are expressed in terms of political weights.\(^1\) The political weights, which represent marginal values on the interest
groups' welfare measures, rank the policy maker's preferences toward the interest groups because the weights are the results of competing policy influencing efforts of interest groups. So it can be interpreted that political weights capture the degree of policy maker's political willingness to favor an group which depends on the political bargaining powers among interest groups seeking to benefit themselves.

When the policy decisions are subjected to the political influences of interest groups, it is important to justify the notion of interest groups in conceptualizing the endogenous rice policy. The higher the rice price, the higher profit for the farmers. On the contrary, the lower the rice price, the less the food expenditure of the consumers. In this study, it is assumed that three interest groups- government, producers, consumers- which have their own independent objective functions, are included in the policy maker's political preference function. By including the welfare measure of the government in the political preference function, we accept the hypothesis that the government has an autonomy as an interest group, contrary to the theory of economic regulation.

The welfare measure of domestic producers (UP) is assumed to be their net profit function whose argument is the producers' price faced by farmers, and is expressed as follows;

\[ UP_t = P(PDP_t) \]  \hspace{1cm} (4.5)

where \( P(.) \) is the profit function of rice producers; \( PDP_t \) is price faced by farmers in year \( t \).

In defining this objective function, rice producers are assumed to be homogeneous, competitive, and profit maximizers. As the profit goes up due to higher producers' price, the welfare of rice producers will increase. Later, the property that the profit function from the partial derivatives with respect to the price of rice yields the supply function for rice
producers will be exploited in order to estimate the political weight of the rice producers (Varian, 1985; Paarlberg and Abbott, 1986).

Consumers are assumed to be homogeneous, and to maximize utility as described by quasi-homothetic preferences (Gorman, 1961). In that case, a utility maximization problem may be used to define an aggregate expenditure function, \( E(CDP_t, Ucons) \), whose arguments are the prices faced by consumers, \( CDP_t \), and a given level of constant utility \( (Ucons) \). So it is assumed that the consumers' objective is to minimize expenditures for rice consumption for a targeted level of utility.

The objective function of the consumers' group is defined as follows:

\[
UC_t = -E(CDP_t, Ucons) \tag{4.6}
\]

where \( E(.) \) is the expenditure function from rice consumption; \( CDP_t \) is the price faced by consumers in year \( t \); and \( Ucons \) is the given utility level.

The Political weight of consumers \( (WC_t) \) attached to the objective function of the consumers reflects their political efforts to benefit from the rice policy. The properties of the expenditure function and the condition of identities of Hicksian and Marshallian demand functions will be used for estimating the political weight of consumer group (Varian, 1985).

In Korea, the major goals of governmental policies for rice is to achieve a high degree of self-sufficiency, and parity between farm and urban household incomes. In order to attain such goals, rice is often sold to consumers at prices below purchase prices although consumer price is much higher than the international price. In attaining these policy objectives, there has been a large-scale government rice procurement at announced prices every year, and tight control over rice imports.
The government is assumed to maximize the revenue for such given level of policy goals. In an effort to address the proxy for government revenue, it is assumed that the government is buying all domestic supply at PDPt, satisfying domestic demand at CDPt, and importing rice at border price, BPRt, for given policy goals described above. Thus, the objective function of government can be the net revenue (or expenditure) to the government as a result of rice policies, defined as:

\[ UG_t = CDP_t \cdot DC_t - PDP_t \cdot DP_t - BPR_t \cdot NIM_t + (PDP_t - CD_P_t) \cdot (ST_t - ST_{t-1}) \]  \( 4.7 \)

In equation (4.7), the government revenue is measured by the net fiscal balance through Grain Management Fund (GMF) after accounting for all receipts from consumers and outlays to producers, importers, and for stock changes. The first term on the right hand side of the equation is the government revenue from selling to consumers (domestic production multiplied by consumer price) in year t, the second term is the cost of purchasing (domestic production multiplied by producers price) in year t, and the third term is the payment of importing rice to foreign countries (border price for rice multiplied by the import amount) in year t. Finally, the fourth term represents both outlays (negative) and receipts (positive) from adding to or drawing down on the rice stock in year t.

4.2.2 Specification of Rice Policy Instruments

There have been various rice policy instruments for achieving the policy goals mentioned earlier. For long-run, the Korean government has placed an emphasis on increasing rice production through institutions for input supply, research and extension services, consolidation of land, etc.

Recognizing the political economic nature of the rice industry, however, the Korean government's main policy for rice has been to set prices both for the rural producer and the
urban consumer. The reason is that the government can accommodate a political bargaining game among the interest groups through price policy rather than other policy instruments. Similar type of policy in other countries have broadly prevailed, which may be an evidence of the inseparability of the political nature and the economic conditions of agriculture.

Based on the above description, it is assumed that domestic price policies for rice can be selected as major policy instruments reflecting the situation of the political economy of the rice industry. It is assumed in this model that current price policy resulted from a domestic welfare optimization problem. In this framework, producer and consumer welfare, and government gains (negative gains means deficit) are assumed to be explicitly traded-off objective functions. In other words, government policy instruments are to set producer and consumer price in order to maximize the policy maker's political preference function, which consists of each interest group's weighted welfare measure.

It should also be noted that price policy focuses on explaining the selection of alternative levels of given policy instruments rather than the choice of available institutional changes. This implies that rice policy decision making is determined generally in the bureaucratic choice process rather the election process or the legislative choice process. (Rausser, Lichtenberg, and Lattimore, 1982). So, for a given legislation, actual policy instruments choice in this model will be viewed as the results of maximizing the policy maker's political preference function through interactions of each of the interest group's political influence.

Actually, the policy instruments of rice in Korea are to influence the private markets through the operation of purchase and release price levels, and the amount associated with the government's stock and import management. In this model, producers' price \( \text{PDP}_t \) and consumers' price \( \text{CDP}_t \), which reflect the results of a combination of price and quantity operations, are regarded as the policy instruments to simplify the model.
Usually the quantities of rice imported are predetermined in accordance with the estimated overall demand and supply for a given year. Imports of rice are handled directly by the government. In equation (4.3), the amount of imports \((NIM_t)\) is automatically determined for a given volume of the rice stock variable \((ST_{t-1} - ST_t)\) in year \(t\), while the domestic supply and demand are determined by equation (4.1) and (4.2). Therefore, the import variable \((NIM_t)\) is also a policy instrument endogenously determined in the definition of market clearing constraints.

4.2.3 Determination of the Political Weights

The political weights reflecting the bargaining power and policy influencing efforts play an important role in determining the government behavior in rice policy. There are various approaches to estimate the political weights so as to represent their changing impacts on domestic policy instruments and endogenous economic variables: Keeny and Raiffa's multiattribute utility analysis (1976), Rausser and Freebairn's set of criterion functions (1974), Zusman N-interest group of revealed preference (1977), Theil random rational behavior (1971, 1974), McFadden qualitative choice models (1975, 1976).

However, None of the above methods appear to be entirely adequate for estimating the political weights transmitted to the final determination of the policy and the relationship between policy alternatives and the generation of political effort (Rausser, Just, and Zilberman, 1980) At present, available methods of endogenizing policy choice in political economic systems are largely empirical, using simple approximate structures. Within these structures, it claims that political weights reflecting social power of interest groups are inferred from past policy actions (Johnson, 1986).

Along this line, a method called revealed preference can be used to quantify the invisible policy influencing efforts of the interest groups, which are the weights attached to the political preference function, without specifying the market conduct. The basic
assumption of revealed preference method is that the actual past levels of price policy are close to the optimal selection (Rausser and Freebairn, 1974, Gardner, 1987).

This method can provide the relevant information on the changes in weights of each group to trace the relative changes in the influences that lead to a change in the level of endogenous policy instruments. More recently, the potential applicability of this method in analyzing changes in agricultural policy has been demonstrated by Sarris and Freebairn (1983) and by Paarlberg and Abbott (1986), in both cases for the international wheat economy.

The computational formulas for the political weights were derived by maximizing the political preference function \( W_t \) given in equation (4.4), subject to the market clearing constraint in equation (4.3) with respect to three policy instruments - the producers' domestic price \( PDP_t \), consumers' domestic price \( CDP_t \), and net import \( NIM_t \). By substituting the \( PDP_t \) and \( CDP_t \) into the first order conditions derived from maximizing the constrained political preference function, we can estimate the political weights in each year \( t \). This is the way in which we calculate the changing revealed political weights of producers, consumers, and the government in the political preference function. The detailed procedure for estimating political weights is presented in Appendix A.

If there are different political attitude toward the interest groups by the policy maker, political weights would be differentiated since the weights are designed to represent the political willingness to favor an interest group. When the weights are tested to be different among interest groups, it can be said that the policy maker is responsive to the interest groups' policy influencing efforts. Therefore, the priority ranking of the welfare measure of each interest group might be differentiated by the policy maker. Further, if the estimated political weights are different pairwise among the interest groups, we can reject the null hypothesis that policy influencing efforts of interest groups do not exert on the rice policy maker's political willingness to adjust the rice policy in favor of a group.
If the values of the weights are all equal to one, then the political preference function is equivalent to national welfare as conventionally defined. If all but the weight on the government are not zero, and that weight equals zero, then it implies that rice policy cannot be endogenously determined. With prices to all behavioral agents being equal, the political preference function is equivalent to net social payoff used in solving the spatial equilibrium trade problem for a competitive equilibrium (Bawden, 1966). The pattern of weights plays an important role in specifying market conduct.

The maintained assumption for this approach is that policy makers know the underlying domestic behavioral relationships, which are stable over time, and correspond to the estimated econometric model of the domestic rice market. The weights representing political preference rate toward the interest groups are the results of implicit political lobbying and campaign by the interest groups. As political circumstances change over time, so may these weights. In turn, the changes in these weights cause changes in the levels of policy instruments, is one explanation for the variation in those levels.

4.2.4 Determination of Endogenous Rice Price Policy

Once we have established the functional relations between the political weights and the levels of rice policies, we can derive the formulas for deciding endogenous domestic prices for producers and consumers. By simply rearranging 3 equations which represent first order conditions in Appendix A, we have the following identities for endogenous price determination;

\[
PDP_t = (DP_t \cdot WP_t / WG_t - DP_t - ST_t + ST_{t-1}) / (\partial DP_t / \partial (PDP_t / PAL_t)) + USBPR_t \cdot EX_t
\]  

(4.8)
where USBPR_t is the border price of rice in terms of current US dollar in year t; EX_t is the official exchange rate in terms of Korean won in year t; \[ \partial DP_t / \partial (PDP_t / PAI_t) \] is the price coefficient for domestic supply in year t; \[ \partial DC_t / \partial (CDP_t / CPI_t) \] is the price coefficient for the domestic consumption in year t.

From these equations, it is possible to evaluate how the various political economic factors contribute to the establishment of endogenous price levels: First, border price for rice is considered in rice price decisions. Border price in terms of US dollars multiplied by the exchange rate shows positive effects on the increasing price for rice. Second, the amount of domestic production and consumption associated with the price coefficients \( \partial DP_t / \partial (PDP_t / PAI_t) \) and \( \partial DC_t / \partial (CDP_t / CPI_t) \) are related to the procedure of determining producer's price. Third, the amount of rice stock in the current and previous year also have impacts on the formation of producers and consumers price. Finally, the above equations indicate that political weights of producers, consumers, and government are involved in the process of rice price decisions. For instance, from equation (4.8), the increasing political weights of producers relative to that of government indicates how these increasing powers contribute to the rise of producer price.

Further, if we move the border price variable (USBPR_t and EX_t) to the left hand side of equations (4.8) and (4.9), we can see how political economic factors influence the differences between the domestic and international prices in equations (4.10) and (4.11).

\[
PDP_t - USBPR_t*EX_t = (DP_t*WP_t/WG_t - DP_t - ST_t + ST_{t-1})/( \partial DP_t / \partial (PDP_t / PAI_t))
\]

(4.10)
\[ CDP_t - USBPR_t * EX_t = (DC_t * WC_t / WG_t - DC_t) / \partial DC_t / \partial (CDP_t / CPI_t) \]

(4.11)

These equations suggest the potential utility of the political weights in evaluating the changes in the growth of protection of the Korean rice economy. In equation (4.10), we can examine the relationship between the political weights and protection growth (in case of nominal protection rate; ratio of the difference between the domestic producer price and international price). For example, if the producers' welfare is valued higher than the government welfare as the producers' political weight goes up, the average producer price would be above the world price, which is likely to lead to protection growth.

On the other hand, the difference between producer and consumer price is determined without regard to international border prices, which cancels out in equation (4.12). Here, the differences are influenced purely by domestic demand and supply factors that are also reflected in the political weights of consumers and producers to that of the government.

\[ CDP_t - PDP_t = (DC_t * WC_t / WG_t - DC_t) / \partial DC_t / \partial (CDP_t / CPI_t) \]

- \[ (DP_t * WP_t / WG_t - DP_t - ST_t + ST_{t-1}) / \partial DP_t / \partial (PDP_t / PAL_t) \]

(4.12)

As mentioned above, identities determining the price decisions imply that there are various political economic variables influencing the producers and consumers prices with predetermined parameters. When these identities are put into the system of simultaneous equations, it is very likely that the feedback loop effects occur among the endogenous variables when running the simulation because of mutual simultaneous interaction between the endogenous variables. To avoid such problems and improve the forecasting ability of the system, identities of endogenous price determination are transformed into the behavioral equations and adjusted as follows;
In equation (4.13), the level of producers price is assumed to be endogenously decided by the border price (USBPR*EX, converted into Korean currency, the level of prices paid by farmers (PAI), the relative political value attributed to the amount of rice production in the previous year (DPt-I*WPt/WGt), and the farm wage rate of the previous year (FWI).

Similarily, the level of consumers price in the equation (4.14) is supposed to be related to the border price (USBPRt*EXt), index of consumer prices (CPIt), political marginal value of domestic consumption expressed as a ratio of political power of consumers to that of producers times consumption (DCt*WCt/WGt), and consumer price for rice in the previous year (CDPt-I). Basically, selection of explanatory variables are derived from the identities of price determination (equation (4.8) and (4.9)).

4.3 Modeling the Political Macroeconomy of Rice Policy in Korea

In this section, we focus on the political economic structure of the rice industry interacting with the macroeconomic system. Viewed in this way, we present a political macroeconomic approach to explain how changes in political and sociological forces have led to the rice policy adjustments. The conceptual framework in which the macroeconomic forces are translated into the policy can be schematically presented as in Figure 4.1.
In Figure 4.1, Macroeconomic factors are regarded as the political inputs which produce the rice policy adjustments, and then lead to changes in the performance of rice economy. The political mechanism by which the macroeconomic forces can be translated into an political pressure for policy adjustments is embedded in what is referred to as a "political black box". Attention is focused on how macroeconomic forces are transmitted to rice policy adjustments that are brought about through the policy influencing efforts.

Basically, the Korean food agency within the Ministry of Agriculture, Forestry and Fisheries calculates the rice prices in consideration of various political economic factors. As the political and economic factors changes, so does the criterion of price calculations. Here, we adopt a political preference function to represent the complicated political black box accommodating political and social forces. In the political preference function, the resultant force of these activities is expressed by the political weight (policy influencing power).

Figure 4.1 attempts to show the sequential linkages from the macroeconomy to the rice economy to understand the essence of the political macroeconomic approach. The actual transmission process is, of course, much more complicated and includes both forward and backward linkages between the rice economy and the macroeconomy.
FIGURE 4.1 Conceptual Framework of Political Macroeconomy of Rice Economy

MACROECONOMIC ENVIRONMENTS:
GNPA/GNP, SAI/PAI, RRUI, GMFD, GVD
GNP/POP, CPI, MS, INV, GX, GM, GVC, EX

POLITICAL BLACK BOX: SOCIAL VALUE
HISTORICAL VALUE, POLITICAL CAMPAIGN
LEGAL, INSTITUTIONAL SYSTEM

POLITICAL FILTER (POLITICAL PREFERENCE FUNCTION): POLITICAL PRESSURES (WG, WP, WC)

RICE PRICE POLICY ADJUSTMENTS:
PDP, CDP

PERFORMANCE OF RICE ECONOMY:
DP, DC, ST, NIM
Based on above conceptual framework, the overall model dealing with the political macroeconomic analysis consists of two submodels: (a) the political economic structure of the rice industry described in section 2, and (b) the macroeconomic system linked to the political economy for rice. We focus primarily on how rice price policies are adjusted to the changing macroeconomic environments in the political arena. For this purpose, we incorporate the macroeconomic system into the political economic system of the rice economy in order to examine which macroeconomic variables are related to the changes in political weights, and how they affect the political weights.

4.3.1 Macroeconomic Influences on Political Weights

Once we specify the political preference function for the political pressure to be transmitted to the rice policy adjustments, our next step is to explore how the macroeconomic factors are functionally related to the changes in political weights. Here, political weights represent the political filter through which macroeconomic forces are able to linked to the rice policy changes. This means that the revealed political weights of each interest group would not be exogenous but depend on economic political factors. In other words, political weights of interest groups, resulting from the conflicted political bargaining process in the political arena, would show some relationships with the variations of macroeconomic performances. Such macroeconomic forces would provide the fundamental political backgrounds for the demand for the changing policy implementation.5

Besides the political issues of agriculture, there have been increasing recognition that agriculture is strongly linked to the macroeconomy through macro prices such as inflation, interest, and exchange rates (Gardner, 1982; Penson, 1982; Timmer, et al., 1983; Devadoss, 1988). Further, Andrews and Rausser (1986) argued that macroeconomic disturbances and their links to the agriculture sector are centralized in any
historical account of the policy developments leading to a direct government intervention in the agricultural sector.

So if macroeconomic changes are major sources of generating political environments for changing rice policies, the relationship between selected macroeconomic variables and the political weights can be empirically explored. Selection of the macro variables may depend upon the particular political economic conditions of an economy.

4.3.1.1 Macroeconomic Effects on Government's Weight

The annual decision process of setting rice prices became a focus for political actions by farmers and other groups. For example, religious institutions such as the Association of Korean Catholic Farmers were organized and developed in an attempt to make efforts to influence the rice policy in favor of farmers.

Although the expansion of the economic pie facilitate the rise in the budget allocation in favor of farmers, Korean government has been gradually worried about the accumulating deficits of Grain Management Funds which finances the cost of rice price policy. The Economic Planning Board (EPB) has insisted that Grain Management Funds should be reduced since it is inflationary (Kim and Joo, 1982).

So the size of deficits of GMF has been the main limitation to continuing high price supporting policy. Also the size of total budget deficits has been a constraining factor in determining the price of government purchasing and selling rice because these operations are supposed to affect the total deficits through direct or indirect transfers of the GMFD deficits. So the size of GMF deficits and total government budget deficits are selected to explain the size of government's political weight.

\[
WG_t = F_5 \left( GMFD_t, GVD_t, LAG(WG_t), DUM_2 \right) + u_{5t}
\] (4.15)
where GMFD\(_t\) is the Grain Management Fund (GMF) deficit in year \(t\); GVD\(_t\) is total budget deficit in the year \(t\); LAG(WG\(_t\)) is the political weight of the government in the previous year; DUM\(_2\) is dummy variable for the first oil shock in the year of 1974.

If the purpose of government is to minimize the cost (maximize the revenue) for a given level of policy instruments, government as an interest group would be concerned about its fiscal balances resulting from policy implementations. Otsuka and Hayami (1985) in analyzing the rice policy of Japan pointed out that the political weights of governments associated with budget cost became weaker than that of rice producers.

However, it can be expected that the policy maker, trying to ameliorating the budget balances, gives more political preference to the government's welfare measure expressed in the cost (or revenue). Consequently, the deficits in fiscal balances will be reduced as a result of the regaining political power of the government. So weakening bargaining power of the government does not necessarily mean the increasing deficits because accumulating deficits may eventually cause the policy maker shift the political preference rate toward governments' interest. This essentially says that government can reinstate itself any time it wishes. On this basis, there is no true producers and consumers political weight, just government's preference which can favor the producer or can withhold favor if the deficits are getting too large.

The reason of including the lagged variable for government's political weight in the equation is to investigate whether historical trend of government's power is considered by the policy maker. A dummy variable was also involved to examine the impact of the first oil shock on the political weight of the government since there was an unstable international rice price.
4.3.1.2 Macroeconomic Effects on Consumers' Weight

The rice policy adjustments in favor of farmers are also largely affected by the countervailing pressure from other interest groups such as consumers group. The consumers' willingness to accept the high price for rice has been dependent on the relative size of their food cost in total household expenditures.

As per capita income rises, declining Engel Coefficient (ratio of food expenditure to total expenditure) is a common phenomenon in Korea. Also the shift to the high quality food such as animal protein reduced the importance of rice in the diet of Korean people. So it is expected that consumers become less sensitive to food price increases because of the decreasing share of food in household expenditure.

Per capita income is included in the equation of the political weight of consumers so as to reflect how consumers' political pressure responds to a rising income. Also the retail price for rice in real terms is chosen with the assumption that increasing rice price will reflect the declining political weight of the consumer. In addition, a lagged variable of the political weight of the consumer is included to examine how the historical trend of the consumer's weight affects the current political power.

\[ W_{C_t} = F_6(GNP_t/POP_t, CD_{P_t}/CPI_t, LAG(W_{C_t})) + u_{6t} \]  

where \( GNP_t/POP_t \) is the per capita GNP in year \( t \); \( CD_{P_t}/CPI_t \) is the consumer price deflated by consumer price index in year \( t \); and \( LAG(W_{C_t}) \) is the lagged variable of \( W_{C_t} \).

4.3.1.3 Macroeconomic Effects on Producers' Weight

Various political economic factors are likely to affect the generation of the policy influencing power of rice producers. But the problem is that the political efforts of farmers can not be easily quantified for economic analysis because their actual political influences are concealed in the complicated "Black Box" procedures of the political arena or do not
exist. Here, so-called farmer's political influence may be simply the policy maker's perception of and response to the perceived need to pursue a degree of rice self-sufficiency. When it is assumed that macroeconomic changes are the original sources of political influences for rice policy adjustments, a number of potentially relevant variables can be selected to explain the variations in the political efforts of rice producers to influence rice price policy as follows.

$$WP_t = F_7(SAI_t/PAI_t, DP_t/DC_t, RRUI_t, GNPAt/GNP_t, DUM_2) + u_t$$ (4.17)

where $SAI_t/PAI_t$ is the price parity index (the ratio of price received to the price paid by farmers in year $t$; $DP_t/DC_t$ is the proxy for self-sufficiency rate (domestic production divided by domestic consumption) in year $t$; $RRUI_t$ is the ratio of rural household income to urban household income in year $t$; $GNPAt$ is the aggregated value of agricultural products in year $t$; $GNP_t$ is the gross national product in year $t$; $DUM_2$ is the dummy variable for first oil shock.

While farmers increased the rice production through growth in unit productivity, the small size of landholdings preclude the balanced productivity growth between the farm and non-farm sectors. As a result, there was a steady deterioration in the relative incomes of farmers since 1960s. So farmers strongly demanded for high price support on the grounds of equity and social justice (Burmeister, 1988).

The parity ratio between the prices received ($SAT_t$) and paid by farmers ($PAIt$), and the ratio of rural household income to urban household income ($RRUIT_t$) are the key indicators by which the welfare of farmers can be compared with that of other social groups. If farmers resort to the political pressure for higher price support as a measure of ameliorating their imbalanced incomes, these two indicators would have functional relationships with the political weight of rice producers.
The high price for rice has been justified as a measure of achieving the self-sufficiency in rice. Thus, farmers can have the political support for high rice price in relation to the policy goal. The degree of self-sufficiency rate (DP/DC) can be a possible indicator linked to the political position of farmers.

Also agricultural share of GNP (GNPA/GNP) are selected to explain the changes in the political efforts of rice producers. As the share of agriculture in total output declines, farmers are required to shoulder adjustment costs associated with the structural adjustment. Since farmers have not alternatives to overcome the suffering from adjustments, they would increase political pressure for high rice price in an attempt to reduce the adjustment costs.

Anderson and Hayami's analysis (1986) tries to show that nominal protection is related to the declining share of agriculture. But in this study, the share of agriculture is suggested to be related to the political power rather than to the protection rate itself. Also a dummy variable (DUM₂) is selected to examine whether or not the first oil shock has an impact on the political influence of producers.

4.3.2 Block of Macroeconomic System

We need the macroeconomic system so that we might explore the transmission mechanism between the rice economy and the macroeconomy. For our purpose, it is sufficient to construct the macroeconomic system at the very rudimentary level.⁶

4.3.2.1 GNP Identity

At the rudimentary level, we may begin with the following simplified macroeconomic system to explore the expected major linkages to the political economic system of the rice industry. Gross national product(GNP) identity measured in real terms is
determined as the sum of private consumption (CON), gross investment (INV), government expenditure (GVC), and net exports (gross export (GX) - gross import (GM));

\[ \text{GNP}_t = \text{CON}_t + \text{INV}_t + \text{GVC}_t + \text{GX}_t - \text{GM}_t \]  \hspace{1cm} (4.18)

We assume that the gross investment and net export variables are exogenous since the Korean rice economy has been a closed economy as far as international trade is concerned, and also has accounted for only a very minor portion of gross investment. On the other hand, aggregate consumption and government expenditures are assumed to be endogenous because these variables may very well be affected by the performance of rice economy from the viewpoint of policy making. These assumptions are based on the fact that the policy maker has the ability to control only the levels of rice policy instruments and not the macroeconomic policy variables.

4.3.2.2 Aggregated Consumption Function

In determining real aggregate consumption (CON), GNP is chosen in accordance with the proposition suggested by the Keynesian income hypothesis. However, changes in the level of GNP should affect the aggregate consumption only slowly, so the dependence occurs through a geometric lag. In that case, the lagged consumption variable is selected to reflect the lagged distribution on the aggregate consumption.

\[ \text{CON}_t = F(\text{GNP}_t, \text{CON}_{t-1}) + u_{8t} \]  \hspace{1cm} (4.19)
4.3.2.3 Money Supply Function

Korean money market is characterized by the high growth of money supply mainly resulting from financing large portions of budget deficits. The Korean government has often printed money to finance the deficits, thereby contributing to inflation.

In this study, money supply (MS) is presumed to be influenced by, among other factors, deficits of the Grain Management Fund (GMFD) and the overall government budgets (GVD). In this way, we can examine the effects, if any, of rice price policy on the inflation. That is, we may test the influencing effects of high rice price policy on the inflation via the accumulation of GMFD and GVD largely financed by printing money.

The Deficits of Grain Management Funds (GMFD), total government deficits (GVD), lagged money supply (MS_{t-1}), and gross national products are chosen as explanatory variables:

\[ MS_t = F_9( MS_{t-1}, GMFD_t, GVD_t, GNP_t) + u_{9t} \]  \hspace{1cm} (4.20)

4.3.2.4 The Equation of Consumer Price Index

In equation (4.22), money supply (MS_{t-1}) and index of consumer prices (CPI_{t-1}), both lagged by one year, aggregated output of the economy (GNP_t), and prices received by farmers (SAI_t) are selected to investigate how these variables affect the CPI.

\[ CPI_t = F_{10}( MS_{t-1}, GNP_t, SAI_t, CPI_{t-1}) + u_{10t} \]  \hspace{1cm} (4.21)

It should be noted that the CPI variable impacts other variables through different ways. For example, in equation (4.2), as the CPI increases, unless other offsetting variables change, the real retail price for rice decreases, which, in turn, could lead to the increase of rice consumption.
Figure 4.2 illustrates the major linkages between the identities and the equations of the overall model, consisting of 12 behavioral equations and 2 identities. In figure 4.2, five groups of variables - macroeconomy, political weights, policy instruments, rice economy, and international linkages - are involved in the diagram of political macroeconomy of Korean rice economy. Basically, macroeconomic variables play an major role of bringing about functional linkages among the variables.
4.4 Data Sources

From the year of 1961, the Korean government began to enforce the rice pricing policy of purchasing rice at prices substantially above the estimated production cost from the crop year 1961. So for estimation and validation of the model during that policy period, time series annual data from 1961 to 1985 were collected from various statistical literature issued in Korea. The available data come from the following institutes in Korea and the UN FAO:

1) Ministry of Agriculture, Forestry, and Fisheries (MAFF), Korea
2) Korea Rural Economic Institute (KREI), Korea
3) National Agricultural Cooperative Federation (NACF), Korea
4) Economic Planning Board (EPB), Korea
5) Bank of Korea (BOK), Korea
6) Federation of Korean Industry (FKI), Korea
7) Food and Agriculture Organization (FAO), UN

4.5 Summary of Equations and Variables in the Model

The political economic system of the rice industry, which is linked to the performance of the macroeconomy in this model is summarized as follows:

1) Structural Equations of the Rice Economy (3)

1) \( DP_t = F_1(PDP_{t-1}/PAI_{t-1}, FWI/t/SAI_t, DP_{t-1}, DUM_1 ) + u_{1t} \)
2) \( DC_t = F_2(CDP_t/CPI_t, GNP_t/POP_t, DC_{t-1} ) + u_{2t} \)
3) \( NIM_t = DC_t - DP_t + ST_t - ST_{t-1} \)

2) Equations of Endogenous Policy Decisions (2)

4) \( PDP_t = F_3(USBPR_t*EX_t, PAI_t, DP_{t-1}*WP_t/WG_t, FWI_{t-1} ) + u_{3t} \)
3) Equations of the Political Macroeconomy of Rice (7)

6) \[ WG_t = F_5(GVD_t, GMFD_t, WG_{t-1}, DUM_2) + u_{5t} \]

7) \[ WP_t = F_6(SAI_t/PAI_t, DP_t/DC_t, RRUI_t, GNPA_t/GNP_t, DUM_2) + u_{6t} \]

8) \[ WC_t = F_7(GNP_t/POP_t, CDP_t/CPI_t, WC_{t-1}) + u_{7t} \]

9) \[ CON_t = F_8(GNP_t, CON_{t-1}) + u_{8t} \]

10) \[ MS_t = F_9(MS_{t-1}, GMFD_t, GVD_t, GNP_t) + u_{9t} \]

11) \[ CPI_t = F_{10}(MS_{t-1}, GNP_t, SAI_t, CPI_{t-1}) + u_{10t} \]

12) \[ GNP_t = CON_t + INV_t + GVC_t + GX_t - GM_t \]

Exogenous variables (17)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAI_t</td>
<td>index of prices paid by farmers (1980=1.0)</td>
<td>Major Statistics of Korean Economy, EPB</td>
</tr>
<tr>
<td>DUM_1</td>
<td>dummy variable for the 1981 poor harvest due to cold weather</td>
<td></td>
</tr>
<tr>
<td>DUM_2</td>
<td>dummy variable for year 1974 first oil shock</td>
<td></td>
</tr>
<tr>
<td>POP_t</td>
<td>total population in year t (million)</td>
<td>Major Statistics of Korean Economy, EPB</td>
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<tr>
<td>USBPR_t</td>
<td>border price of rice in year t (current US dollar)</td>
<td>Annual Report FAO</td>
</tr>
<tr>
<td>EX_t</td>
<td>official exchange rate in year t (in won per cent)</td>
<td>Economic Statistics Year Book, BOK</td>
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<td>ST_t</td>
<td>size of rice stock in year t (thousand ton)</td>
<td>Major Agricultural Statistics, MAF</td>
</tr>
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<td>GVD_t</td>
<td>deficit of government budget in year t (current mil. won)</td>
<td>Economic Statistics Year Book, BOK</td>
</tr>
<tr>
<td>RRUI_t</td>
<td>ratio of rural income to</td>
<td>Social Indicator,</td>
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<tr>
<td>Variable</td>
<td>Description</td>
<td>Source</td>
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<tr>
<td>----------</td>
<td>-------------</td>
<td>--------</td>
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<td>$FWI_t$</td>
<td>index of wage in farm sector in year $t$ ($1980=100$)</td>
<td>EPB, Statistics Year Book, MAF</td>
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<td>$INV_t$</td>
<td>gross investment in year $t$ (billion won in 1980 price)</td>
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<td>$GVC_t$</td>
<td>government expenditure in year $t$ (billion won in 1980 price)</td>
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<td>gross exports in year $t$ (billion won in 1980 price)</td>
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<td>$SAI_t$</td>
<td>index of prices received by farmers</td>
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<td>$GNPA_t$</td>
<td>agricultural share of GNP in year $t$ (billion won in 1980 price)</td>
<td>Economic Statistics Year Book, BOK</td>
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Endogenous variables (12)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
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<td>$DP_t$</td>
<td>domestic production of rice in year $t$ (thousand ton)</td>
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<td>$DC_t$</td>
<td>domestic consumption of rice in year $t$ (thousand ton)</td>
<td>Statistical Year Book, MAF</td>
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<td>$NIM_t$</td>
<td>net import of rice in year $t$ (thousand ton)</td>
<td>Major Agricultural Statistics, MAF</td>
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<td>$PDP_t$</td>
<td>domestic producer price for rice in year $t$ (thousand won/ton in 1980 price)</td>
<td>Statistics of Prices in Rural Area, NACF</td>
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<td>$CDP_t$</td>
<td>domestic consumer price for rice in year $t$ (thousand won/ton in 1980 price)</td>
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<td>Calculated</td>
</tr>
<tr>
<td>$WC_t$</td>
<td>political weight of the consumer group in year $t$</td>
<td>Calculated</td>
</tr>
<tr>
<td>$WP_t$</td>
<td>political weight of the producer group in year $t$</td>
<td>Calculated</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
<td>Source</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td>CON$_t$</td>
<td>aggregated private consumption in year $t$ (billion won in 1980 price)</td>
<td>Economic Statistics Year Book, BOK</td>
</tr>
<tr>
<td>MS$_t$</td>
<td>money supply in year $t$ (M2) (^{(100 \text{ mil. current won})})</td>
<td>Economic Statistics Year Book, BOK</td>
</tr>
<tr>
<td>CPI$_t$</td>
<td>index of consumer prices ((1980=1.0))</td>
<td>Economic Statistics Year Book, BOK</td>
</tr>
<tr>
<td>GNP$_t$</td>
<td>gross national product in year $t$ (billion won in 1980 price)</td>
<td>Economic Statistics Year Book, BOK</td>
</tr>
</tbody>
</table>
4.6 Notes

1) The political weights may be interpreted in various ways as follows; political bargaining power, political pressure, policy influencing power (effort), political preference rate, political willingness to redistribute income, marginal value on the welfare measure, political attitude toward interest groups.

2) Since total welfare \((W)\) is maximized, the consumer expenditure function \((E(.))\) is multiplied by -1 to yield positive consumer welfare measure \((UC)\).

3) Hayami (1985) also identified the same kind of policy goal in Japan, which is to minimize budget costs resulting from a dual rice price policy.

4) In a simulation model, it is possible that dynamic interaction of the equations which compose the model can be poorly fitted even though they have a good statistical estimates. For detailed explanation, see Pindyck and Rubinfeld (1981) pp.401-405. and chapter 5 in this study.

5) The calculated political weights characterize the deterministic nature since they are resultants of mathematical combination of variables used in deriving the optimal rice policy. However, if we assume that actual political weights are stochastically affected by the relevant variables including the macrovariables, changing macroeconomic variables would provide the functional sources of varying political weights.

6) For the advanced study, more specified macroeconomic models may be introduced for analyzing the political macroeconomic system of rice industry. For the reference, see Song, Hee Yhon(1977), and Shin, Hyun Chul and Dae Sik Kim (1981).
CHAPTER V

DISCUSSION OF EMPIRICAL RESULTS

This chapter discusses the estimation of political weights, and the empirical results obtained from the simultaneous equations constructed out of the model presented in the previous chapter. Based on the empirical results, we interpret the political macroeconomic system of the Korean rice industry. For this purpose, we discuss the estimation techniques, the data base, the operational definition of variables, the estimation results, the validation of the model, and the dynamic simulation results. After testing the hypotheses through statistical methods, a dynamic simulation to examine how changes in the external economic environment affects the endogenous variables was performed.

The empirical findings are presented in the following three sections. The first section is to estimate the political weights of the three major interest groups in the Korean rice economy, and to test the hypothesis of political pressure on the rice price policy from the interest groups. Then we interpret the political mechanism of rice policy adjustments with the revealed political weights.

Once the political weights among the interest groups are proved to exist, the second section concentrates on the empirical evidence of forward linkages from macroeconomic factors to the changes in the political weights, which are transmitted to rice policy decisions. Also it investigates backward linkages from them to macroeconomic variables such as the index of consumer prices (CPI) and money supply (MS). For these purposes, an econometric model was constructed and estimated. The model consists of 12 equations, including 10 behavioral equations and 2 identities.
In the third section, after validating the model, the impacts of external economic environments on the endogenous variables through the several ex post (or historical) dynamic policy simulation was investigated.

Annual data for the period 1961-1985 were used to obtain the empirical results. Since the study focused on aggregate modeling, some problems were encountered in obtaining appropriate data. It should be specially noted that there exist the possibility of measurement errors in the values of the variables in the early 1960s since there are inconsistency problems in the data collection during that period.

Because this study deals with aggregate data, the identities do not match very often. To avoid this problem, computed residual components were included in the identities as exogenous variables. For example, residual variables are exogenously added to the GNP identity (equation 4.18) and Market clearing identity (equation 4.3) in order to meet computational identities. Also in few cases, appropriate proxy variables were used to find the relevant functional relationship because of the unavailability of data. For instance, in the rice production equation, the index of farm wage rate substitutes for rice production cost due to lack of available data.

5.1. Results of Political Weights Estimation

5.1.1 Testing the Hypothesis of Political Influences

There are various approaches to estimate the effects of power exertion on the determination of policy and the relationship between the levels of policy instruments and the generation of political effort (Rausser, Just, and Zilberman, 1980). In this study, a political preference function is designed to detect and measure the relative policy influencing powers (weights) of different interest groups in changing the rice price policies to their benefit. If the weights are differentiated according to the effectiveness of political
influences by the interest groups, the implication is that political attitude towards them by
the policy maker would be responsive to their relative policy influencing efforts. Conceptually, the resulting weights can be interpreted as an equilibrium solution to the political bargaining game.

Thus, these weights can be potentially useful aids in endogenous policy analysis. They can be used to detect whether differences exist among interest groups, and if so, what directions these differences are moving. The potential applicability of these weights to analyzing changes in agricultural policy has been demonstrated by Sarris and Freebairn (1983) and by Paarlberg and Abbot (1986), in both cases for the international wheat economy. The revealed preference approach was used to infer the invisible political pressure among the three major interest groups (consumers, producers, and government). This approach requires that the policy decision making process be rational and consistent. In other words, revealed preference method is to assume that past actual policies are close to the optimal selection.

The computational formulas for the political weights were derived by maximizing the political preference function $W$ given in equation (4.4) subject to the market clearing constraint equation (4.3) with respect to the three policy instruments -- the producers domestic price (PDP), consumers domestic price (CDP), and rice importation (NIM). The revealed political powers are derived by forming the Lagrangian function and obtaining the first-order conditions from maximizing it. The detailed procedure for the estimation of political weights is presented in Appendix A. The sum of the political weights were normalized to equal to 300.

The estimated results from the Korean data covering the 25 year period (1961-1985) are shown in table 5.1. If the estimated patterns and trends are significantly different from the 100 base line, and discriminate pairwise among the interest groups, we can reject
the null hypothesis that political influences do not exert on the rice price policy. The null hypothesis was rejected at the 1 percent significance level.\(^1\)

Once we reject the null hypothesis, changing weights can reflect changes in not only the political but also the economic conditions in relative to the rice policy decisions. In other words, rejecting the null hypothesis may imply that some political economic factors participate in changing the pattern of political weights.

5.1.2 Implications of the Estimated Political Weights

The estimated political weights as shown in table 5.1 indicate that Korean rice policy maker shows a trend of favoring rice producers more than the other interest groups and implies the hypothetical policy maker's increased political willingness to redistribute income in favor of farmers. This finding supports the assertion that Korean government raised the rice purchasing price as a measure of soothing farmers.

The estimated changing political powers are shown in Figure 5.1 in order to view the outline of their trends. There is clear evidence that the relative weights of both consumers and government fall steadily over the period. The political weights of both consumers and government decrease by about 15 percent from 1961 to 1985 but quite different paths. On the other hand, rice farmers have increased their relative political weights by about 30 percentage. In other words, the welfare measure of rice farmers' income has been gaining high priorities from policy makers compared to the consumers' expenditure and the government's net revenue. Also it should be noted that this figure could reflect only a government concern about diminishing self-sufficiency. These general patterns appears to be consistent with the historical trend in rice policies described earlier in chapter 3. On the whole, producer's price for rice went up faster than the consumers' price in Korea.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>GOVERNMENT</th>
<th>PRODUCERS</th>
<th>CONSUMERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>100.9</td>
<td>100.0</td>
<td>99.1</td>
</tr>
<tr>
<td>1962</td>
<td>99.9</td>
<td>100.4</td>
<td>99.7</td>
</tr>
<tr>
<td>1963</td>
<td>99.4</td>
<td>101.8</td>
<td>98.8</td>
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<tr>
<td>1964</td>
<td>98.9</td>
<td>101.3</td>
<td>99.8</td>
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<tr>
<td>1965</td>
<td>99.4</td>
<td>100.6</td>
<td>100.0</td>
</tr>
<tr>
<td>1966</td>
<td>101.1</td>
<td>99.7</td>
<td>99.2</td>
</tr>
<tr>
<td>1967</td>
<td>99.0</td>
<td>100.0</td>
<td>101.0</td>
</tr>
<tr>
<td>1968</td>
<td>97.4</td>
<td>101.1</td>
<td>101.5</td>
</tr>
<tr>
<td>1969</td>
<td>99.3</td>
<td>101.3</td>
<td>99.4</td>
</tr>
<tr>
<td>1970</td>
<td>95.6</td>
<td>104.0</td>
<td>100.4</td>
</tr>
<tr>
<td>1971</td>
<td>97.3</td>
<td>104.5</td>
<td>98.2</td>
</tr>
<tr>
<td>1972</td>
<td>94.3</td>
<td>107.3</td>
<td>98.4</td>
</tr>
<tr>
<td>1973</td>
<td>99.0</td>
<td>99.8</td>
<td>101.2</td>
</tr>
<tr>
<td>1974</td>
<td>107.0</td>
<td>90.8</td>
<td>102.2</td>
</tr>
<tr>
<td>1975</td>
<td>95.3</td>
<td>105.3</td>
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<td>93.4</td>
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<td>1977</td>
<td>93.4</td>
<td>111.3</td>
<td>95.3</td>
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<tr>
<td>1978</td>
<td>93.8</td>
<td>110.9</td>
<td>95.3</td>
</tr>
<tr>
<td>1979</td>
<td>97.0</td>
<td>115.3</td>
<td>87.7</td>
</tr>
<tr>
<td>1980</td>
<td>84.8</td>
<td>121.5</td>
<td>93.7</td>
</tr>
<tr>
<td>1981</td>
<td>81.7</td>
<td>132.8</td>
<td>85.5</td>
</tr>
<tr>
<td>1982</td>
<td>89.4</td>
<td>125.8</td>
<td>84.8</td>
</tr>
<tr>
<td>1983</td>
<td>87.4</td>
<td>127.0</td>
<td>85.6</td>
</tr>
<tr>
<td>1984</td>
<td>89.2</td>
<td>127.0</td>
<td>83.8</td>
</tr>
<tr>
<td>1985</td>
<td>84.8</td>
<td>131.2</td>
<td>84.0</td>
</tr>
</tbody>
</table>
Figure 5.1 indicates that there was no significant growth in the political power of rice producers until late 1960s. This phenomenon reflects the fact that the policy maker did not seriously accommodate the producers' political pressure in setting the purchase price for rice until late 1960s. Ministry of Agriculture, Forestry, and Fisheries in Korea actually allowed only a small increase of the purchase price for rice until 1968 although it began direct purchase in favor of farmers in 1961 as described in Chapter 3. This is because of no serious recognition of income gap between the rural and urban sectors.

The effects of the first oil crisis in 1973-74 is clearly seen in the opposite swing in the political weights as the border price of rice shot sharply upwards to almost double price compared to the previous year. There was a significant increase of deficits in the Grain Management Fund from 25 billion won in 1973 to 125 billion won in 1974, mainly due to high cost of importing rice. Therefore, Korean government did not effectively accommodate the demand for increasing purchase price for rice in order to reduce the burden of the deficits or could not accommodate both budgetary drains.

Consequently, the political weight of the government sharply went up to 107 from 99 of the previous year. The nature of the normalized political weights led to the weakening political powers of rice producers from 100 to 91 during the same period. Such abrupt opposite changes in the political weights are mainly due to the fact that rice policy maker transmitted the burden of rising border price to the producers in favor of government's interest. This temporary situation corrected itself in a couple of years as the government's domestic purchase prices continued to escalate in favor of the rice producers.
FIGURE 5.1. Estimated Political Weights for The Korean Rice Economy
The second oil shock in the late 1970's had little effect on border prices while the official domestic purchase prices continued to increase far beyond the border price and to cover sufficiently production cost. In 1981, there was a poor harvest of rice, decreasing by more than 30 percent of the average harvest. The government maintained the stable rice price by importing the 2,245 thousand tons of rice, which were more than 4 times the average annual import amount. The political weight of rice producers climbed up to 133 in 1981, increasing by more than 11 points, while those of both the government and the consumers went down. This implies that poor harvest itself can make the political position of rice producers reinforced in the policy maker's political preference function although rapid increase of rice price was not allowed for the social and political reasons. The alternative hypothesis that a continuing concern in high government circles with self-sufficiency could explain such actions. After 1981, surging political weight of rice producers showed a slightly downward tendency with better harvest.

5.2 Discussion of the Estimated Simultaneous Equations

For the empirical analysis of the macroeconomic relationships to the rice price policy adjustments, an econometric model was constructed, consisting of 12 equations, of which 10 are behavioral and two are identities. The mathematical structure of the model presented previously is nonlinear in that basic variables form ratios that render the model nonlinear. Moreover, a linear simultaneous equations system, with autocorrelated error terms, can lead to nonlinearities (Judge et al. 1982). In view of the nonlinear nature, nonlinear three stage least square method (N3SLS) was used for the final estimation of the model because of the high efficiency in estimating the parameters.2
The estimation results of the model are discussed for each equation. The number in parentheses below each coefficient estimated are the t-values. Except for the lagged variables, the time subscript for the present variables is omitted for convenience.

5.2.1 Domestic Rice Production Function

\[ (5.1) \quad DP = -1296.13 + 5.0344 \times LAG(PDP/PAI) + 0.38288 \times LAG(DP) \]
\[ (3.11) \quad (3.37) \quad (4.48) \]
\[ 2136.17 \times (FWI/SAI) + 2183.5 \times DUM_1 \]
\[ (4.48) \quad (-7.60) \]
\[ R^2 = 0.8577 \]

In the sequence of years, farmers are presumed to respond to the real price received in the previous year as they decide the area planted for rice. So it is proper to choose the one year lagged price variable deflated by the index of prices paid by farmers as explanation variable for determining domestic rice production.

The price faced by rice producers in the previous year is found to have positive impact on domestic rice production at a 1 percent level of significance as expected. The price coefficient, 5.0344, means that, as the rice price in real terms increases by one thousand won per ton, domestic production would increase by 5,034 ton.\(^3\) This indicates that farmers responded strongly to the high price supporting policy for rice. Actually, while the total cultivated area for rice has been slightly increased during surveyed years, there was a considerable increase of rice production due to technology advance.\(^4\) These innovations are mainly due to the growth of land productivity by adopting high yielding variety (Ban, Moon, and Perkins, 1980).

The reason for selecting the one year lagged DP variable is to reflect the lagged impact of price on the rice production. The high t value, 3.37, supports the existence of a
lagged distribution of the dependent variable on the equation. This means that it takes time for farmers to expand the paddy land for rice cultivation in response to the price signal.

The index of real farm wage rate was involved as a proxy for the input prices because farm wages took a major portion of agricultural management expenditures. Farm wage rate deflated by the price received index was found to have a positive coefficient with 1 percent level of significance but unexpected positive signs.

In relation to this contrary effect, it should be noted that mass migration of farm population into the urban area due to rapid industrialization contributed to the reduction in the potential unemployment rate in rural areas and raised the real farm wage. However, rice producers have limited substitutes for farm labor because small farming system incurs the economic scale problem in adopting the mechanical technology. The positive coefficient of real wage rate can be interpreted that although farmers suffered from increasing labor input cost due to the labor shortage in rural area, high price support for rice covered the labor cost, giving the farmers incentive to increase the rice production.

The dummy variable (DUM$_t$) for the particularly low production in 1981 was chosen to investigate the impact of bad weather on rice production. It is found to be strongly significant to explain the sharp reduced rice production in 1981.

5.2.2 Domestic Rice Consumption Function

\[(5.2) \quad DC=1657.52 +0.11805*(CDP/CPI) + 1.2584*(GNP/POP) + 0.44008*LAG(DC) \]
\[\text{ (0.16) } \quad \text{ (3.02) } \quad \text{ (3.18) } \]
\[R^2 = 0.8984\]

Estimating the aggregated consumption parameters with any real confidence is seldom easy. Time series data for aggregated consumption parameters are frequently short and of dubious accuracy when domestic food grain production makes up a significant part
of total consumption. Actually it has been argued that mechanical regression analysis of aggregated consumption seldom gives plausible estimation of parameters (Timmer, Falcon, and Pearson, 1983).

In addition, if a long-run time series data are used in estimating aggregate consumption, such long run consumption parameters are not likely to reflect reliable consumption parameters—those that reflect the overall aggregate response of all consumers to a changes in average per capita income or in prices. The reason is that many confounding influences condition the usefulness of aggregate data for long run aggregate consumption analysis. In spite of problem in estimating the aggregate consumption, it is important to know the aggregate consumption parameters if the resulting parameters provide the necessary information on the linkages from macroeconomic performance to the rice sector.

The consumer price expressed in real terms (CDP/CPI) is found to have positive relationship with aggregate consumption but strongly insignificant as its low t value, 0.16, indicates. This finding may support the view that the consumption prices actually reflect not the demand but both of supply and demand. In that case, aggregate rice consumption may continue to rise as the price goes up.

On the other hand, per capita income (GNP/POP) expressed in real terms is found to have significant and close relationship with rising aggregate rice consumption. Its coefficient is 1.2584, which means that as the per capita income increases by one thousand won, total rice consumption goes up to 1,259 tons. The coefficient of one year lagged DC variable, used as a reflection of a lagged dependence of rice consumption on the consumers' price, is also significant at the 1 percent level. As the rice price changes in relative to the other agricultural products prices, there may be gradual changes in the diet which impact on the rice consumption with a geometric lag.
5.2.3. Functional Effects on Government Weight

(5.3) \[ \text{WG} = 79.50437 - 0.0053591 \times \text{GVD} - 0.0031151 \times \text{GMFD} + 0.19181 \times \text{LAG}(\text{WG}) \]
\[ + 13.54101 \times \text{DUM}_2 \]
\[ (-4.21) \quad (-6.67) \quad (2.3) \]
\[ R^2 = 0.8531 \]

The objectives of rice policy adjustments are to promote the rice production and maintain the farm income more or less level with rising non-farm incomes. In the course of the economic development, high price support policy served the function of increasing the rice production and compensating the farmers, whose incomes tended to lag behind those of urban workers. However, deficits from the implementation of high price policy gradually became brakes on further increases in rice price.

Increasing deficits in the overall government budget (GVD) and the Grain Management Fund (GMF) were both found to be inversely related to the declining political weight of government at the 1 percent significant level. Increasing deficit caused by government operation in rice policy may be regarded as the decreasing political influence of the government on the rice policy. This may be interpreted that policy maker give less priority to the accumulation of public debts relatively.

On the contrary, we can derive the different interpretation from the positive relationship between the political power and the deficits. As the deficits accumulate, the government will attempt to exert its political influences to reduce the both deficits. In that case, there would be backward linkages from the increasing political power to the reduction of deficits. The significant coefficient for the political weight of previous year has shown
the influence of the downward trend in the political power of the government during surveyed period.

In 1974, there was a soaring price for rice at the international market, associated with the first oil shock, prevailed over the world. Dummy variable (DUM2) reflecting the unstable international market for rice in 1974 was found to have significantly positive impact on the political influences of the government. This shock was found to lead to the increase in the political weight of government by 13.5 points. The high political power of government during the oil shock period is largely due to the narrowing difference between the border price and domestic price for rice. The high political weight can be also explained by referring to the formula in Appendix A. The formula suggests that the more difference between the border and domestic price, the greater the political weight.

5.2.4 Functional Effects on Producers' Weight

\[
(5.4) \quad WP = 76.57463 + 0.00452243 \cdot (SAI \cdot 100/PAI) + 0.3466 \cdot RRUI + 19.124 \cdot (DP/DC) + 0.95619 \cdot (GNPA/GNP) - 21.11821 \cdot DUM2
\]

\[(3.05) \quad (6.18) \quad (-2.12) \quad (-10.64) \quad (-5.52)\]

\[R^2 = 0.8975\]

Since the early 1960s, it has been observed that as the rice policy became the main political issue in agricultural policy, the relative political position of rice producer in the process of implementing rice policy has enlarged. There are various factors to incur surging political voice of rice producer. Above all, agricultural adjustments problem forced by macroeconomic changes provoke the farmers' political motivation to affect the rice policy.

Price parity ratio (SAI/PAI) (ratio of prices received by farmers to the prices paid by farmers) is one of the indicators which reflect the level of farmers' welfare. If the price
parity ratio increases, there would be an improvement in real purchasing power in farm sector. Decreasing price parity aggravates the terms of trade between the rural and urban sector and may cause the farmer's political complaints about it. The statistical significance of price parity ratio implies that political demand for higher rice price as a measure of ameliorating the farmers' incomes results in rising price parity ratio. Korean policy maker, who worried about bad effect of declining farmers' income on the political authority, tried to implement the high rice price policy in compensation for farmers.

The ratio of rural household income to urban household income which represents the wealth gap between the rural and urban sector. The positive coefficient of rural urban income ratio implies that there has been reinforced political power of rice producers in the course of improving the relative rural incomes. In other word, policy makers yield to the political demand for high price of rice as a way of correcting the income gap.

These empirical findings support the assertion that political demand for high price support has been strengthened on the grounds of ameliorating income gap between the rural and urban sectors. Korean farmers know that higher government procurement price for rice contributes to increasing their incomes. Therefore, farmers and pro-farmers have attempted to gain the support for higher rice price through the political campaigns. For example, there have been public hearings on the government's rice price calculation. Usually, the pro-farmers groups argued for the price calculation by the government and suggested different calculation methods in favor of farmers.

On the other hand, as both indicators are improved, farmer may lose their grounds for political pressure for higher prices of rice. In such case, weakening policy influencing power of farmers would, in turn, lead to the lowering the indicators.

Also it was found that agriculture's declining share (GNPA/GNP) of the total economy contributed significantly to enhancing the political position of rice producers toward rice policy. The declining share of agriculture in total output requires the farmers to
adjust themselves in order to participate in the growing economic pie. Accordingly, such adjustment costs may cause the farmers to demand for higher price policy for the purpose of transferring the costs to other groups.

As mentioned earlier, one of the government's primary targets in rice policy is to achieve self-sufficiency in rice industry. So there is need to check whether this policy goal is related to the political weight of rice producers posed by the policy maker. If such relationship is proved to exist with the empirical test, we might suggest that favoring the rice producers with high price supports can be related to achieving the self-sufficiency ratio in rice production.

The estimated result for coefficient of self-sufficiency rate was found to have negative relationship with the political weight of rice producers with the 5 percent significant level. This estimation result is consistent with expectation that as the self-sufficiency ratio increase, policy maker place less favorable attitude toward the rice producers because he does not want more rice production than required for domestic consumption.

The coefficient of dummy variable was found to be about -21 with strong statistical significance. This may suggest that high border price in 1974 led to the weakening of the political weight of rice producers since supporting domestic rice price became less relative to the standard of international market.

### 5.2.5 Functional Effects on Consumers' Weight

(5.5) \[ WC=65.942 + 0.004786*(CDP/CPI) -0.01408*(GNP/POP)+ 0.388*LAG(WC) \]

\[ (0.63) \quad (-3.46) \quad (2.78) \]

\[ R^2=0.8386 \]
Per capita income (GNP/POP) is significantly tested to be negatively related to consumers' political weight. This implies that the rising per capita income contributed to making the consumers less sensitive to rice policy resulting in higher consumer prices. In addition, as the Korean people shift their demands to higher quality of food, importance of rice in the diet declines. Consequently, it can be concluded that consumers have mitigated their demands for lower price as per capita income rises.

Consumer price (CDP/CPI) in real terms has positive impact on the political weight of consumer group but its coefficient shows the statistical insignificance. This statistical result asserts that, as long as the increase of per capita income is enough to maintain or reduce the relative cost of rice in household expenditure, consumers tend not to be concerned about the rising consumer price for rice and adapt to it. In other word, if the effect of increasing income offsets disadvantages of high rice price, consumers would accept the political justice of high consumer price of rice. Actually, it has been observed that most Korean consumers are reluctant to require to lower the rice price in considering the social justice of helping the poor farmers.

It was found that one year lagged political weight has significant positive impacts on the political weight of the consumers. This implies that there is tendency to follow the pattern of the previous rice policy in deciding the current policy.

5.2.6 Estimated Results of the Aggregate Consumption

\[
(5.6) \quad \text{CON} = 1157.12 + 0.17245*\text{GNP} + 0.71657*\text{LAG(CON)}
\]

\[
(3.88) \quad (8.66)
\]

\[R^2 = 0.9977\]
As expected, the coefficient of GNP is found to be positive at the 1 percent level of significance. This estimate is consistent with the theory in which the size of income (GNP) strongly determine the consumption pattern. In this equation (5.6), the GNP coefficient of 0.17245 means that, as the real GNP increases by 1 billion won, aggregated consumption would increase by about 172 million won. The one year lagged consumption shows to have statistically significant positive effect on the current year's consumption as expected.

5.2.7 Estimated Results of Money Supply Function

(5.7) \[ MS = -324.92 + 1.11642 \times \text{LAG}(MS) + 0.10290 \times \text{GMFD} + 1.27909 \times \text{GVD} + 0.0232 \times \text{GNP} \]

\[ \begin{array}{c}
(50.24) \\
(0.85) \\
(6.25) \\
(1.96)
\end{array} \]

\[ R^2 = 0.9983 \]

It has been asserted that money supply has been manipulated to encourage the economic growth at the cost of incurring the inflation in Korea. As long as the government deficits for investing public sector has been financed by printing money, money supply has been likely to exceed the demand for GNP growth, and eventually raise the level of general prices. So it is important to examine whether the money supply is related to the fiscal balances in the general budget and the more specific grain management fund.

It has been suggested that the size of deficits of GMF generally depends on the level of purchasing and releasing price for rice. Therefore, if the deficits of grain management fund (GMFD) due to high price supporting for rice has impact on the money supply, we can conclude that grain management fund relied on printing the money is likely to contribute to general inflation.

It is found that increasing deficits in the overall government budget is positively related to the increasing money supply with the strong significance. But the coefficient of
GMFD is found to be positive but statistically revealed to be insignificant, which means the rejection of hypothesis that the deficits due to rice policy have positive effects on money supply. This finding may support the assertion that increasing deficits in grain management fund resulting from dual price system are not transferred to inflation through the money supply.

Meanwhile, the growth of GNP is found to have positive relations with the 5 per cent significant level as expected. Also the one year lagged money supply shows the strong positive impact on the trend of current money supply as the high $t = 50.24$ value indicates.

### 5.2.8. Estimated Results of Consumer Price Index Function

\[
\text{CPI} = 0.02086 - 0.00000167 \times \text{LAG(MS)} + 0.00000205 \times \text{GNP} + 0.00611529 \times \text{SAI} \\
\quad + 0.32862 \times \text{LAG(CPI)}
\]

\[
\begin{align*}
\text{R}^2 &= 0.998 \\
\text{(-0.76)} & \quad \text{(2.58)} \\
\text{(3.86)} & \quad \text{(12.7)} \\
\end{align*}
\]

Generally speaking, the level of general prices is said to be a major indicator of the general market conditions of a complicated macroeconomy. The consumer price index can be one of such major indicators because it is the aggregation of all consumer prices weighted to each commodity. In this study, we focus not only on the forward effects of the general economy on the rice economy as mentioned earlier, but also on the backward effects of rice economy on the general economy. Accordingly, to measure the backward effects on the general economy, the consumer price index was chosen to investigate such effects because of its broad representation of the general economy.
The one year lagged money supply variable is found to be not related to the consumer price index since its coefficient is not significant. However, statistical significance of GNP and one year lagged CPI confirms that the consumer price index is positively influenced by those independent variables.

The level of prices received by farmers (SAI) is found to contribute to increase of the general prices with statistical significance at the 1 percent level. This finding support the hypothesis of backward linkage from the rice economy to the general economy. Furthermore, since the index of prices receive by farmers is expected to link to rice price faced by farmers, it can be imagined that high purchasing price would implicitly boost the general price level through the SAI.

5.2.9 Functional Effects on Producers' Price Policy

(5.9) \[ PDP = 46.99072 + 0.10994*(USBPR*EX/10) + 388.69*PAI + 0.01499*(LAG(DP)*WP/WG) + 1.00286*LAG(FWI) \]

\[ R^2 = 0.9945 \]

If we want to predict and evaluate the government's actions in rice policy in the political economy context, it is important to examine how the policy instruments are endogenized. Furthermore, through this analysis we may raise the possibility of designing the alternative policy strategies so as to direct the desirable changes in agricultural structural adjustments. Therefore, we need to explore the functional relationships between the policy instruments and the political economic variables despite the difficulty in measuring the significant coefficients of such relevant variables.
The index of prices paid by farmers (PAI) was found to have positive impact on the producers price determination with high significance. This implies that increasing cost of buying necessities outside the farm sector forced the policy maker to raise the producers price for rice. Since the one year lagged index of farm wage rate as a proxy of production cost shows a significant coefficient, it can be asserted that policy maker consider the farmers' production cost in the process of setting level of price for rice.

Also, the independent variable, LAG(DP)*WP/WG, can be interpreted in terms of how policy maker evaluates the value of rice production in the previous year by weighting it by the marginal value of producers' political weight, in relative to that of the government. The statistical significance of the positive coefficient attached to the WP/WG ratio supports the assertion that upward tendency of producers prices clearly reflect the political economic valuation of the rice production rather than a pure market valuation.

However, border price was found to have no impact on the determination of producers price as the low t value, -0.76, indicates. This estimation result may reflect the separation of policy decision for producers' price from the international rice market. Such separation may be possibly due to what policy maker only concerns about the domestic welfare of producers as an interest group disregarding its impact on the interest group of world rice market.

5.2.10 Functional Effects on Consumers' Price Policy

\[
(5.10)\text{CDP}=59.783 + 0.39266 \times \text{USBPR*EX/10} + 668.38 \times \text{CPI} + 0.3085 \times (\text{DC*WC/WG}) - 0.03379 \times \text{LAG(CDP)}
\]

\[
(4.25) \quad (7.53) \quad (-3.01) \quad (-0.29)
\]

\[R^2 = 0.9938\]
Border price for rice is found to have positive impact on the determination of consumer price with the 1 percent significance level. This estimated results is contrary to the case of producers price. This may interpret that policy maker can link the border price to the control of domestic consumer price, mainly by means of releasing the imported rice to domestic market. Domestic rice price has been usually 2 to 3 times higher than the international prices. The Korean government often repressed the retail price of rice by selling the imported rice to consumers at the cheaper price than the market price.

Since the coefficient of consumer price index shows the statistical significance, we can conclude that decision of consumer price for rice depends on the general price level. When the government decides the level of consumers' rice price, it often justified its price decision based on consideration of the level of consumers' prices.

The negative coefficient (-0.03085) of DC*WC/WG variable support the expectation that, for given amount of rice consumption, the more the political weight of consumer group in relative to that of the government, the less the consumer price for rice. However, one year lagged consumer price for rice is found to have no impact on the decision of current price for rice.

5.3 Policy Analysis Through Dynamic Simulation

This section investigates how changes in the external economic environments affect endogenous rice price policies and rice market performances through ex post (or historical) dynamic simulation analysis. Two ex post simulations, expansion of the macroeconomy and contraction of the macroeconomy are performed to show macroeconomic impacts on the rice economy through a comparison of the dynamic simulation results of those events. For this purpose, all the estimated coefficients based on the the specifications from the
simultaneous equation model were used when simulations were carried out. The Gauss-Seidel technique was used to solve the system in running the simulation.

Since the model consists of a system of non-linear equations, the dynamic multipliers in the simulation will differ according to the magnitude of variation in the exogenous variable as well as the starting values of all endogenous variables, i.e., the selection of the starting year (Kim, Joo Hoon, 1987). Two scenarios for simulation were examined for the period 1969-1985. Before performing the simulation, a historical simulation running from 1962-1985 was performed to test the validity of the model, and to obtain the base series of simulated values for the endogenous variables.

5.3.1 Test of Model Validation

When we are concerned with the dynamic interactions of the simultaneous equation system that represents the dynamic behavior of the real world, simulation results may not be so simple because a structural instability can be built into the model when the equations of model are solved simultaneously. Even if efficient parameter estimates can be obtained by the proper simultaneous-equation estimation method, several kinds of problems can arise in the process of performing the simulation. Such problems may be a failure to converge to a solution, an unstable solution, or a dynamically explosive solution. In that case, a simulation model can be modified or adjusted to improve its performance, i.e., to improve its forecasting ability or its ability to provide information regarding policy alternatives according to the purpose of the simulation.

Before performing a policy simulation, there might be a need to restructure the model if it performs poorly in tracking the real values in spite of significant statistical results of individual equations. The simulation model as mentioned in the previous chapter was adjusted for the purpose of improving the dynamic structure of model. In this model, there are feedback loop effects which continually magnify small changes in the rice
production (equation 4.1) and consumption function (equation 4.2) into large changes in the identities of endogenous price formation (equation 4.8 and 4.9). Therefore, the identities were transformed into the behavioral equations (equation 4.13 and 4.14), and then adjusted to avoid the feedback loop effects among the endogenous variables. In the validation run, a historical simulation running from 1962 to 1985 was performed to test the validity of the model. The Gauss-Seidel method was used to solve the dynamic simultaneous simulation.

Root mean square error (RMSE) and root mean square percentage error (RMSPE) are two common measures used to evaluate the historical simulation. The RMSE is a measure of the deviation of the simulated variable from its actual value. RMSPE expresses RMSE in percentage terms. The overall goodness of fit of the model is judged from the RMSE, the RMSPE, and the prediction of turning point. For a large econometric model, an RMSPE of less than 25 percent is considered to be good (Devadoss, et al., 1988).

Table 5.2 presents RMSE and RMSPE for endogenous variables. The statistics on table 5.1 shows that the model generally performs a good simulation fit.

At 36.3 percent, the RMSPE for money supply variable (MS) is by far largest, which means wide discrepancies between the actual and simulated values. The reason is that actual money supply may have grown at the exponential rate while the money supply function is expressed in linear form during surveyed period. However, money supply function replicates the actual values more closely after the year 1974. The RMSPE for domestic production is by far the second largest, reflecting the characteristics of unforeseeable agricultural production. The net import variable (NIM) was removed because its value can either be positive or negative, which renders its calculation of RMSE and RMSPE meaningless.

It is relatively difficult to precisely track the actual values of the endogenous variables related to the rice economy sector such as DP, DC, PDP, and CDP. But in case of
the political weights, the RMSPE is small (less than 5 percent), which imply that the simulated values track the actual values fairly closely.

As another important criterion for evaluating simulation performance, this study examined how the model can predict the trend of actual values and turning points in a historical data. In figures 5.1 to 5.14 in Appendix B, the actual and simulated values for the endogenous variables are plotted. The ability of model to reproduce the historical trend is generally found to be nicely fitted. But in the case of domestic production (figure 5.1) and import functions (Figure 5.12) for the period 1966-1976, the model did not reproduce the general trend well. This is because the simulated producers' price (PDP), which was higher than the actual value, leads to the higher simulated rice production. Naturally, the simulated rice import resulted in the lower level by the identity 4.3. However, the model replicates the actual values of those functions quite well after 1976.
<table>
<thead>
<tr>
<th>Variable</th>
<th>RMSE</th>
<th>RMSPE(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>766.62</td>
<td>19.93</td>
</tr>
<tr>
<td>DC</td>
<td>319.58</td>
<td>7.01</td>
</tr>
<tr>
<td>PDP</td>
<td>23.89</td>
<td>17.34</td>
</tr>
<tr>
<td>CDP</td>
<td>33.66</td>
<td>17.20</td>
</tr>
<tr>
<td>CPI</td>
<td>0.02</td>
<td>8.88</td>
</tr>
<tr>
<td>WG</td>
<td>2.21</td>
<td>2.41</td>
</tr>
<tr>
<td>WP</td>
<td>4.07</td>
<td>3.75</td>
</tr>
<tr>
<td>WC</td>
<td>2.65</td>
<td>2.64</td>
</tr>
<tr>
<td>GNP</td>
<td>960.29</td>
<td>5.22</td>
</tr>
<tr>
<td>CON</td>
<td>960.29</td>
<td>6.93</td>
</tr>
<tr>
<td>MS*</td>
<td>1667.74</td>
<td>36.26</td>
</tr>
</tbody>
</table>

* values calculated from the year 1971 to 1985.
Generally this model correctly captures the turning points as a whole endogenous variables during the surveyed period. Particularly, the sharp turning point in 1980 for domestic production function is simulated closely to the actual values. Also, simulated values for the political weights of the government and the producers replicated well the turning points during the first oil shock in 1974.

5.3.2. Results of Macroeconomic Impacts Simulation

The Korean government has attempted to accelerate economic growth through public expenditure since the first economic development plan in 1962. As economic development advanced, rice price policy began to become an issues among the interest groups as mentioned in chapter 3. The year 1969 marks the starting period when the government substantially increased the purchasing price for rice in response to political pressure from the interest groups. This section discusses the impact of macroeconomic change experiments on the political macreconomy of rice industry over the period 1969-1985. The comparison of the dynamic simulation results with and without such macroeconomic impacts is to detect the differential path of political economic nature of rice industry.

Two kinds of macroeconomic changes are simulated for the period 1969-1985. First, the Korean government pursues an expansionary and opening agricultural market policy. In this experiment, government increases government spending (GVC) at 20 percent per year, accompanying a 20 percent increase in general budget deficit (GVD) and of official exchange rate(EX) in order to promote economic growth. As a result of opening the agricultural market, we assume that there will be a decrease in aggregate agricultural products by 10 percent. Second, a contractionary policy of a decrease in those macro variables at a 20 percent per year is performed in order to stabilize the economy. In that
case, it is supposed that aggregate agricultural products decrease by 10 percent. It is assumed that other exogenous variables follow the same paths as in the historical data.

Table 5.3 reports the simulation results of the expansionary and contractionary macroeconomic impacts on the endogenous variables associated with the political economy of rice. For details, there are simulation results for yearly changes in the endogenous variables in Appendix C.

Simulation results of the expansionary impact on the rice economy shows that total net increase in producers price is 87 thousand won per ton and the rice production increases by 2,791 thousand ton for the period 1969-1985. Since the political weight of the producers is positively related to the producers' price for rice, it can be inferred that total net increase in producers price is partly due to the surging political weight of rice producers of which total net increase is 26.5.
### TABLE 5.3 Dynamic Impact of Macroeconomic Changes on The Endogenous Variables (1969-1985)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expansionary</th>
<th></th>
<th>Contractionary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Net Change</td>
<td>Percentage</td>
<td>Total Net Change</td>
<td>Percentage</td>
</tr>
<tr>
<td>DP(Thous. m/t)</td>
<td>2,791</td>
<td>78.9</td>
<td>-2,025</td>
<td>-26.6</td>
</tr>
<tr>
<td>DC(Thous. m/t)</td>
<td>-1,281</td>
<td>-23.7</td>
<td>-4,039</td>
<td>-77.1</td>
</tr>
<tr>
<td>PDP(10thous. won/t)</td>
<td>87</td>
<td>66.9</td>
<td>-211</td>
<td>-44.8</td>
</tr>
<tr>
<td>CDP(10thous. won/t)</td>
<td>282</td>
<td>112.1</td>
<td>-237</td>
<td>-26.9</td>
</tr>
<tr>
<td>CPI(index)</td>
<td>-0.11</td>
<td>-30.8</td>
<td>-0.18</td>
<td>-45.3</td>
</tr>
<tr>
<td>WG(index)</td>
<td>2.56</td>
<td>4.1</td>
<td>8.17</td>
<td>10.3</td>
</tr>
<tr>
<td>WP(index)</td>
<td>26.50</td>
<td>26.4</td>
<td>-63.75</td>
<td>-55.2</td>
</tr>
<tr>
<td>WC(index)</td>
<td>-10.27</td>
<td>-8.7</td>
<td>11.54</td>
<td>15.4</td>
</tr>
<tr>
<td>NIM(thous.m/t)</td>
<td>-4,071</td>
<td>-1831.1</td>
<td>-2,013</td>
<td>-2956.1</td>
</tr>
<tr>
<td>GNP(bil.real won)</td>
<td>7,696</td>
<td>17.8</td>
<td>-38,996</td>
<td>-123.2</td>
</tr>
<tr>
<td>CON(bil.real won)</td>
<td>-4,498</td>
<td>-29.5</td>
<td>-26,802</td>
<td>-127.0</td>
</tr>
<tr>
<td>MS(100 mil.current won)</td>
<td>33,714</td>
<td>499.9</td>
<td>-2,139</td>
<td>-71.6</td>
</tr>
</tbody>
</table>
On the other hand, total net increase in consumer price for rice is 282 thousand won per ton during this period. This event may ascribe to the weakening political weight of consumers which is reduced to 10.27 in total net changes. Accordingly, it seem plausible that total net decrease in domestic consumption, 1,281 thousand ton, is due to the reduction of real consumer price despite of income growth. These results imply that expansionary macroeconomic changes strengthen the political position of rice producers leading to a rise in the producers price, and rice production. Meanwhile, the weaker political power of consumers increases consumer price and reduce the rice consumption.

It is found that the political weight of the government is slightly increased, implying that most of cost of rice policy is borne by the consumer group. As a result of reduced consumption and increased production, net import amount of rice is reduced, since the total net decrease in import is 4,071 thousand ton during the period. Turning to the macroeconomic sector, GNP shows a total net increase during the period as expected, thereby causing the accelerated growth in money supply, and reduction of aggregate consumption.

Table 5.3 also shows that a simulated contraction of the macroeconomy would lead to different results in the performance of the rice economy, contrary to the case of expansionary macroeconomic changes. First, the simulation results of contractionary macroeconomy show that the political weight of rice producers are considerably reduced, leading to a reduction in producers price and rice production. Second, even if the consumer price for rice is lowered because of a growing political weight of consumers, the reduction in domestic consumption is higher in the contractionary simulation than in the expansionary simulation as shown in Table 5.3. From these two simulations, following findings are suggested:

First, economic development accompanying the expansion of economy is an important source of strengthening the political power of rice producers, and increasing the
rice price and production. Meanwhile, the contracted macroeconomy plays the role of repressing the political voice of rice producers, and reducing their rice price and production.

Second, the political power of consumers becomes more weak as the expansionary economic development progress. As a result, the consumer price shows an upward trend, in spite of the reduction in the demand for rice. In the case of economic contraction, although the political power of consumers increase slightly and their consumer price falls, it is found that the aggregated consumption of rice drop further than in the case of expansionary simulation.

Third, the required amount of rice import is found to be less in the expansionary simulation than in the contractionary simulation. The reason is that increasing rice production in the economic expansion is high enough to offset the decreasing rice consumption in the economic contraction.

Fourth, turning to the macroeconomic sector, GNP and money supply shows positive growth in the expansion of the economy as expected, while in the contracting economy they come out to be negative. On the other hand, aggregate consumption exhibited total net decrease in both simulation.
5.4 Notes

1) The t values for testing the hypotheses that the political weights are not different from 100 are 5.27 for WG, 4.63 for WP, and 4.17 for WC, respectively. The t values for testing pairwise differences are 4.89 for the government vs. producers, 5.87 for the government vs. consumers, and 4.44 for the producers vs. consumers.

2) With respect to the computer program for a non-linear simultaneous system of equations, see SYSNLIN of SAS/ETS (SAS 1985).

3) The price elasticity of supply of rice was estimated to be 0.5673 percent from 1965 to 1980. see Huh (1982) for the detailed estimation.

4) Total cultivated area of paddy was 1,221 thousand hectares in 1961 and slightly expanded to 1,325 thousand hectares in 1985.

5) In the case of 2SLS method, the sign of coefficient of real consumer price (CDP/CPI) is negative (-0.24489) and also insignificant since its t value is -0.26.

6) Meanwhile, there have been estimations of price elasticity to per capita rice consumption in Korea. Their estimated parameters show the positiveness with wide ranges. For details, see Yoon(1988), Joo (1980), Lee(1978), Sung(1975), Seol(1973), and Huh(1982).

7) According to the theory of economic regulation, increasing political weights of rice producers imply that the policy maker has accommodated the demand for redistribution to producers with the higher priority and that the political preference function characterize the convexity in its functional form. Gardner (1987) argued that policy tends to moderate the economic benefit as relative income changes. For example, there will be an increase in the marginal political preference (weight) for producers as the producer's relative income decreases. However, there can be various factors affecting the political weight in addition to the income variable.

8) When the producers' price, consumers' price and net import are selected to explain the dependent variable,GMFD, the results of the estimation is as follows:

\[ \text{GMFD} = -83.75 + 8.65 \times \text{PDP} - 3.85 \times \text{CDP} - 0.465 \times \text{NIM} \]

\[ (3.69) \quad (-1.85) \quad (-2.49) \]

However, this function was deleted from the simultaneous equation system to improve the forecasting performance in the procedure of adjusting the model.
CHAPTER VI

SUMMARY AND CONCLUSIONS

The traditional welfare economic view that government intervention in agriculture results from the failure of the private market does not provide sufficient scope for dealing with the political reality that the actions of government are, in fact, the results of political economic interactions in the political arena. Thus, new analytical methods (models) have been advanced in recent years to explore why and how agricultural policies have evolved to their present forms and ultimately to predict likely policy reforms in the future. These new models, offered under the well established "political economy" label, go beyond the horizons of traditional market oriented analysis.

A key feature of this "new" political economy approach is that the actions of government are endogenously incorporated into these models rather than exogenously given as in previous models. Thus, the role of government in formulating and implementing policy is not limited to its normative function of correcting market failures, but also includes all its positive functions in the actual political decision making process. This view implies that public policy reflects the stakes of powerful interest groups including government entities all acting primarily in their self-interest without full regard for the effects of their actions on the economy as a whole.

Meanwhile, it has been recognized that the variations of the macrovariables are major sources of generating political influences that culminate in government actions in the agricultural sector. This recognition is largely based on the fact that the political motivations of farmers are likely to escalate to influence agricultural policy as the macroeconomic changes provoke unfavorable effects on the farmers.
Therefore, it can be inferred that the political activities of interest groups to change agricultural policies are functionally related to the changes in the macroeconomy. In other words, government policies are endogenized in the political economic system where the evolution of interest groups and their policy influencing powers are functions of the macroeconomic circumstances.

Focusing on the political economic nature of agricultural policies, we need to examine the questions on how endogenous agricultural policies are interrelated to the macroeconomy so as to advance our understanding of the agricultural policy adjustment process. Thus, the main thrust of this study has been to develop a conceptual framework of political macroeconomic analysis to better understand the functional relations of agricultural policy adjustments. For this purpose, the hypothesis that endogenous agricultural policy has been adjusted to the changes in the macroeconomic system was advanced. To test the hypothesis, this study suggested two working hypotheses:

1) agricultural policy endogenously responds to the results of bargaining process among the competing interest groups; and

2) Macroeconomic changes affect the bargaining powers of interest groups, which are transmitted to the political willingness to adjust agricultural policy.

This research design was formulated with the Korean rice economy in mind. Over the past recent decades, the Korean government has adjusted rice price policies in response to the changing political and economic forces. Farmers and pro-farmers groups demand for higher producers' price while consumers group often complain about rising price of rice. On the other hand, the government justifies its decision on the rice price based on various calculation criteria. In short, Korean rice policy became the main political issue among the major interest groups seeking benefits from the policy, since macroeconomy substantially developed from early 1960s.
If Korean rice policy adjustments depend on the results of political bargaining process, rice policy maker would arbitrate conflicting objectives of interest groups rather than exercise authority in its policy decision making. The model represented in this study was constructed to explain the nature of Korean rice policy under the circumstances of macroeconomic changes. A single rice policy maker, as an arbitrator who accommodates the policy influencing efforts of interest groups, was assumed to have political willingness to redistribute welfare through adjusting the rice policy. Three interest groups - consumers, producers, and government - are assumed to be engaged in exerting political efforts to influence the rice price policy.

A political preference function was designed to detect the bargaining powers of interest groups to influence the rice price policy, which are represented as policy influencing efforts. The political weights (policy influencing effort) was quantified as an equivalent of political willingness of rice policy maker to redistribute income in favor of a group in the revealed political preference function.

This model differentiates itself from previous studies as follows:

First, we regard agricultural policies as the compromising results of a conflict among competing interests (similar to a zero sum bargaining game) rather than the equilibrium results of demand and supply for institutional changes in the political market place.

Second, we extend the research paradigm for empirically endogenizing agricultural policies by incorporating macroeconomic forces into the model.

The following aspects characterize the model:

First, the model design is for partially closed economy in that domestic rice prices are linked to the border price but differentiated from it through the import control.

Second, it is assumed that there is no spillover effects of rice price policy on the other agricultural products.
Third, bureaucratic decision system for the rice price policy-making in Korea is characterized as if there were a single policy maker as an arbitrator accommodating conflicting political pressures from interest groups.

Fourth, political weights estimated by a political preference function are taken to be the results of political bargaining process to influence policy that are transmitted to the policy maker's political preference toward interest groups.

Fifth, macroeconomic changes have important influences on the political economy of Korean rice policy so that the patterns of trends of the estimated political weights are functionally related to the changing macroeconomic conditions.

6.1 Summary of Empirical Findings

The first hypothesis was tested successfully with the results of the political preference function. The revealed political weights support the notion of a rice rice policy maker's differentiated political attitudes toward interest groups based on the premise that the political weight is an indicator of political willingness to redistribute benefits through the rice policy adjustments.

The pattern and trends of changing political weights indicate that rice policy maker increased his relative political preference rate toward rice producers by about 30 percent, while decreasing those of consumers and government steadily by about 15 percent over the period 1961-1985. This implies that rice producers have exerted more political efforts to benefit from the rice price policy than consumers and government. As a result, there has been a continuous rise in rice price in favor of farmers.

The analysis implies that, over the past two decades, the political attitude of rice policy maker appeared to have favored the granting of pricing benefits to producers while at the
same time distributing the costs of the support program into consumers and government, or more precisely taxpayers who share in the burden of financing the rice policy.

Once the policy maker's political willingness to favor the rice producers was identified, an econometric model was constructed by incorporating the rudimentary elements of the macroeconomy into the political economic system of rice to test the second hypothesis. The model consists of 12 equations (10 behavioral equations and 2 identities). The main objective was to test the relationships between the rice policy adjustments and the macroeconomy and to quantify the effects of the macrovariables on the endogenous variables.

Annual time-series data for the Korean economy from 1961 to 1985 was used for estimating the model since the Korean government, in a substantial sense, began to enforce the rice price policy characterizing the political nature from 1961. The simultaneous equations were estimated by the non-linear 3 stage least square method. After testing the validation of the model, a dynamic simulation method was performed by using the Gauss-Seidel method.

The main empirical findings are summarized as follows;

1) Increasing deficits in Grain management Fund for financing the rice policy and in general government budget were found to reflect the reduced political position of government in rice price policy making. This empirical findings support the assertion that rice policy maker tends to give the burden of fiscal deficits less political priority to redistribute the income in favor of farmers. On the other hand, it can also be interpreted that reinforced political position of government leads to the reduction of deficits.

2) The ratios of farm parity price and rural-urban income ratio were positively related to the policy maker's political preference rate (political weight) toward rice producers. This implies that, as the farmers' demand for higher
rice prices gained political support, the accommodation of these demands reflected a conscious attempt by the policy maker to correct the growing income gap between the rural and urban sectors. These two parity ratios are clear indicators of farmer's relative incomes, and as such, the high rice prices reflected policy efforts to ameliorate their declining income position vis-a-vis their urban counterparts.

In addition, the declining agricultural share of GNP have remained strongly associated with the increasing policy influencing effort of producers to benefit from the rice policy even after the price and income parity affects were separately accounted for. This may be interpreted in terms of the broader rural sector for rice farmers and the need to reduce the wide array of rural adjustments costs associated with general structural change.

3) At the aggregated level, per capita income is the main determinant of consumers' effort for lowering rice prices. As the per capita income increases, consumers tend to mitigate their demands for lower rice prices and also to some extent shift their tastes and preferences toward substitutes for the staple starch. This is suggested by the declining Engel's coefficient for rice and the statistical insignificance of the estimated coefficient relating rice prices to consumers political weights. The results of the foregoing analysis infers that the rice policy maker will give less political preference to consumers who lack in policy influencing efforts to lower the price of rice as long as their per capita income goes up sufficiently to offset the rising cost to them. In fact, urban dwellers appear to willingly accept the high rice prices with a sense of social justice in aiding the plight of poor farmers as the per capita income rapidly increases.
4) Policy influencing efforts of interest groups and economic variables are functionally related to the formulation of the consumers' and producers' price. The policy maker's political preference rates (political weights), associated with the rice production and consumption variables, appear to show their impacts on the prices for both producers and consumers. Border price was found to be linked to the consumers' price but the producers' price. This findings affirm that producers' price was well buffered from the influences of international rice market while the consumers' price was adjusted to the changes in the international market.

5) Through the simulation of macroeconomic impact experiments, expansion of the economy was shown that the policy maker promotes the political preference toward rice producers, thus contributing to the increase in rice prices and production. On the other hand, simulation of contracted macroeconomy showed a repression of the political willingness of rice policy maker to give the favor to rice producers, through the rice policy, which, in turn, leads to the reduction of rice prices and production.

6) During times of expansion, rice policy maker shows the less political preference regarding the welfare of consumers resulting in rising consumer price and a reduction in demand. In the contractionary phase, rice consumption and consumer prices decreased further despite the strengthened effort of the consumer to influence the rice policy compared with the expansionary times. On the other hand, the policy maker increased the political attitude toward the government's deficits resulting in reduction of them in both expansionary and contractionary policy simulations. No matter how the macroeconomy changes, consumers shoulder a major
portion of the cost of rice policy adjustments since they are forced to reduce their rice consumption in both simulation experiments.

6.2 Implications for Policy

The model used in this study to capture the links between the macroeconomic sector and the motivations for rice policy adjustments appears reasonable and not overly complex. There are, however, problems still inherent in the model, so that the empirical results should be interpreted with caution. This model, nevertheless, provides useful implications for alternative political economic analysis of agricultural policy adjustments.

It should be noted that the dynamics of many important agricultural policy adjustments are heavily dependent upon the macroeconomic conditions through the political bargaining process. Therefore, to the extent that agricultural policies serve the interest groups with political effort to pursue their own benefits, the purpose of policy to increase economic efficiency at the farm level cannot be expected to be always effective.

If we want to increase the opportunities for agricultural policy reforms, new institutional rules should be designed so as to persuade the affected interest groups to accept the reforms. Institutional rules which make clear what kinds of policy adjustments will be needed to conform with the changing political economic conditions are essential for the long term.

In this context, some of the policy implications applicable to Korean rice economy may be suggested as follows:

1) As long as Korean economy is on the expansionary path, high price support policy in favor of rice producers is expected to be enforced until a shift in the subsidy cost to the consumers and government begin to make the rice policy maker perceive the increasing political effort of both groups to
influence the rice policy. Rice policy in Korea should be designed in the future to lower the burden which the consumers and government shoulder if the policy maker attempts to continually maintain the high price supporting system.

2) To this end, the government may consider measures to import the proper amount of rice to alleviate the rising cost burden but not to impair price incentives for farmers. This measure can also prevent overproduction of rice in case of continuing high rice price in the future. This is because decreasing per capita rice consumption would lead to over supply. In that case, proper use of rice imports may serve to control the rice production while accommodating political pressure from farmers.

3) Korean rice producers have been shielded from the world market, resulting in the rapid growth of protectionism. If the Korean rice economy had to be liberalized toward the free trade, an politically acceptable policy should be accompanied so as to persuade the farmers not to raise their political complaints. Before opening the domestic rice market, for example, an policy measure to secure the farmers' profit from rice farming may be needed.

4) In the long run, one possibility is to lower the domestic cost of producing rice through extensive investment in further land and irrigation development. However, since most of the cultivated land is already under intensive use, there appears to be limited scope for doing so.

Another possibility is to promote other sources of farm income so as to encourage the farmers to put less political pressure for a high price support for rice. Also there may be a possibility of creating off-farm sources of incomes within the commuting distance of farm households, in considering that farmers still earned the small portion of off-farm incomes.
By doing so, the political weight of rice can be lowered and we can provide the avenue for opening the rice market and improving its economic efficiency.

6.3 Suggestions for Further Research

There remains considerable room to improve the specification of policies, the criterion function, incorporation of the macroeconomy into the endogenous policy adjustments, etc. For example, attempts to estimate stochastic political weights can be useful to overcoming the certainty and equilibrium assumptions of political weight in this study. Also the rudimentary macroeconomic system can be improved so that we may explore the more specified transmechanism between the rice economy and the macroeconomy.

In this study, we focus on the bureaucratic level of policy making with assumption of a single policy maker maximizing his welfare function. We may argue for the inclusion of only the conflicting welfare of interest groups in the political preference function, while excluding other social goals such as food security. In that case, the national interest should be measured in terms of the economic well-being of all groups taken together. Furthermore, in empiricizing the institutional changes beyond the bureaucratic level, however, we may need different analytical frameworks which focus on the election process or the legislative choice process of policy making. The liberal-plural paradigm that focuses on the potential process of comprehensive policy reform can be re-examined for such analysis.

If the rice economy moves towards the free trade, incorporating the open economy into the model would be able to provide deeper understanding of the linkages between the agricultural policy adjustments and the changing domestic and international economy. Actually, as the international pressure for opening agricultural markets has been
recognized in the recent years, the notion of interest groups could be redefined to reflect surging new interest group in the process of policy determination. The effects of increased international pressure on domestic agricultural policies can be addressed by the inclusion of a foreign interest group in the political preference function. Furthermore, agricultural protectionist policy can be reevaluated if the international political pressure is proved to play an role of impacting on endogenous government actions in the agricultural sector.

In this study, actual political procedures in the process of policy determination are assumed to be in a political black box. When the political transfer mechanism from macroeconomic changes to policy determination is explored, we can have more relevant information on the political behavior of the government, which may provide alternative policy strategies to reach politically possible policy decision. By doing so, we can also avoid unnecessary misunderstandings on what are the possible reforms of agricultural policies.
APPENDIX A

MATHEMATICAL SOLUTION OF OPTIMAL POLICY

Lagrangian for the constraint maximization problem for the policy maker, substituting objective functions (equations, (4.5), (4.6), and (4.7)) of the interest groups into the political preference function (equation (4.4)) and incorporating constraint equation (4.3), is as follows;

\[ L = WP_t \times P(PDP_t) - WC_t \times E(CDP_t, \text{cons}) + WG_t \times (CDP_t \times DC_t - PDP_t \times DP_t) \\
+ USBPR_t \times EX_t \times NIM_t + (CDP_t - PDP_t) \times (ST_t - ST_{t-1}) \\
+ \mu \times (DP_t + NIM_t + ST_{t-1} - DC_t - ST_t) \]

Using the defined derivatives of objective functions, differentiate the Lagrangian function with respect to the policy instruments (PDP_t, CDP_t, and NIM_t), we have,

\[ \frac{\partial L}{\partial PDP_t} = WP_t \times DP_t - WG_t \times (DP_t + PDP_t \times \frac{\partial DP_t}{\partial PDP_t} + ST_{t-1} - ST_t) \\
+ \mu \times (\frac{\partial DP_t}{\partial PDP_t}) = 0 \]

\[ \frac{\partial L}{\partial CDP_t} = WC_t \times DC_t + WG_t \times (CDP_t \times \frac{\partial DC_t}{\partial CDP_t} + DC_t + ST_{t-1} - ST_t) \\
+ \mu \times (\frac{\partial DC_t}{\partial CDP_t}) = 0 \]

\[ \frac{\partial L}{\partial NIM_t} = WG_t \times (-USBPR_t \times EX_t) + \mu = 0 \]

Given the estimated parameters (price coefficients) from the domestic production and consumption functions and actual values, the above equations of the first order conditions provide two equations in the three unknown political weights WP_t, WC_t, and WG_t. The estimated results of price coefficients, using the ordinary least squares method, are 5.16652 and -0.3536 for production and consumption function respectively.
Assuming a third normalization equation of the form, \( WP_t + WC_t + WG_t = 300 \), we can estimate the yearly changing political weights. It is consistent with what the policy maker ranks the welfare accruing to the interest groups, accommodating their political pressures on current policies. So the derived formular for estimating political weights are as follows;

\[
WG_t = \frac{300}{X + Y + 1}
\]

\[
WP_t = 300 - WG_t - WG_t^*Y
\]

\[
WC_t = 300 - WG_t - WC_t
\]

where 

\[
X = (DP_t + (PDP_t - USBPR_t^*EX_t)* \frac{\partial PDP_t}{\partial DP_t} + ST_t - ST_{t-1})/DP_t,
\]

\[
Y = (DC_t + (CDP_t - USBPR_t^*EX_t)* \frac{\partial CDP_t}{\partial DC_t} + ST_t - ST_{t-1})/DC_t.
\]

It should be noted that the estimated political weights for each year are assumed to be the results of political bargaining process among the interest groups.
APPENDIX B

SIMULATION FITS OF ENDOGENOUS VARIABLES IN BASE SIMULATION

Figure B.1 Historical Simulation of Domestic Rice Production (DP)
Figure B.2 Historical Simulation of Domestic Rice Consumption (DC)

LEGEND: A = 1 OBS., B = 2 OBS., ETC.
SYMBOL USED IS *

PLOT OF DC*YEAR
PLOT OF DCHAT*YEAR

Figure B.3 Historical Simulation of Government's Political Weight (WG)

PLOT OF EWG*YEAR

PLOT OF EWGHAT*YEAR

LEGEND: A = 1 OBS. B = 2 OBS. ETC.
SYMBOL USED IS *
Figure B.4 Historical Simulation of Rice Producers' Political Weight (WP)
Figure B.5 Historical Simulation of Rice Consumers' Political Weight (WC)
Figure B.6 Historical Simulation of Producers' Price for Rice (PDP)
Figure B.7 Historical Simulation of Producers' Price for Rice (CDP)
Figure B.8 Historical Simulation of Index of Consumer Prices (CPI)
Figure B.9 Historical Simulation of Money Supply (MS)

Plot of MS*YEAR
Plot of MSHAT*YEAR
Legend: A = 1 OBS., B = 2 OBS., ETC.
Symbol used is *

YEAR

Figure B.1OHistorical Simulation of Aggregated Consumption (CON)

PLOT OF CON*YEAR
PLOT OF CONHAT*YEAR

LEGEND: A = 1 OBS. B = 2 OBS. ETC.
SYMBOL USED IS *

CON
30000
25000
20000
15000
10000
5000


YEAR.
Figure B.11 Historical Simulation of Gross National Products (GNP)
Figure B.12 Historical Simulation of Net Import of Rice (NIM)
## APPENDIX C

SIMULATION RESULTS OF MACROECONOMIC IMPACTS ON ENDOGENOUS VARIABLES

Table C.1 Simulation Results of Macroeconomic Expansion

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Notes: The "D" prefix to each variable means the difference between the simulated and the base case.
Table C.2 Simulation Results of Macroeconomic Contraction

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