OPTIMAL POLICY REFORMS WITH AN IMPLICIT POLITICAL PREFERENCE: THE CASE OF RICE IN KOREA

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ABSTRACT

The normative use of the Political preference function may provide useful insights to policymakers and economists. Particularly, when the government attaches different weights to producers, consumers and taxpayers, the optimal choice among alternative policies depends on the particular political (or welfare) preferences and is an empirical question. Thus, this paper has employed the implicit political preference function to analyze the trade-off between economic efficiency and political feasibility among alternative rice policies in Korea. Specifically, in this paper, we demonstrate the trade-off between economic efficiency and political feasibility among five alternative policy instruments.

1. Introduction

The Uruguay Round agreements on agriculture required Korea to liberalize its rice market in 1995 through the import quota in the form of guaranteed minimum market access (MMA). In addition, further negotiations with agricultural exporting countries may require Korea to open its rice market more completely in the future. Furthermore, much criticism has been raised regarding the current rice price policy in that the dual price system severely

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distorts efficient resource allocation. Given this policy environment, an important policy question arises concerning the losses or gains from trade liberalization and policy reforms in the future.

According to the traditional welfare analysis that has ranked policies, pure transfers such as lump-sum subsidies or taxes have been suggested as the most efficient policy instruments for correcting any inequities among interest groups (Bhagwati 1971). Empirically, however, it has been observed that the policy instruments chosen by governments are often those that rank low in terms of the efficiency criteria. For example, in most countries, income support policies for farmers are implemented through a variety of domestic and border price interventions rather than a direct income subsidy.

This raises the question why many governments have adopted welfare-distorting policies that contradict the advice of the economists which is to set the agricultural prices equal to the world market prices and transfer income to the farmers by lump sum transfers. For example, in Korea the price for rice has been more than twice as high as the world price as a result of government intervention, even though many previous studies based on traditional welfare analysis suggest policy prescriptions of reducing protection rates (Anderson 1984; Martin and MacDonald 1986; Kim 1994). 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 sector are fully understood. Therefore, conventional policy analysis based on an efficiency criterion is unable to account for the pervasive nature of welfare-distorting agricultural policies adopted by many countries. As a result, the relevance of the traditional approach has been severely questioned (MacLaren 1992, Swinnen and Van der Zee 1993).

Economists have responded to this challenge in a number of ways. One strategy is to incorporate political considerations

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1 Development in the field of public choice and political economic theory represent a response to the relative failure of the conventional efficiency criterion analysis (Swinnen and Van der Zee (1993), and Brooks (1996)).
into an orthodox policy analysis using a political preference function approach. The normative use of the political preference function at given welfare weights may provide useful insights to policymakers and economists. Thus, using the political preference function approach, we consider five alternative policies that a small importing country might choose to achieve a given producer income goal, based on transfer efficiency and political feasibility. To do so, this paper has applied different welfare weights toward interest groups to the analysis of alternative agricultural policy reforms, in particular, to the case of income transfer to farmers. The policy instruments analyzed in this paper cover most of the traditional government farm programs: 1) Lump-sum transfers, 2) Deficiency payment, 3) Consumer tax, 4) Market price support, and 5) Two-tier pricing system.

The purpose of this paper is to analyze the roles that implicit political (or welfare) weights toward interest groups have on optimal agricultural policy. Specifically, in this paper, we demonstrate the trade-off between economic efficiency and political feasibility among five alternative policy instruments. Since the analysis of economic efficiency and political feasibility depend heavily on the demand and supply parameters as well as the level of the income transfer, a sensitivity analysis is also performed.

II. Welfare Measures of the Interest Groups

In welfare economic analysis, the main objective is to measure welfare changes of interest groups due to applied policy. Therefore, appropriate welfare measures for producers and consumers when policy changes occur are very important. To determine the most practically applicable and exact welfare measure, the criteria of compensating variation (CV) and equivalent variation (EV) are applied to measure welfare effects of interest groups. In order to measure the welfare effects of alternative rice programs on different interest groups, consumer surplus (CS) and producer surplus (PS) are used as
approximations of compensating variation \((CV)\) and equivalent variation \((EV)\). The theoretical justification for consumer welfare measurement is based on the criteria of compensating variation \((CV)\) and equivalent variation \((EV)\) originated by Hicks (1943). However, \(CV\) and \(EV\) can be difficult to determine empirically, since an actual utility level cannot be observed in consumption as well as exact production costs (Just et al. 1982, 98). Thus, consumer surplus \((CS)\) is frequently used as a measure of consumer welfare, which serves as an approximation of willingness to pay and the associated concepts, i.e., \(CV\) and \(EV\). Consumer surplus is defined as the geometric area under the Marshallian demand curve and above the price. However, the Marshallian consumer surplus is subject to the path dependency problem in the case of multiple price changes or when price and income change simultaneously.2 Nevertheless, consumer surplus is commonly used in empirical studies, in line with Willig's (1976) justification that for many goods the possible error in using consumer surplus as a measure of either compensating variation or equivalent variation is less than 5 percent. In a single price change, Willig's analytical result shows that compensation variation \((CV)\) and equivalent variation \((EV)\) are approximated as:

\[
CV = \Delta CS - \frac{\zeta}{2m} (\Delta CS)^2
\]

and \(EV = \Delta CS + \frac{\zeta}{2m} (\Delta CS)^2\)

where \(\Delta CS\) is the change in consumer surplus associated with a Marshallian ordinary demand function, \(\zeta\) is the income elasticity, and \(m\) is income.

From the above equations, the likely error that results from using consumer surplus as an approximation of either

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2 The path dependency problem indicates that consumer surplus depends on the order in which the integration is taken, i.e., changes in consumer welfare depend on the particular path of price change chosen (Just, et al. 1982, 73-75).
compensating or equivalent variation depends on the income elasticity and the share of the change in consumer surplus in total income. Willig's results indicate that the greater the income effects of the price change, the greater will be the deviation between $CV$, $EV$ and $\Delta CS$. However, he argues that the error involved in using consumer surplus as an approximation of $CV$ and $EV$ would be less than 5 percent in many cases. For example, if the share of expenditure on the good in total income and/or its income elasticity are small enough, consumer surplus can be used as an approximate measure of the consumer welfare change caused by the government intervention. In the case of Korean rice, the share of total expenditures devoted to rice is only about 3 percent, and the income elasticity seems to be small [-0.04 for the short-run and -0.13 for the long-run in Im Jeong-Bin (1999), and -0.08 in KREI (1993)]. Thus, consumer surplus can be used as an approximate measure of the consumer welfare change caused by the government intervention.

On the production side, the change in producer surplus ($PS$) is commonly used in empirical work as a measure of producer welfare. Producer surplus is defined as the geometric area above the supply curve and below the price line. However, this producer surplus does not necessarily measure exact producer welfare when multiple price changes are considered in output and input markets, and when input adjustment is allowed in the long-run. In order to account for these more general cases, a measure of quasi-rent (defined as the excess of gross receipts over total variable costs) is used as a measure for producers' net benefits. The change in quasi-rent is exactly the compensating and equivalent variation, expressed in terms of money, measured in an output market as a result of policy change. In the short run, the change in quasi-rent and the change in producer surplus due to the price support program are equivalent, assuming fixed input prices (Just et al. 1982, 54-55).

For the purpose of this paper where only a change in the price of rice is considered within a partial equilibrium framework, consumer surplus and producer surplus are used as measures of
the change in consumer and producer welfare caused by the government price intervention to support producer income.

III. Comparison between Economic Efficiency and Political Feasibility

In this study, five alternative policies that a small importing country might choose to achieve a given producer income goal, are analyzed and compared with respect to their transfer efficiency and political feasibility. The basic assumption is that the political (or welfare) weights among interest groups are not affected by the changes in policies and welfare resulting from the alternative policies. The effects of policies are measured relative to the non-intervention equilibrium. The small country assumption with effective border protection is employed.\(^3\) The world supply of rice is assumed to be perfectly elastic at the world price, \(P_w\). To compute the benefits and costs to various social groups caused by the policy, domestic demand and supply functions for rice are assumed to be linear approximations of the actual functions. Demand and supply can be described by the price dependent linear functions:

(1) \[ D(Q) = P_D = \alpha + \beta Q_D ; \quad \beta < 0 \]

(2) \[ S(Q) = P_S = \gamma + \delta Q_S ; \quad \delta > 0 \]

For the present paper, the price elasticity of demand and supply is assumed to be -0.20 and 0.49, respectively, at the market level of 1995. In 1995, rice quantity supplied \((Q_S)\) was and the prices paid to farmers \((P_S)\) and paid by consumers \((P_D)\) were 1,584 won/kg and 1,540 won/kg. These values are sufficient to parameterize the model. Then, the four unknown parameters in

\(^3\) Even this assumption is necessary to simplify the analysis, and we need to note that actually the Japonica rice which is generally consumed in Korea has been a thin market in terms of international trade. Thus the large change in rice import might change the world price.
the above model are derived as: \( \alpha = 9240 \), \( \beta = -1.39 \), \( \gamma = -1649 \), and \( \delta = 0.64 \).^4

The policy instruments analyzed in this section cover most of the traditional government farm programs. All options keep the assumption that producer welfare is achieved by a certain net income transfer.\(^5\) In other words, the change in producer surplus (\( \Delta PS = k \)) is treated as the exogenous variable. In this chapter, we consider five policy options for achieving a certain net income transfer to the farmers group. The income of farm households may be supported by: 1) Lump-sum transfers, 2) Deficiency payment, 3) Consumer tax, 4) Market price support, and 5) Current Two-tier pricing system.

For this study, the implicit political weight for interest groups in the Korean rice sector is assumed as \( \lambda_p = 1.33 \) for producers, \( \lambda_c = 0.76 \) for consumers and \( \lambda_G = 0.91 \) for taxpayers, respectively. These implicit political (or welfare) weights are based on the previous studies, particularly, those in Im (1999). Although the estimated welfare weights on interest groups are not exactly the same in the previous studies, the political or welfare weights have also been estimated as the similar order of particularly high for producers, low for taxpayers and lowest for consumers (see Kim (1998) and Kwon and Yamauchi (1993)).

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4 Through the price elasticity of demand, \( \eta = \frac{\partial Q_D}{\partial P_D} \cdot \frac{P_D}{Q_D} = \frac{1}{\beta} \cdot \frac{P_D}{Q_D} \), the slope of the linear approximation demand curve is obtained: \( \beta = \frac{1}{\eta} \cdot \frac{P_D}{Q_D} \).

Using this result, the constant term is also obtained: \( \alpha = PD - \frac{1}{\gamma} \cdot \frac{P_D}{Q_D} \). In a similar manner, the parameters of the supply curve (\( \gamma, \delta \)) can be obtained.

5 Agricultural policies are generally used to increase income to farmers at the expense of consumers and/ or taxpayers. For example, Gardner (1987) concludes in summarizing a discussion of U.S farm policy that "whatever the stated goals in the United States and the other industrial countries may be the set of farm policies we observe appear to be equivalent to policies intended to support the incomes of farmers as an interest group." By the same token, although the Korean government has set different priorities from time to time, maintaining self-sufficiency and supporting farm income has been a consistent goal of the rice policies.
Policy 1: Lump-sum Transfer

Suppose the government implements a lump-sum transfer to maintain the targeted producer welfare. With a lump sum transfer, the domestic producer and consumer prices are the same as the border price. Thus, there is no distortion in both production and consumption behavior. The additional producer welfare is extracted from the taxpayers' under the lump-sum transfer policy. The proof that a lump sum transfer is the most efficient instrument to achieve the optimal income distribution in the absence of information costs is well known. Under the usual neo-classical assumption without considering administrative costs, enforcement costs and other transaction costs, it can be established that a system of lump sum transfers is superior to any other support instrument. Figure 1(A) illustrates the market situation that a lump sum transfer is not associated with both production and consumption under free trade. With equal weights assigned to the welfare of each interest group, particularly in case of $\lambda_p = \lambda_c$, a lump-sum transfer policy does not create the deadweight loss regardless of the magnitude of the income transfer ($k$) to farmers:

$$DWL = \Delta W = \Delta PS + \Delta CS + \Delta GS = k + 0 - k = 0$$

where $DWL$ denotes the deadweight loss generated by policy intervention, $\Delta W$ represents the net social welfare change and is defined as a sum of changes in the welfare of producers, consumers and taxpayers.

This $DWL$ concept has often been used in normative policy analysis as a criterion for the choice of policy instruments. It is easily shown that this $DWL$ value judgment criterion is actually the same as the Benthamite (or utilitarian) social welfare function, which gives uniform welfare weights across interest groups. Assuming that policymakers maximize a utilitarian policy objective function, or equivalently minimize $DWL$ as the value judgment criterion for ranking policy options, makes a crucial
assumption that the value of increasing the welfare of an interest group is the same as that of the other group by one unit in the viewpoint of policymakers. However, it has been criticized by many economists for failing to explain the pervasive implementation of welfare-distorting agricultural policies in many countries. It has frequently been realized that the policy options based on DWL or economic efficiency might be politically infeasible. Generally, it is not possible to attain both economic efficiency and political feasibility.

However, with different welfare weights on each interest group, the change in the political preference function is dependent on the magnitude of the income transfer to farmers. By using the political preference function approach, we can apply the implicit political weights over interest groups to define the political feasibility of alternative agricultural policy programs. Consider now the political surplus achieved by policymakers due to a change in policy intervention. The change in its level is as follows:

$$\triangle PPF = \lambda_p * \triangle PS + \lambda_C * \triangle CS + \lambda_G * \triangle GS = (\lambda_p - \lambda_c) * k$$

where $\triangle PPF$ represents the change in the value of political preference function from policy intervention.

**Policy 2: Deficiency Payment**

Under a deficiency payment, the difference between the market price and a target price is paid to producers on each unit of output whereas the consumer price remains at the world price. Figure 1(B) illustrates the market situation for a country which supports the agricultural sector at a price which differs from the price paid by consumers. The income transfer to the producer in this case is entirely financed by the taxpayer. Unlike the above pure lump-sum transfer policy, the producer price is adjusted to achieve the targeted producer welfare. Since the deadweight loss results from the inefficient allocation of resources in production, there is no demand curve parameters in the formula for the
calculation of the economic efficiency and political feasibility. The derivations of $DWL$ and $APPF$ under the deficiency payment are as follows:

$DWL = -\frac{(P_S - P_W)^2}{2\delta}$

$APPF = \frac{(P_S - P_W)}{2\delta} [ P_S (\lambda_P - 2\lambda_C) + \lambda_P P_W + 2\gamma (\lambda_C - \lambda_P) ]$

where $P_S = \gamma + \sqrt{(P_W - \gamma)^2 + 2\delta k}$.
Policy 3: Consumer Tax

A consumer tax policy imposes a higher price on domestic consumers, whereas producers receive the world market price. Additional producer welfare is financed through a higher consumer price. In this policy, the government adjusts the domestic consumer price to provide the targeted producer welfare. With the consumer tax policy, distortion is limited to consumption, not to production, and no taxpayer's burden occurs. Thus, the consumer tax policy relies entirely on the consumer's costs in transferring income to the producer. Figure 1(C) illustrates the market situation for a country which transfers income from consumers to producers through the consumer tax policy. The income transfer to producers under this policy depends on the size of the domestic market as well as the elasticity of demand. The smaller the domestic market is, the larger the increase in consumer price required for a given net income transfer to farmers. Also, the more elastic demand is, the greater the deadweight loss for a given net transfer. Since the deadweight loss results only from the consumption side, there are no production curve parameters in the formula for the calculation of the economic efficiency and political feasibility. The derivations of $DWL$ and $\Delta PPF$ under the consumer tax policy are as follows:

$$DWL = \frac{(P_D - P_w)^2}{2\beta}$$

$$\Delta PPF = \frac{(P_D - P_w)}{2\beta} \times [P_D (2\lambda_p-\lambda_C) + P_w \lambda_C - 2a(\lambda_p-\lambda_C)]$$

where $P_D = \frac{P_w + a - \sqrt{(a - P_w)^2 + 4\beta k}}{2}$. 
Policy 4: Market Price Support

Market price support seems to be the most common method of supporting the agricultural sector in industrialized countries. With this policy, the domestic price to producers and consumers are increased by the same amount relative to the border price. Figure 1(D) illustrates the market situation under market price support. With market price support, deadweight losses occur on the producer as well as the consumer side. The derivations of $DWL$ and $\Delta PPF$ under the market price support are as follows:

$$DWL = \frac{(\delta - \beta)(P_t - P_w)^2}{2\beta \delta}$$

$$\Delta PPF = \frac{(P_t - P_w)}{2} \left[ \frac{(P_t - \gamma)(\delta \lambda_c - 2\lambda_C)}{\delta} + \frac{(P_w - \gamma)\lambda_c}{\beta} + \frac{(P_t - \gamma)(2\lambda_C - \lambda_c)}{\beta} + \frac{(P_w - \gamma)\lambda_C}{\beta} \right]$$

where $P_t = \gamma + \sqrt{(P_w - \gamma)^2 + 2\beta k}$.

Policy 5: Two-tier Pricing System

This policy is a combination of a pure deficiency payment and a pure consumer tax policy. It is equivalent to the deficiency payment if the domestic consumer price is equal to the border price. Also, it is identical to the consumer tax policy if the domestic producer price is equal to the border price. Moreover, it is equivalent to the market price support policy if the consumer and producer prices are the same and are greater than the border price. Figure 1(E) illustrates the market situation under two-tier

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6 It is assumed that the import rent is captured by the government through import management.
pricing system. The derivations of $DWL$ and $\Delta PPF$ under the two-tier pricing policy are as follows:

$$DWL = -\frac{(P_S - P_W)^2}{2\alpha} + \frac{(P_D - P_W)^2}{2\beta}$$

$$\Delta PPF = \frac{(P_S - P_W)}{2\delta} \times [P_S(\lambda_P - 2\lambda_G) + \lambda_P P_W + 2\gamma(\lambda_G - \lambda_P)]$$

$$- \frac{(P_D - P_W)}{2\beta} \times [P_D(\lambda_C - 2\lambda_G) + \lambda_C P_W + 2\alpha(\lambda_G - \lambda_C)]$$

where $P_S = \gamma + \sqrt{(P_W - \gamma)^2 + 2\delta k}$, $P_W < P_D < P_S$.

The effects of the alternative rice programs listed above are measured relative to the non-intervention equilibrium by comparing the economic efficiency and political feasibility resulting from the alternative programs. For the purpose of this chapter, economic efficiency is defined as: $[W_1 (= W_0 + DWL)] / W_0$, where $W_0$ is initial social welfare under free trade, $W_1$ is the new social welfare under the policy intervention, and $DWL$ is the
deadweight loss created by the government intervention. Considering that the deadweight loss is generally created by the policy intervention, i.e., $\text{DWL} \leq 0$, the economic efficiency as defined above is upper bound by one. Also, the political feasibility is defined as: $[\text{PPF}_1(=\text{PPF}_0 + \Delta \text{PPF})]/\text{PPF}_0$, where $\text{PPF}_0$ is the value of the political preference function under the non-intervention equilibrium, and $\text{PPF}_1$ is the new value of the political preference function generated by the government intervention. Unlike the index of economic efficiency, there is no precondition for the magnitude of political feasibility because the change in the political preference function is ambiguous, i.e., $\Delta \text{PPF} \leq 0$ or $\Delta \text{PPF} \geq 0$. In the context of the Korean rice policy, it is assumed that the policymakers want to intervene in the rice market to support the income of farmers as an interest group. Then, an important policy question is which policy is the most appropriate policy instrument in terms of economic efficiency and political feasibility. Of particular interest is the comparison of economic efficiency and political feasibility under alternative policies as the size of the transfer to producers varies. Therefore, the economic efficiency and political feasibility is explicitly expressed as a function of the size of the income transfer. The scale of net income transfers considered in this section ranges from zero to four hundred percent of the producer surplus under the free trade situation.

In Figure 2, the results of the economic efficiency comparisons of the five government instruments are illustrated. The graph shows the economic efficiency generated by policy intervention as a function of the size of the income transfer to farmers. The economic efficiency is graphed on the vertical axis, bound at the upper end by one, which is associated with a neutral lump sum transfer. The size of the income transfer is expressed on the horizontal axis. Depending on the policy variable and its effect, economic efficiency could be measured when we are interested in how efficiently producer gains are realized through associated deadweight losses generated by government programs. If the purpose of policymakers is to find
the most efficient way of redistributing a certain amount of income to producers, the policy instrument with the highest economic efficiency should be selected. General policy ranking is ordered as we expected. Economic efficiency tends to decline as the size of the income transfer increases. The lump-sum transfer policy (Policy 1) has the highest economic efficiency in all the policies considered over the entire range of the income transfer to producers. The consumer tax (Policy 3) has a higher economic efficiency rather than the other policies over most ranges of income transfers to farmers, except the lump-sum transfer policy. This implies that the consumer tax policy created a relatively small amount of the deadweight loss on the consumption side, which is explained by a more inelastic demand schedule than supply curve. However, as the targeted size of income transfers to producers is increased, the economic efficiency of a consumer tax tends to decrease over the range beyond the specific level of income transfers even though it is not shown in a given range of the graph. This reflects that a larger increase in consumer price is
required for a targeted large income transfer to producers, which generates the relatively large deadweight loss. The deficiency payment (Policy 2) is ranked higher than both the two-tier pricing (Policy 5) and market price support (Policy 4) which are generating the deadweight losses in both production and consumption.

In Figure 3, the results of the political feasibility comparisons of the five alternative government instruments are illustrated. The graph shows the change in the political objective function generated by policy intervention relative to the non-intervention equilibrium as a function of the size of the income transfer to farmers. This result shows that there is a positive relationship between income transfers and political feasibility. If the purpose of policymakers is to find the most politically feasible way of redistributing a certain amount of income to producers, the policy instrument with the highest political feasibility should be selected. In a given range of income support to farmers in the Korean rice sector, most
policies considered, except the market price support, increase the political feasibility.

However, the political feasibility of the market price policy tends to be decreased over the range beyond the specific level of producer welfare gains around 300 percent. The political feasibility of the lump-sum transfer to support the producer is now lower than consumer tax for all levels of income transfer to farmers, and lower than the two-tier pricing policy beyond a certain range of income size. The consumer tax is the most politically feasible over all the other policies considered over the entire range of the income transfer to producers. Also, the income support under the current two-tier price policy could be the relatively more feasible policy over the lump-sum transfer for producer welfare gains to around 160 percent. This implies that the policy rankings in terms of political feasibility are dependent on the welfare transfer to farmers. In other words, there is a certain range of income transfers which make the political feasibility lines cross, unlike the policy rankings which are independent of the size of the welfare transfer to producers. It is also worth noting that there is a big difference between two-tier pricing and single market price support in terms of political feasibility, even though there is little difference in economic efficiency between these policies as shown in Figure 2. Single market price policy has still ranked the lowest in terms of political feasibility. This result reflects that the consumer's welfare loss under this policy is more over-exploited than the taxpayer's welfare gain in the single market price support with different weights on consumers and taxpayers, even if the taxpayer has a higher political (or welfare) weight than the consumer.

Now, the important policy question is why the Korean government has not used the consumer tax policy, which is superior to the current two-tier pricing in terms of both economic efficiency and political feasibility, given a set of market parameters and policy preferences. This could be answered in the context of self-sufficiency, which is one of the main policy goals
in the Korean rice sector. In Figure 4, the effects of alternative policies on the self-sufficiency rate are shown. These results show that, in terms of the self-sufficiency in the Korean rice sector, consumer tax and lump-sum transfers are much less effective for attaining the rice self-sufficiency rate at a given welfare transfer to farmers than any other policy considered. In terms of the self-sufficiency rate, the market price support policy ranks highest, followed by two-tier pricing plan, deficiency payment, consumer tax, then lump-sum transfer, for all ranges of welfare changes.

Overall, in terms of economic efficiency, without considering the opportunity cost of government taxation, a pure lump-sum transfer is the most efficient policy as indicated in most previous studies using the conventional efficiency criterion. However, in terms of a policy objective function with different

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7 Additional costs such as the costs of implementing and administering a support program and the economic costs of raising funds for government expenditures on agricultural protection are not generally considered.
welfare weights, it could be a sub-optimal policy. Through the above analysis of the economic efficiency and political feasibility, we can draw the following conclusions: 1) the larger the proportional increase in domestic support to farmers, the smaller the economic efficiency in terms of the change in deadweight loss, and the greater the political feasibility in terms of the change in value of political preference function, 2) the current two-tier pricing plan could be a highly effective policy in terms of both political feasibility and self-sufficiency, 3) the consumer tax could be the most promising policy option in terms of political feasibility if we ignore the self-sufficiency concerns in the Korean rice sector, 4) the lump-sum transfer policy could be the most effective policy in terms of not only economic efficiency but also political feasibility for the higher welfare transfer to farmers' group, but at the cost of self-sufficiency and 5) the policy rankings are different depending on which policy criterion is used.

IV. Sensitivity Analysis

Choosing among alternative policies crucially depends on the particular circumstances. However, it is difficult to say that a policy is always superior to others in a continuously changing economic environment. For example, an optimal policy that is superior today may be sub-optimal tomorrow. Therefore, extensive sensitivity analysis is needed to assess more meaningful policy implications. Sensitivity analysis of the policy rankings in terms of both economic efficiency and political feasibility is performed to evaluate results under the alternative demand and supply elasticity estimates as well as the magnitude of the implicit political preferences toward interest groups.

The appendix shows the results of the sensitivity analysis from a change in market parameters. Each scenario differs from the base situation through the alternative demand and supply elasticity as well as the magnitude of the implicit political preferences toward interest groups. First, as the supply elasticity
becomes less elastic changing from 0.49 to 0.2 while holding the demand elasticity constant at -0.2, a policy ranking reversal takes place between the deficiency payment and consumer tax. In this case, the economic efficiency of a deficiency payment increases, as supply becomes less elastic for a given welfare transfer to farmers since the deadweight loss of deficiency payment results entirely from inefficient resource allocation in production. On the other hand, the economic efficiency of consumer tax is not affected from the change in the price elasticity of supply since there are no production curve parameters in the formula for the calculation of the economic efficiency. Also, the economic efficiency of both market price support and two-tier pricing policy increase because deadweight loss occurs on the production side as well as on the consumption side. Thus, the difference in the economic efficiency between consumer tax and all the other options is narrowed.

However, there is no policy ranking reversal in terms of political feasibility. Even though the relative political feasibility rankings among alternative policies do not change, the difference in political feasibility among alternative policies is narrowed. Particularly, the low supply elasticity makes a two-tier pricing policy much more preferable to lump-sum transfer for a larger level of welfare transfers to farmers until around 380 percent as shown in appendix. If supply were more inelastic, then the interaction would occur at higher transfer levels. Overall, the less elastic supply increases the economic efficiency and political feasibility of government instruments that affect output response through decreasing the deadweight loss on the production side for a given level of income transfer.

Second, as the supply elasticity becomes more elastic changing from 0.49 to 0.7 while holding the demand elasticity constant at the base case, the relative economic and political feasibility rankings among alternative policies do not change. In this case, the economic efficiency of a deficiency payment, market price support and two-tier pricing policies that are related to inefficient resource allocation in production decrease as supply
become more elastic for a given welfare transfer to farmers. However, the economic efficiency of a consumer tax is not affected from the change in the price elasticity as in the previous case of less elastic supply. Thus, both the relative economic efficiency and political feasibility rankings among alternative policies are much more intensified than the base case. For example, the high supply elasticity makes a two-tier pricing policy much less preferable to lump-sum transfers for a larger level of welfare transfers to farmers.

Third, as the demand elasticity becomes less elastic changing from -0.2 to -0.1 while holding the supply elasticity constant at 0.49, the economic efficiency of a consumer tax increases, since the social deadweight loss of consumer tax decreases for all levels of producer welfare change. The economic efficiency of both market price support and two-tier pricing policy also increases while the economic efficiency of a deficiency payment is not affected by the change in the price elasticity of demand, since there is no consumption curve parameters in the formula for the calculation of economic efficiency. Thus, the difference in the economic efficiency between a consumer tax and a deficiency payment is widened, while the difference in economic efficiency between a deficiency payment and market price support (or a two-tier pricing policy) is narrowed even though there is no reversals of policy rankings in terms of economic efficiency. Also, there are no policy ranking reversal in terms of political feasibility. Even though the relative political feasibility rankings among alternative policies do not change, a lower demand elasticity makes a two-tier pricing policy much more preferable to lump-sum transfers for a larger level of welfare transfers to farmers around 250 percent, as shown in the appendix. If demand were more inelastic, then the interaction would occur at higher transfer levels.

Fourth, as the demand elasticity becomes more elastic changing from -0.20 to -0.3 while holding the supply elasticity constant at the base case, the economic efficiency of consumer tax, market price support and a two-tier pricing policy is lower
for all levels of welfare transfers to farmers than the base case. The economic efficiency of these policies that are related to inefficient resource allocation in consumption decrease as demand become more elastic for a given welfare transfer to farmers. However, there is no policy ranking reversal in terms of both economic efficiency and political feasibility. Even though the relative economic efficiency and political feasibility rankings do not change for a given range of welfare transfer to farmers, the difference in those between the other options and a deficiency payment is narrowed.

Finally, since political feasibility in welfare redistribution among alternative rice programs depends heavily on the assumed political (or welfare) weights assigned to interest groups as well as the demand and supply parameters, an additional sensitivity analysis over the change in policy preferences toward interest groups is needed to assess more meaningful policy implications for the future. For simplicity, we only consider the case that the taxpayers' weights increase rather than that of consumers. The possibility of this case is relatively high in considering the current situation after the financial crisis in Korea. Particularly, it is assumed that the taxpayers' preferences will be changed into one while that of the producers holds constant at the base case value, 1.33. This scenario differs from the base case only through the change in welfare weight of taxpayers from 0.91 to 1 and that of consumers from 0.76 to 0.67. As the welfare weight given to government fiscal costs (or taxpayers' burden) becomes large, policy ranking reversals in terms of political feasibility take place two times: 1) between the consumer tax and two-tier pricing for lower levels of welfare transfer of around 130 percent, 2) between the deficiency payment and market price support for a level of welfare transfer of 130 percent. The political feasibility of the lump-sum transfer and deficiency payment is lower for all levels of welfare transfers to farmers than the base case. These policies are greatly dependent on the government expenditures in order to support a given welfare transfer to farmers. The political feasibility of the other options—consumer tax, market price
support and two-tier pricing policy—increase as the tax payers' weights relatively increase rather than that of consumers. In particular, the progressive decline of the political feasibility of lump-sum transfers makes a two-tier pricing policy more preferable to a lump-sum transfer policy for a higher level of income transfer to farmers.

V. Summary and Policy Implications

The normative use of the PPF concept at given welfare weights may provide useful insights to policymakers and economists. Particularly, when the government attaches different weights to producers, consumers and taxpayers, the optimal choice among alternative policies depends on the particular political (or welfare) preferences and is an empirical question. Thus, this paper has employed the implicit political preference function to analyze the trade-off between economic efficiency and political feasibility among alternative rice policies in Korea.

Five alternative policies that a small importing country might choose to achieve a given producer income goal are analyzed and compared with respect to their economic transfer efficiency and political feasibility. The policy instruments analyzed in this section cover the traditional government farm programs: 1) Lump-sum transfers, 2) Deficiency payment, 3) Consumer tax, 4) Market price support, and 5) Two-tier pricing system. The results suggest that, in terms of economic efficiency, a pure lump-sum transfer is the most efficient policy as indicated in most previous studies using the conventional efficiency criterion. However, in terms of the political preference function with different welfare weights, it could be a sub-optimal policy. In the current political-economic situation of the Korean rice sector, the larger the proportional increase in domestic support to farmers, the smaller the economic efficiency in terms of the change in deadweight loss, the greater the political feasibility in terms of the change in value of political preference function. Through the analysis of the economic efficiency and political
feasibility, we could draw the following conclusions:

(1) In the current political-economic situation of the Korean rice sector, the larger the proportional increase in domestic support to farmers, the smaller the economic efficiency in terms of the change in deadweight loss, the greater the political feasibility in terms of the change in value of political preference function.

(2) The two-tier pricing plan could be a highly effective policy in terms of both political feasibility and self-sufficiency.

(3) The consumer tax could be the most promising policy options in terms of political feasibility if we ignore the self-sufficiency concerns in the Korean rice sector.

(4) The lump-sum transfer policy could be the most effective policy in terms of not only economic efficiency but also political feasibility for the higher welfare transfer to farmers' group, but at the cost of self-sufficiency.

However, the policy choice among alternative policies crucially depends on the particular circumstances. Therefore, sensitivity analysis of the policy rankings in terms of both economic efficiency and political feasibility was performed to evaluate results under the alternative demand and supply elasticity estimates as well as the magnitude of the implicit political preferences toward interest groups. Major findings in the sensitivity analysis are as follows:

First, as the supply elasticity becomes less elastic, the less elastic supply increases the economic efficiency and political feasibility of government instruments that affect output response through decreasing the deadweight loss on the production side for a given level of income transfer.

Second, as the supply elasticity becomes more elastic, both the relative economic efficiency and political feasibility rankings among alternative policies are much more intensified than the base case. In this case, the economic efficiency of deficiency payment, market price support and two-tier pricing policies that are related to inefficient resource allocation in production decrease as supply become more elastic for a given welfare
transfer to farmers. In contrast, the economic efficiency of consumer tax is not affected from the change in the price elasticity.

Third, as demand becomes less elastic, the economic efficiency of consumer tax increases since the social deadweight loss of consumer tax decreases for all levels of producer welfare change. The economic efficiency of both market price support and two-tier pricing policy also increases while the economic efficiency of deficiency payment is not affected by the change in price elasticity of demand since there is no consumption curve parameters in the formula for the calculation of the economic efficiency.

Fourth, as demand becomes more elastic, the economic efficiency of consumer tax, market price support and two-tier pricing policy is lower for all levels of welfare transfers to farmers than the base case. The economic efficiency of these policies that are related to inefficient resource allocation in consumption decrease as demand become more elastic for a given welfare transfer to farmers.

Finally, as the welfare weight toward government fiscal costs (or taxpayers' burden) becomes large, the political feasibility of the lump-sum transfer and deficiency payment is lower for all levels of welfare transfers to farmers than the base case. These policies are greatly dependent on the government expenditures in order to support a given welfare transfer to farmers, while the political feasibility of the other options- consumer tax, market price support and two-tier pricing policy increase as the tax payers' weights relatively increase rather than that of consumers. In particular, the progressive decline of the political feasibility of the lump-sum transfer makes two-tier pricing policy more preferable to the lump-sum transfer for a higher level of income transfers to farmers.
REFERENCES


Optimal Policy Reform with on Implicit Political Preferences


Appendix: Sensitivity Analysis of the Results

Case 1: Less elastic supply ($\epsilon = 0.2$)
Case 2: More elastic supply ($\varepsilon = 0.7$)
Case 3: Less elastic demand ($\eta = -0.1$)
Case 4: More elastic demand ($\eta = -0.3$)
Case 5: Higher weights on taxpayers: from $\lambda_G = 0.91, \lambda_c = 0.76$ to $\lambda_G = 1, \lambda_c = 0.67$