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An Evaluation of the Environmentally Friendly Direct Payment Program in Korea*

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Abstract

Welfare economics supports government intervention to ensure the proper provision of positive environmental externalities when markets fail to address it. As an effective policy instrument to rectify such a failure, the Environmentally Friendly Direct Payment Program (EFDPP) has been proposed and designed to be compatible with international trade rules. Since 1999 the EFDPP has contributed to growth of participating farms and areas. As of 2010, the program accounts for about 426,247 hectares of farmland with a payment of 483,000 won, or USD418 per hectare on average. A survey indicates both the participating farmers and program-responsible government officials fully recognize the necessity and effectiveness of the program. To improve the EFDPP this paper suggests an increased payment rate up to one half of the gap in gross margins between conventional and environmentally friendly farms, differentiated payments over the transition periods of farming methods, sound monitoring systems, and menu-typed, targeted payments on specific agricultural practices.

Keywords: Environmentally friendly farming, direct payments, organic agriculture, Korean agricultural policy

JEL classification: Q15, Q18, Q57

1. Introduction

Agriculture is an industry based on continuous resource renewal and has historically been an industry in harmony with the environment. However, continued heavy use of chemical inputs, including fertilisers and pesticides, often results in environmental problems like soil degradation and deterioration of water quality, which in turn present obstacles to continued cropping and threaten the sustainability of agro-ecosystems. Accordingly, it is necessary to promote environmentally friendly (EF) farming, and in particular lower levels of chemical inputs, as a solution to environmental problems in the agricultural sector. Most farmers are in favour of the practice of EF farming. However, many farmers are reluctant actually to implement these practices due to the perceived risk of lower yield and income resulting from the adoption of environmentally friendly, and often

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unfamiliar, farming practices.

In these circumstances, the Korean government has implemented several policy measures for promoting environmentally friendly agriculture on a large scale since the mid-1990s. These measures culminated in the *Environmentally Friendly Direct Payment Program* (hereafter referred to as the EFDPP), introduced in 1999, which provides incentives for farmers to switch to EF farming. This program offers a subsidised direct payment to compensate for any decreases in income associated with farmers switching to EF farming practices during a three-year transitional period. Farmers who participate in this program receive a subsidy subject to their compliance with the requirements of the program. The payment ceases after three years, and farmers cannot reapply for it.

The adoption of environmentally friendly agriculture will initially result in both increases in labour input and decreases in yield compared to conventional farming until a technically stable situation is reached. In addition, it may also cause a considerable decrease in income until a differentiated sales network for environmentally friendly farming products can be accessed. The payments made under the EFDPP act essentially to cover adjustment costs and additional risk during transition.

At the same time, scientific analysis and on-site research have confirmed that the continuous practice of environmentally friendly farming has improved the ecological environment in the regions concerned by helping to restore harmony within agro-ecological systems. As the positive externality of environmentally friendly practices in the agricultural sector cannot be traded using market mechanisms, this is a case of market failure that can justify government intervention to correct it. Since EF farming practices generate positive effects on agro-ecological systems on a permanent, long-term basis when compared to conventional farming practices, government intervention beyond the transitional period could be justified based on externality theory.

In reality, however, the EFDPP payments offered to farmers who adopt certified EF farming, are intended to cover adjustment costs and compensate them during a transition period when their products can still only be sold on conventional markets (that is, without any organic or EF premium incorporated in the price). Lee et al. (1998) laid the basis for the framework and the implementation of the EFDPP through their survey of EF farming practices and the benchmarking of European cases. They suggested KRW 524,000¹ per ha as the amount of direct payment required to cover the income difference between conventional and low-pesticide rice farming practices.

The need to develop and evaluate the EFDPP has led to research efforts aimed at expanding EF farming practices. Huh (2000) assessed the performance of the agri-environmental programs using a survey of program participants in specific regions around the country. The survey result showed concerns among farmers regarding what was seen as a low level of direct payment. The program participants' desired amount of direct payment was found to be about KRW 1,000,000 per ha for environmentally friendly rice farming practice. Kim, Oh and Kim (2003) also evaluated agri-environmental measures using a criterion-based survey of policy authorities and policy beneficiaries. They used evaluation criteria such as appropriateness, adequacy, satisfaction, and feasibility in evaluating the policy program.

As environmentally friendly agriculture development is emphasised as a growth engine for future agriculture in an era of market liberalisation, a systematic evaluation of the EFDPP is an important task in establishing environmentally friendly agricultural system in Korea. Following the studies cited above, this paper will specifically focus on evaluating the EFDPP using the evaluation criterion of policy performance in order to identify directions for improving the program.

¹ KRW represents Korean won. The average exchange rate was 1,399 won per U.S. dollar in 1998.

2. Overview of Agri-Environmental Policies in Korea²

2.1. Five-year Eco-friendly Agriculture Fostering Plan

Pursuant to the *Eco-Friendly Agriculture Fostering Act*, the Korean government has been setting policy objectives and a basic plan for the development of eco-friendly agriculture for every 5-year basis and implementing the plan. The first 5-year plan for eco-friendly agriculture fostering was established and was implemented for the period of 2001~2005. Then the second 5-year plan was established for the period of 2006~2010 and many programs were implemented by the respective sectors such as the production, distribution, and consumption system of eco-friendly agriculture. Policy objective set for the second 5-year plan is to reduce the quantity of pesticides and chemical fertilizers usage by 30% of the average of 5 years usage for the period of 1999~2003 and to expand the proportion of production of eco-friendly agricultural products to 10% of total agricultural products.

Five items were presented for the basic directions of the second 5-year fostering plan, including settling down to resource circulated agriculture through the harmony between agriculture and environment, enhancing the quality of life of people through the supply of high quality safe agricultural foods, raising competitiveness of domestic agricultural products through eco-friendly agriculture, increasing revenues and profitability of farming households that practice eco-friendly agriculture, and contributing to the preservation of national land environment through eco-friendly management of agri-environmental resources.

The third 5-year Plan for Eco-friendly Agri-environmental Fostering (2011~2015) sets its vision of the ‘materialization of eco-friendly green industry where people and nature are together’ and government plans to implement 7 strategic tasks of creation of production base, activation of distribution and consumption, activation of processing and agricultural material industry, cultivation of specialized manpower, fostering of eco-friendly livestock industry, fostering of forestry and establishment of agri-environmental resources management system.

2.2. Eco-friendly Agriculture Base Establishment Project

Eco-friendly agriculture base establishment project is categorized into district creation project and wide area complex creation project.

First of all, eco-friendly agriculture district creation project sets the creation of base for the implementation of eco-friendly agriculture in diversified forms taking the water sources or the region where the implementation of eco-friendly agriculture is required as centers as the project’s policy objective. Objects for the project are farmers or producers’ organizations who want to create a district for eco-friendly agriculture in the region (town), and the eligibility for application is set for the farmlands which were collectivized for more than 10ha and the region which has more than 10 farming households who desire to participate in the project. Subsidy for this project will be paid in a town unit for the purpose of purchasing eco-friendly agriculture materials production facilities and equipments, eco-friendly agricultural products distribution facilities and equipments and eco-friendly agriculture education facilities and equipments for the implementation of eco-friendly agriculture by many farming households. Unit amount for subsidy is set with the range of 200 million won to 1 billion won per location and actual subsidy amount will be differentiated depending on the size and conditions of the project.

Eco-friendly agriculture wide area complex creation project is a project to create eco-friendly agriculture complex with resource circulation in wide area units in connection with cultivation and

² The contents of agri-environmental policy programs are drawn from MIFAFF (2011b).

livestock business in city · gun · watershed unit for the improvement of agri-environmental and the fostering of eco-friendly agriculture. This project was implemented from 2006 with the purpose of expanding the area that practices eco-friendly agriculture to a significant level by converting a small scale, high cost eco-friendly agriculture method to a low cost, high efficiency large scale eco-friendly agriculture method. This project is a program which supports for the costs of eco-friendly agricultural materials production facilities, the costs of production · distribution facilities for eco-friendly agricultural products and livestock products, and infrastructure such as cultivation-livestock circulation resources recovery center, education and tourism facilities. Object region for the project is wide areas in which farmlands for more than 600ha can be secured, project cost per complex is 6 billion~10 billion won depending on the area for object region for the project. Financial support consists of government subsidy for 40%, local government subsidy for 40% and self-fund for 20%. The project period is 3 years, and payments are made in three stages: 10% in the 1st year for the establishment of project plan, design and some arrangements and purchases, 50% in the 2nd year when major equipments are to be installed and 40% in the 3rd year when the project is to be completed. The program aims to foster a total of 50 complexes for the period from 2006 to 2013. By 2010, 25 complexes were selected (3 in 2006, 6 in 2007, 9 in 2009 and 7 in 2010). Out of 25 selected complexes, 9 projects were completed. The result of evaluation for wide area eco-friendly agriculture complex creation project revealed that the project significantly contributed to the diffusion of farming households which implemented eco-friendly agriculture and the activation of distribution in the regional units.

2.3. Direct Payment Program for Eco-friendly Agriculture

The direct payment program for eco-friendly agriculture aims at the diffusion of eco-friendly agriculture by making up for the initial revenue decrease and production cost of the farming households which are implementing eco-friendly agriculture and to enhance environmental services such as environmental preservation function of agriculture. This project has been implemented since 1999 in order to actively induce the production of eco-friendly agricultural products through the diffusion of the farming households which implement eco-friendly agriculture. Objects for the project are the farmers who obtained the certification for eco-friendly agricultural products pursuant to the eco-friendly agriculture To foster particular crop producer organizations, payments are made for 3 years (3 times in the case of discontinuous payments). Direct payments for eco-friendly agriculture are differentiated depending on the certification steps and whether it is for rice paddy or field, and the area for the payment limit per farming household is 0.1~5.0ha. The payment per ha in 2010 was 794,000 won for organic upland, 674,000 won for no pesticides cultivation and 524,000 won for low pesticides cultivation. The payment per ha for rice paddy are 392,000 won for organic cultivation, 307,000 won for no pesticides cultivation and 217,000 won for low pesticides cultivation, which are to be paid in addition to the direct payment for revenue from rice. For reference, in the direct payment system for making up revenue from rice, unit amounts of support for fixed direct payment are 746,000 won for agricultural promotion area and 597,000 won for non-agricultural promotion area.

2.4. Biological Disease and Harmful Insect Prevention Project

The biological disease and harmful insect prevention project is to reduce the usage of pesticides and to produce high quality safe agricultural products by converting insect prevention by synthetic pesticides for facility horticulture crops to biological insect prevention utilizing natural enemies. Thus, it will satisfy consumers' demand for eco-friendly agricultural products, increase revenues by decreasing labor force of farming households joined the project, and protect the health of farmers

from the pesticides damage. This project has been introduced and implemented since 2005 in order to induce the conversion of production method for facility horticulture crops to an eco-friendly method. It is a model project for insect prevention using natural enemies to convert the area of 50,000ha which is 50% of the area for facility horticulture cultivation to insect prevention using natural enemy and public officials and consultants training programs. Objects for the project are the farmers, farm corporations and agricultural corporations who are culturing the crops eligible for support in the facility greenhouses with the size of more than 3,000m². Eligible crops were expanded to 9 crops including strawberry, tomato, chili (bell pepper), paprika, cucumber, watermelon, grape and melon. The payments are comprised of government subsidy for 20% and local government subsidy for 30%, and the remaining 50% of self-funding.

The microorganism project for biological insect prevention was introduced in 2009 to reduce the usage of pesticides and to convert to high quality safe agricultural products production system through the conversion of insect prevention by synthetic pesticides to biological insect prevention using microorganisms. The object area for the project is 1,000ha and the project cost is 4.2 billion won; comprised of 20% government subsidy and 30% local government subsidy, and the remaining 50% is self-funding. Object crops for support are limited to 10 crops of strawberry, tomato, chili (bell pepper), cucumber, watermelon, pumpkin, lettuce, flavor water parsley, perilla and cabbage.

2.5. Eco-friendly Fertilizer Support Project

The Eco-friendly Fertilizer Support Project is divided into organic fertilizer support project and soil conditioner assistance project.

The policy objective of the organic fertilizer support project is to promote resource recovery through recycling of by-products from agriculture, forestry and livestock industry and to settle down eco-friendly resource circulating agriculture by preserving soil quality of farmlands and reducing the input of chemical fertilizers. Objects for the project are farmers and farm corporations who use organic fertilizers, and the objects for support are 3 kinds of organic fertilizers such as mixed expeller cake fertilizer, mixed organic fertilizer and organic composite fertilizer and 2 kinds of by-product fertilizer such as livestock manure compost and general compost. Support from government subsidy is given on a fixed amount basis; 1,500 won per 1 bag (20kg) of organic fertilizer; 1,200 won per 1 bag of first grade livestock manure compost, 1,100 won for second grade, and 900 won for third grade; and 1,000 won for first grade general compost, 900 won for second grade and 700 won for third grade. In the case of local government subsidy, 600 won per 1 bag is supported- additional supports will be given depending on fund availability of local government.

The policy objective of the soil conditioner assistance project is to improve acid soil and the soil of the farmland with a low content of effective silicic acid through the input of soil conditioner (lime and silicic acid) and to create the base for the implementation of eco-friendly agriculture by maintaining and preserving soil fertility. In the case of soil in Korea, mother rock itself usually has acidity, and with heavy reliance on chemical fertilizers in cultivation, soil acidification is further accelerated. Therefore, soil improvement is an important task for the establishment of a sustainable agricultural base. Soil improvement project has been implemented since 1960 based on the Article 20 of the Farmland Act (Soil improvement and preservation) and the Article 24 of the Enforcement Decree of the said Act (Implementation of the project for soil improvement and preservation). Objects for the project are the farming households which cultivate farmlands in all parts of the country, and objects for support are the rice paddies with the effective silicic acid content of less than 130ppm and fields of volcanic ash soil. Additionally, in the case of lime, fields with acidity of less than pH 6.5 (including orchard) and farmland with heavy metal pollution are the objects for support. Supports are comprised of 80% government subsidy and 20% local government subsidy.

2.6. Eco-friendly Agri-Products Distribution Activation and Consumption Promotion Project

In order to induce the activation of the distribution and the promotion of consumption for eco-friendly agricultural products, actions such as: the education of producers' and consumers' organizations; the expansion of the installation of specialized sales corner for eco-friendly agricultural products; and the expansion of financial support for direct trade of eco-friendly agricultural products are taken. Furthermore, expansion of the handling of eco-friendly agricultural products at the wholesale markets and the establishment of exclusive logistics center for eco-friendly agricultural products are considered. Besides, the exploration of mass demanding places such as school meals and hospital meals and the development of eco-friendly processed foods are implemented as well.

The eco-friendly agricultural products certification system is a system which certifies the safety and quality of agricultural products through overall inspection using strict standards of the specialized certification agency for the purpose of fostering eco-friendly agriculture as well as protecting consumers. Criteria for certification are; business management, cultivation, packing, water, seeds, cultivation method and quality control of products in the case of agricultural products. Moreover, breeding farm, breeding conditions, feed self-sufficiency base, origin of livestock, feed, nutrition management, animal welfare, disease control and quality control are the criteria in the case of livestock products. Eco-friendly certification steps are comprised of certification for organic cultivation, no pesticides cultivation and low pesticides cultivation in the case of agricultural products. In the case of low pesticides certification, new certification was suspended from 2010 and it is scheduled to be abolished from 2016. Eco-friendly livestock products certification steps are comprised of 2 steps, organic breeding and no antibiotics breeding. Certification for eco-friendly agricultural products is handled by the National Agricultural Products Quality Management Service, a public institution and a civil certification institution. Currently, there are 70 civil certification institutions designated and operating (as of December 2010).

The eco-friendly agricultural products direct trade match support project (financing) is being implemented as a project for the activation of the distribution of eco-friendly agricultural products. Objects for the project are farm corporations and consumers' cooperative, which are engaged in eco-friendly agricultural products direct trade business; while, e-Commerce business entities are also allowed to participate in the project as well. The financing of support is from a public fund for 80% and the remaining 20% is self-funded. The support amounts for this project reached to 35.9 billion won to 61 organizations in 2008, 40 billion won to 74 organizations in 2009 and 40 billion won to 75 organizations in 2010. Obligatory direct trade match amount for this project was set to be more than 125% of support amounts. Next, eco-friendly agricultural products consumption place distribution activation project (financing) is a financing project which supports the specialized stores for eco-friendly agricultural products to facilitate consumers' access to eco-friendly agricultural products. Objects for the project are the corporations which operate specialized stores for eco-friendly agricultural products with annual sales turnover of more than 1 billion won having more than 50 members of producers and more than 1,000 members of consumers. Project cost for 2010 was 2.4 billion won, and for support, is financing from a government fund for 80% with interest rate of 3% p.a., and the remaining 20% is self-fund. Repayment is for 3 years after 2 years of grace period. Use of support fund is limited only to key money for lease for eco-friendly agricultural products store, cost for store facilities for new opening, and purchase costs for display stand in store and freezing and cooling facilities.

From 2008 the government has implemented the eco-friendly agricultural products certification activation project to effectively cope with the increasing demand for certifications and to reinforce education for screening members for certification to prevent the issuance of poor certifications. Major

content of this project is to provide support for eco-friendly agricultural products practice fee, supports for the cost of education and publicity of screening members of eco-friendly certification institutions, and cost for exchange and cooperation between producers and consumers for the enhancement of credibility of certified eco-friendly agricultural products. Moreover, the education and publicity projects for the promotion of consumption of eco-friendly agricultural products have been continuously implemented while publicity projects for exchange between urban and rural areas were implemented to expand the use of eco-friendly agricultural products for school meals which is a mass user.

3. Theoretical Background of Environmental Friendly Direct Payment Program

The theoretical framework of the EFDPP is based on externalities attributed to market failure in welfare economics.³ Farming activities both positively or negatively affect the welfare of other economic agents through the external market. When an externality is generated, the production of agricultural products by price mechanism either exceeds or does not reach social optimum levels. Especially in the case of intensive conventional farming, which depends on excessive inputs of chemical agricultural materials, production may increase even though social costs are incurred due to the discharge of pollutants associated with producing agricultural products into the environment. However, the resulting external costs, including the treatment costs of pollution sources, are not actually included in the production cost.

In contrast, environmentally friendly agricultural practices improve the quality of agro-ecological systems and thus generate a positive externality.⁴ In order to ensure that environmentally friendly agriculture is properly evaluated and recognized through the market mechanism, considerable amount of transitional time and transactional cost are required (OECD, 2001).

The theoretical background of the direct payment program is based in the externality and subsidy theories in economics. A core tenet of environmental economics is that environmental problems can be solved to some extent by market mechanism of demand and supply. If we can measure the effect of environmental quality improvement in an agro-ecological system through the environmentally friendly farming practices, we can internalize an externality in the market mechanism as long as a direct payment is made as a subsidy equaling the amount of external marginal benefits (EMB). Theoretically, environmental subsidies are payments awarded for reducing pollution levels or for developing environmentally friendly farming practices.⁵ Farmers will enhance the environmental performance of the agricultural sector if they are provided with proper subsidy as an economic incentive to cover the environmental costs and benefits drawn from their production activities. In practice, the larger the payment, the greater the range of practices likely to be adopted and the higher the number of likely participants. However, the subsidy programs may be expensive for taxpayers to fund because participation will increase as payment rates rise.

The theoretical framework in which the EFDPP increases social benefits through the establishment of sustainable agricultural system can be presented using a graphic approach. First, it

³ Externality means a direct effect of the action of one person or firm on the welfare of another person or firm, in a way that is not transmitted by market prices. The theory of externality with a subsidy is explained by Baumol and Oates (1988) and Carlson, Zilberman, and Miranowski (1993).

⁴ In this case, if the agricultural products produced are compensated with an appropriate price through differentiation in the market. We can regard this as a pecuniary externality, which also has the characteristics of technological externality as the evaluation on the improvement of environmental quality is not properly reflected in the market.

⁵ In reality, the subsidy programs might be affected through direct payment, grant programs, loans at below-market interest rates, or tax concessions (Kim, 2001).

is assumed that the marginal benefit (demand aspect) and the marginal cost (supply aspect) are precisely measured through an appropriate quantification method. Under this premise, environmentally friendly farming practices contribute to the reduction of water pollution, increase of soil microbes and biodiversity, and so generate a positive externality with an incremental marginal external benefit. As shown in Figure 1, the horizontal axis represents the output level (Q) of environmentally friendly farming practices. The demand for the output is equivalent to marginal private benefit (MPB). The equilibrium point from applying an appropriate subsidy is moved up from E_0 to A and then social optimal production is shifted from Q_0 to Q^* . In this figure, Q^* represents the optimal amount of production (or consumption), P^*_c in optimal consumer price, P^*_p in optimal producer price which is equal to $P^*_c + s$. The symbols in Q_0 and P_0 represent quantity and price in a competitive case without an externality.

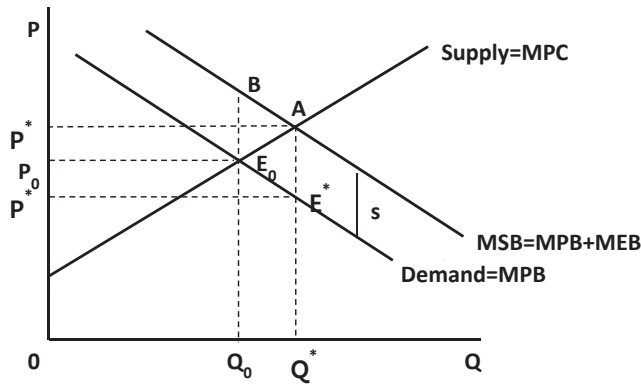


Figure 1. Framework for analyzing the EFDPP with positive externality

In the case of generating the positive externality drawn from environmentally friendly farming practices, the optimal decision problem with maximizing social welfare is mathematically formulated through paying subsidy amount to the external marginal benefit as follows:

$$\text{Max}_Q \text{SW}(Q) = \text{PB}(Q) + \text{EB}(Q) - \text{PC}(Q) \quad (1)$$

where $\text{SW}(Q)$: Social welfare of producing environmental-friendly output Q

$\text{PB}(Q)$: Private benefit of producing environmental-friendly output Q

$\text{EB}(Q)$: Environmental benefit of producing environmental-friendly output Q

$\text{PC}(Q)$: Private cost of producing environmental-friendly output Q

The first order condition for optimizing the equation (1) is as follows:

$$\text{PB}_Q + \text{EB}_Q - \text{PC}_Q = 0 \quad (2)$$

That is, $\text{MPB} + \text{MEB} = \text{MSB}$. At the optimal amount of production Q^* , $\text{MC}(Q^*) = \text{MSB}(Q^*)$. The optimal level of direct payment is that optimal producers' price minus optimal consumers' price, i.e., $s = P^*_p - P^*_c$. Social optimal solution is decided at E^* , i.e., $\text{MSB} = \text{MC}$, which is determined by the amount of direct payment, $s = \text{MEB}(Q^*)$. In this case, social welfare could be analyzed as follows:

Consumer gain = $P^*_c P_0 E_0 E^*$

Producers gain = $P_0 P^*_p A E_0$

Environmental gain = $BA E^* E_0$

Policy cost of direct payment = $P^*_c P^*_p A E^*$

Net social Gain = $BA E_0$

Therefore, expanding sound environmentally friendly farming practices through the EFDPP results in net social welfare gain equivalent to BAE_0 . However, in order to precisely determine the amount of subsidy amount (or green payment), there is a need for scientific quantifying the external marginal benefit (EMB) drawn from activating environmentally friendly farming practices. In reality, the proxy of the EMB uses the production cost gap and revenue gap between conventional and environmental farming practices due to the difficulty of quantifying the externality.

As shown in Figure 2, during the transitional period ($t_0 \sim t_c$) before environmentally friendly agriculture is fully established, more production cost are incurred and also the quantity of production is decreased resulting in a decrease in income. The gap between environmentally friendly agriculture and conventional farming is C portion in oblique lines and income gap can be shown as R portion in oblique lines. Realistically the income gap between farming methods may be different depending on the prices received by farmers and therefore it is difficult to establish a set transition period. The EFDPP is a subsidy in the form of compensation for the increase in production cost and decrease in income from the aspect of farmers' balance of payment. When the agro-ecological environment is improved by practicing environmentally friendly farming, the direct payment can be regarded as a means of compensation for externality. The EFDPP enhances farmers' interests in farming methods, which reduce the quantity of chemical fertilizers and pesticides, as a solution for the deterioration of environment in rural area. In addition, it also contributes to the conversion to and strengthening of environmentally friendly farming systems, such as the certification system for environmentally friendly agricultural products and the change of perception on environmental issues among farmers and the general public.

Under the expansion of market liberalization and strengthening stringent environmental regulations, the program of green payments is a representative measure of a cross-compliance mechanism (Baldock and Michell, 1995; Horan, Shortle and Abler, 1999). Cross-compliance means that a farm's operational management has to meet certain requirements in order for its owner to be eligible for assistance under government support schemes.⁶ Farmers claiming support under one

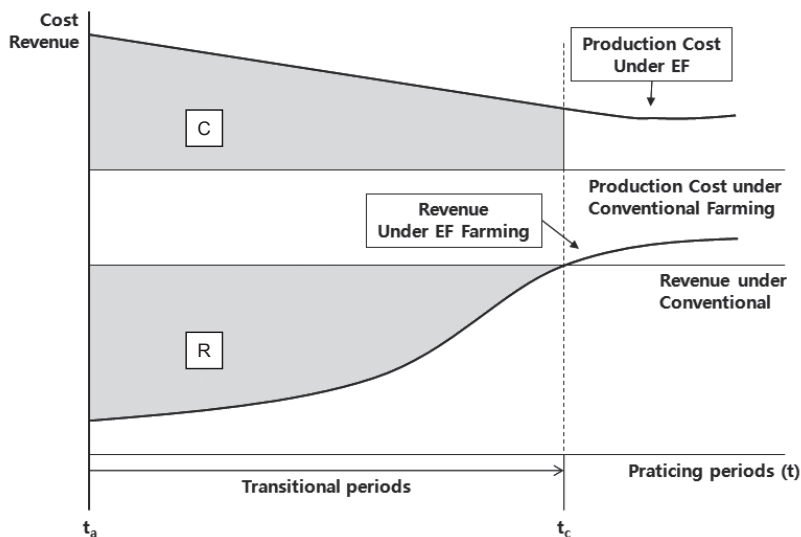


Figure 2. Comparison with conventional and environmental-friendly farming practices

⁶ The concept of cross-compliance as a policy term originated in the United States in the 1970s. The use of the term 'cross-compliance' has been extended since 1980, both within the US and elsewhere, to refer to linkages between agricultural and environmental policies. For more detailed exposition on cross-compliance approach, see Kim (2001).

program have to meet the rules for that program and certain obligations of other programs: thus making a link across programs, which gave rise to the term cross-compliance. So, cross-compliance means making income support dependent on meeting certain environmental and conservation objectives in the context of market and price policy. The various forms of cross-compliance, the consequences for the agricultural sector, and the possible advantages to the environment have not yet been fully examined.

4. Implementation status of the Environmentally Friendly Direct Payment Program

4.1. Background and objectives of the EFDPP

The EFDPP compensates those farmers who comply with the requirements of the program. The implementation of the policy has its legal basis in Article 11-2 of the *Special Law regarding the Compliance of World Trade Organization Agreement* and the Article 13 and 23 of the *Enforcement Regulation on the Direct Payment Program Implementation for the Agricultural Producers*.

The specific objective of the EFDPP is to encourage the preservation of the agricultural and rural environment together with the production of safe agricultural products by supporting farmers who have converted their farming to EF farming through a direct subsidy payment that compensates them for a part of the decrease in their income associated with this transition (MAF, 1998; MIFAFF, 2011a).

4.2. Results of policy implementation

The program content has been continuously revised over time according to changes in political circumstances (policy targets, budget constraint, politicians' need and social demand). Table 1 shows that, during the first phase of the EFDPP in 1999-2001, the targets for the program were farmlands in environmentally sensitive areas such as water source protection districts and natural parks, where the degree of potential future environmental improvement is relatively large and the potential for local support is high. The farmers eligible for the benefit of the program were those engaged in farming and tree-planting in the target regions, who introduced environmentally friendly agriculture on an area of farmland larger than 1,000m². The target products were all agricultural products, excluding livestock and forest products.

From 2002, the EFDPP was improved and extended to all certified farmers who adopted EF farming. The aim was to increase program participation and make a clear distinction with the direct payment system for rice paddy farming. The target area for the program was extended from limited environmental control regions, such as water source protection districts, to nationwide. Eligibility for the direct payment scheme was limited to farmers with farmland exceeding 1,000m² and revenues from environmentally friendly agricultural products of more than KRW 1 million a year. For a farming household, the level of the subsidy was KRW 524,000 per ha (Kim and Kim, 2003). In addition, within the environmental control regions, the farmers with certified low-pesticide farming were also eligible considering the importance of environmental preservation.

In 2003, for farmers eligible for the subsidy based on low-pesticide farming, the amount of the subsidy was differentiated in proportion to the expected decrease in income depending on the type of environmentally friendly agriculture undertaken. In addition, among the farmers who obtained the certification for low-pesticide farming, incentives based on the stage of the certification were paid on top of the basic subsidy for rice paddy and upland farming. Basic amounts for the direct payment are KRW 524,000 per ha for upland farming and KRW 500,000 per ha for paddy farming (the basic subsidy amount of direct payment for rice farming). Incentive payments in the case of

Table 1. Support policy targets and payment levels of the EFDPP.

	1999-2001	2002	2003	2004-2011
Policy targets	Water source protection districts, other environmental control areas	Upland: low-pesticide ¹ Paddy: no-pesticide ¹ Env-regulating area: over low-pesticide ¹	low-pesticide ¹	no-pesticide ¹
Payment level (KRW 1,000)	524/ha (same unit amount of payment in upland and paddy fields)	524/ha (same unit amount of payment in upland and paddy fields)	Upland ² ● organic :794 ● no-pesticide: 674 ● low-pesticide: 524 Paddy ² ● organic:770 ● no-pesticide: 650 ● low-pesticide: 500	Upland same as in 2003 Paddy ● organic :824-924 ● no-pesticide: 739-839 ● low-pesticide: 649-749

1. The scope of “low-pesticide” in policy targets denotes the certified environmentally friendly farmers who meet the low-pesticide standard, or exceed the standards specified by no-pesticide and organic farming methods. Similarly, “no-pesticide” is specified as an upper stage, which covers no-pesticide and organic farmers, but not low-pesticide farming.
2. The basic payment for paddy = 524 (upland) 500 (paddy); this is topped up by incentive payments of 270 for organic or trans-organic production, or 150 for no-pesticide production.

Source: MIFAFF (2011a).

organic farming were KRW 270,000 per ha, 150,000 per ha for no-pesticide farming. There was no incentive payment in the case of low-pesticide farming.

In 2004, target farmers were limited to those who obtained the certification for no or low pesticide farming. The period of support for farmers who were selected as the target for the certification for low-pesticide farming and continued to use low-pesticide practices was limited to three years, including the year of initial selection. The unit amount of subsidy for upland farming was the same as in 2003, but for paddy fields it was increased from KRW 500,000 to KRW 532,000. For organic and transitional organic farming households, the subsidy per ha was KRW 802,000 and KRW 682,000 in the case of no-pesticide farming practices.

The entire amount of subsidy payments came out of national treasury funds. As shown in Table 2, the record of actual direct payment for the period from 1999 to 2010 was on average KRW 15 billion per year covering approximately 36,000 ha of cultivation for certified products. The number of farming households eligible for the direct payment was approximately 45,000. In 2002, the number of farming household that obtained certification was significantly lower and thus the total of direct payments for that year decreased to approximately KRW 3 billion, almost half the annual average of previous years. The number of farming households participating in the program also fell sharply to 6,589 households, covering 5,274 ha of cultivated land. The reason for these falls was the stricter eligibility criterion for the program, which required certification equal to or exceeding no-pesticide standards for paddy farming.

However, since the beneficiaries' requirement was relaxed to include low-pesticide farm households in 2003, the number of participating farming households significantly increased to 12,195 households covering 10,459 ha of cultivated land, thereby expanding the budget for the EFDPP to approximately KRW 6.7 billion. Eligibility conditions were expanded to include no-pesticide farm households in 2004, and the 24% increase in program participants resulted in a budget of approximately KRW 8.1 billion, 14,520 participating farming household and 13,698 ha of

Table 2. Implementation of the EFDPP.

	1999	2000	2001	2002	2003	2004
Total paid (million KRW)	5,667	5,730	5,724	2,757	6,426	8,120
Area receiving payments (ha)	10,269	10,459	10,480	5,274	10,459	13,698
Number of farm households	17,436	18,697	18,806	6,589	12,195	14,520
Average payment based on total money paid (1,000 KRW/ha)	552	548	546	523	614	593
	2005	2006	2007	2008	2009	2010
Total paid (million KRW)	7,703	14,055	17,525	26,282	40,868	37,608
Area receiving payments (ha)	20,780	34,896	45,434	72,444	98,849	93,305
Number of farm households	22,119	45,567	60,090	87,416	115,300	116,385
Average payment based on total money paid (1,000 KRW/ha)	458	403	386	363	413	403

Source: MFAFF(2011b).

Table 3. Participation in the EFDPP among certified environmental farming households.

Classification			2008	2009	2010
Total number of EF farming households	Certified EF farming households	<i>Farm households (number)</i>	172,553	198,891	183,918
		<i>Area (ha)</i>	174,107	201,688	194,006
	Participating households	<i>Farm households (number)</i>	96,771 (56.1)	112,409 (56.5)	116,382 (63.3)
		<i>Area (ha)</i>	76,352 (43.9)	90,132 (44.7)	93,318 (48.1)
Organic farming households	Certified EF farming households	<i>Farm households (number)</i>	8,460	9,403	10,790
		<i>Area (ha)</i>	12,003	13,343	15,518
	Participating households	<i>Farm households (number)</i>	2,782 (32.9)	2,653 (28.2)	2,856 (26.5)
		<i>Area (ha)</i>	2,349 (19.6)	2,246 (16.8)	2,207 (14.2)
No-pesticide farming households	Certified EF farming households	<i>Farm households (number)</i>	45,089	63,653	83,136
		<i>Area (ha)</i>	42,983	71,039	94,533
	Participating households	<i>Farm households (number)</i>	22,274 (49.4)	30,448 (47.8)	36,448 (43.8)
		<i>Area (ha)</i>	16,173 (37.6)	23,484 (33.1)	29,520 (31.2)
Low-pesticide farming households	Certified EF farming households	<i>Farm households (number)</i>	119,004	125,835	89,992
		<i>Area (ha)</i>	119,136	117,306	83,954
	Participating households	<i>Farm households (number)</i>	71,715 (60.2)	79,308 (63.0)	77,348 (85.9)
		<i>Area (ha)</i>	57,830 (48.5)	64,401 (54.9)	61,592 (73.4)

Note: The figures in parentheses show the percentage of farm households that benefitted from the EFDPP among the total certified EF farming practices.

Source: MFAFF (2011b).

farmland (see Table 2).

In 2010, 183,918 farming households obtained certification for environmentally friendly agricultural products for an area of 194,006 ha. The percentage of farming households participating in the program was 63.3% of those with qualifying certifications. These households accounted for 48.1% of qualifying cultivated land. That means that over half of all farming households that obtained the certification for environmentally friendly agricultural products did not get the benefit of the EFDPP even though they obtained the certification (see Table 3). Regarding environmentally friendly certification, about 63% of total certified farming households participated in the program, which represents about 26% of the total area of farmland involved in organic farming, approximately 44% of the total certified farming households and the size of farmland in the case of no-pesticide farming, and approximately 86% of total certified farming household in the case of low-pesticide farming.

5. Policy evaluation of the Environmentally Friendly Direct Payment Program

5.1. Criteria for policy evaluation

Policy evaluation analyses the extent to which the originally intended effects of the policy in question were achieved, and the criterion of effectiveness is a central concept of this evaluation. The purpose of policy evaluation is to provide objective information for rational decision making on the scope for policies to enhance the effectiveness of limited government budget resources, and also guidance for the revision, supplementation or abolition of policy schemes (OECD, 2002a, 2002b).

In most cases, the policy maker is responsible for the contents of policies, including policy objectives and policy implementation. As the purpose of policy evaluation is to identify problems in the current situation and to explore areas of improvement, policy evaluation may become a threat to the person in charge. It is therefore necessary for staff involved in the monitoring and evaluation of policies, as well as researchers, to participate from the start of the evaluation. This would enhance the relevance of the evaluation, by improving the appropriateness of the method and the survey respondents, and by facilitating communication (Oskam et al., 1998).

Evaluation of policy is based on criteria for judging the quality of the policy, which can be classified according to various dimensions but can be largely divided into two main categories in terms of contents and procedures.⁷ This paper has adopted *effectiveness* and *appropriateness* as the criteria for evaluating the evaluation of actual contents of the EFDPP. Effectiveness is the criterion for evaluating the degree to which policy objectives are met. Appropriateness measures the effectiveness of the budget resources applied, and is the criterion for judging the *realistic* possibility of accomplishing the policy objectives under the given conditions and constraints (OECD, 2010).

⁷ In this case, “the criteria in terms of contents” are the same as “the criteria for the results.” They are the basis for judging whether the results that flowed from the execution of the policy were desirable or not, and serves as the basis for evaluating policy contents in accordance with the objectives, means, target and policy situation. “Criteria in terms of procedure” are the criteria for judging whether the decision making processes for policy and policy execution that generated the policy results are desirable or not. They may be broken down to analytical reasonableness and political acceptability. For a more detailed exposition of these evaluation criteria, see Jeong et al. (2002).

5.2. Evaluating the performance of the EFDPP

A total KRW 178 billion was input into the program carried out for the years 1999-2010 over a total of 426,347 ha, which represents an average subsidy of KRW 483,000 per ha (see Table 2). The average areas of farmland for a farming household receiving a subsidy of KRW 524,000-794,000 per ha according to farming method was approximately 0.5-0.7 ha, which means a subsidy of KRW 500,000-600,000 per household. The amount of subsidy differ over households depending on input costs, and in most cases the subsidy can only cover the expenses for purchasing materials for environmentally friendly agricultural farming. Accordingly, these subsidies are insufficient to serve as a proper incentive for income compensation to the farming household that implements EF farming.

For the evaluation of the program, an in-depth survey was conducted through site visits to the beneficiaries and officers in charge of the schemes (Kim et al., 2003; Kim et al., 2009). We obtained the list of farmers who actually participated in the policy program and selected the 61 survey respondents from among them using purposive sampling, which is a subjective sampling method. Officers in charge of administering the policy were selected from among the officers in charge of policy for promoting environmentally friendly agriculture in the Environmentally Friendly Agriculture Department of the Ministry of Agriculture and Forestry, and officers in charge of relevant administration tasks in each province, city and county office. Fifty-eight officers in charge of environmentally friendly agriculture policy, who were involved in the establishment and execution of the policy, were selected nationwide as survey respondents for policy evaluation.

The average age of officers in charge of policy was 46 years, and their break-down according to the length of time they had been assigned to environmentally friendly showed that more than 50%

Table 4. Summary of survey results on policy officials and beneficiaries

Respondents' characteristics and responses	Policy officials		Policy beneficiaries	
For policy officials: length of time involved for farmers, length of time participating				
● less than 1 year	12	(20.7)	7	(11.5)
● over 1 year - less than 2 years	16	(27.6)	7	(11.5)
● over 2 years - less than 3 years	12	(20.7)	4	(6.5)
● over 3 years	18	(31.0)	43	(70.5)
Viewpoint on the future of EF agriculture				
● core part of future agriculture	38	(65.5)	42	(68.8)
● limitation on our agricultural circumstances	19	(32.8)	12	(19.7)
● uncertain about the future of EF agriculture	1	(1.7)	7	(11.5)
Difficulty in practicing environmentally friendly farming				
● difficulties in comparison with conventional farming		–	16	(26.2)
● difficulties at the beginning but are now stabilized	–	–	45	(73.8)
Viewpoint on environmentally friendly farming practices				
● necessary for sustainable management even though income becomes a little lower	–	–	56	(91.8)
● difficult to adopt EF farming due to uncertainty of income and yields	–	–	5	(8.2)

Note: The figures in parentheses represent the percentages.

Source: Kim, Jeong, Jang, Kwon and Moon, 2009.

of officers in charge had been involved in environmental agriculture-related assignments for over two years (see Table 4).

The average age of program participants was 51 years, and the shares according to the length of time spent in the program increased sharply with longer duration, with over two-thirds having participated for three years or more. Participants' recognition of the difficulties of practicing environmentally friendly agriculture compared with conventional farming showed that for nearly three out of four of them, these difficulties had been overcome after an initial phase, which means that the skills to practice EF farming are now well established for this large majority of the survey targets. The most difficult EF practice for farmers to manage is weed control. On the feasibility and longer-term prospects for practicing EF farming, 92% of total survey targets expressed the opinion that "the program is necessary for continuous management of agriculture even though income is lower", and only 8% thought that "it is difficult to adopt the new farming program as its influences on yield as well as income remain uncertain", which indicates a large majority who recognize and accept the necessity of EF farming for the longer term.

The result of the survey of the authorities in charge of the policy showed that, among the officials only, 44.6% believed that "the program is necessary for promoting environmentally friendly farming households, but supplementation of the policy is required because farming households' dependence on the government subsidy" is increasing, 41.1% considered that "the program is an appropriate means for the expansion of environmentally friendly farming households," and 12.5% believed that "it does not seem to be a desirable policy as the fiscal burden is too high." On the other hand, in the group consisting of the policy recipients only, 85% expressed the opinion that "the program is a very appropriate means for expanding the number of environmentally friendly farming households" although 11.7% said that they were not well informed about the contents of the policy (see Table 5).

In relation to the appropriateness of the unit amount of direct payment, a surprising result is that a larger share of officers in charge of policy than of participating farmers expressed the opinion that "the amount (already) adjusted upwards in 2009 needs to be increased again" (61% as against 35%) and these proportions were reversed when it came to those in the two groups who considered the amount in 2009 was appropriate. It could be interesting to explore whether these differences are

Table 5. Survey results concerning the performance of the EFDPP

Respondents' characteristics and responses	Policy officials	Beneficiaries
Evaluation of effectiveness of EFDPP		
• appropriate policy measure for expanding EFDPP	23 (41.1)	51 (85.0)
• necessary policy measures for promoting EFDPP, but supplementation of the policy is required due to dependence on subsidy	25 (44.6)	1 (1.7)
• undesirable policy measures due to heavy financial burden	7 (12.5)	1 (1.7)
• not well informed about the contents of policy program	1 (1.8)	7 (11.7)
Appropriateness of the unit amount of the payment		
• appropriate increase of the payment in 2009	20 (35.7)	36 (60.0)
• greater increase of payment needed in 2009	34 (60.7)	21 (35.0)
• smaller increase of payment appropriate in 2009	1 (1.8)	–
• uncertain about the unit amount of payment scheme	1 (1.8)	3 (5.0)

Note: The figures in parentheses represent the percentages.

Source: Kim, Jeong, Jang, Kwon and Moon, 2009. Kim et al.(2009).

linked to respondents' age, length of time associated with the program, size of farm and so on. However, the small sample sizes would preclude drawing strong conclusions from any findings on these points.

5.3. Problems associated with the Environmentally Friendly Direct Payment Program

Farming households that are eligible for the direct payment program are limited to those producing certified environmentally friendly agricultural products with a low-pesticide rating or above. However, the menu for the policy appeared to be too simple and the policy does not seem to have reflected the changes in the actual conditions of EF farming. Accordingly, the development of a direct payment program with a variety of measures, which can contribute to the preservation of environment in the agricultural sector, will be necessary in order to promote healthy environmentally friendly agriculture with the objective set toward the harmony of agriculture and environment.

The current unit amount for the EFDPP is insufficient incentive for risk management faced by the participating farming households. For most farming households considering switching to EF farming, a major deterrent is the decrease in income due to the uncertainty about yield and price. Therefore, the appropriate level of direct payment is one that covers the risk to the farming households that implement EF farming.

As the current EFDPP does not differentiate the rate of subsidy unit according to the degree of transition during the implementation stage, it cannot yet serve as an aggressive incentive to attract farming households to opt into EF farming. Accordingly, in the future program, it is desirable to differentiate the amount of subsidy by the stage of implementation taking account of differences in technology employed and purchasing at different stages.*

The establishment of a follow-up control system for monitoring the implementation by the beneficiaries of the EFDPP, is also insufficient at the current time. In the case of the farming household, which implements EF farming, it is necessary to prepare farming administration records and establish databases of pertinent data in order to establish a proper monitoring system for implementation, and also to introduce appropriate penalties for those participating farming households that do not comply with the requirements.

6. Directions for Improving the Environmentally Friendly Direct Payment Program

6.1. Increase of subsidy rate and differentiated payment according to year

The current unit amount of the EFDPP subsidy is based on the difference between the *revenues* of conventional farming and EF farming practices. However, in the current situation this revenue gap between conventional and EF farming practices is gradually reducing even though there is a need for further increases in the unit amount of the direct payment. Therefore, the method for calculating the unit amount for the subsidy under the EFDPP, which is based on the revenue gap only, is insufficient. The basis of calculation for the unit amount for the payment will have to be changed to a method that comprehensively considers the elements such as production cost, income and net income together. This would still be consistent with WTO definitions of green box direct payments.

In addition, the current subsidy rate of KRW 824,000 was based on the revenue difference with that of conventional farming in 2004, and should be adjusted upwards based on the latest status survey.

The difference in gross margins per ha between conventional and organic farming practices is KRW 2,500,000 in the 1st year, KRW 2,050,00 in the 2nd year, KRW 1,440,000 in the 3rd year and KRW 370,000 in the 4th year. However, organic farming gross margin is KRW 550,000 higher than

conventional one in the 5th year. In the no-pesticide farming case, the difference would be KRW 510,000 to 2,340,000 depending on the year. Full compensation for the difference in gross margins during transitional period would imply a very large budget. Based on compensating half the average difference in gross margins would be more realistic (Refer to Figure 3).⁸

On the technological level, conversion from conventional farming to organic farming requires 3-5 years and therefore subsidies designed to cover adjustment costs should be paid up to a maximum of four years. However, when environmentally friendly farming is completely established, there will still be various positive effects to the preservation of soil, water quality and various microbes, and therefore it will be reasonable to make direct payment for a certain fixed amount per ha in recognition of the environmental benefits and the income foregone by farmers adopting EF practices. Annual payments could be graduated into three stages: 1-2 years, 3-4 years and from five years and onwards using five years as the basis for implementation. We consider benefits to biodiversity and GHG reduction to become observable from organic farming after 4 years and we therefore propose a new payment scheme will then be introduced. This scheme is targeted to compensate farmers for the costs related to biodiversity-friendly or low-carbon practices. However, a more systematic and detailed review of the subsidy rate by stage may be necessary as implementation progresses. Figure 3 illustrates the hypothetical payment schemes that embody this principle.

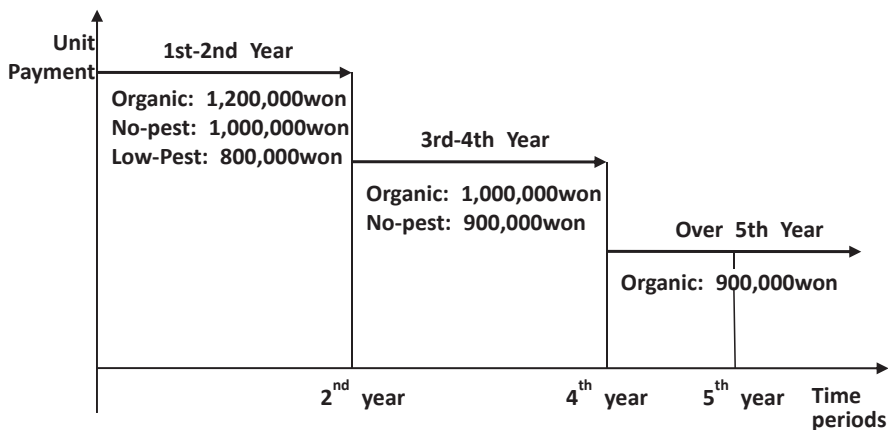


Figure 3. A Hypothetical Five-Year Differentiated Payment System of EF Rice Production.

Among the countries that implement a direct payment program to promote organic farming, France, Denmark, Switzerland and Norway are paying differentiated amounts for subsidies. Leading countries in developing sustainable agriculture, such as France and Denmark, pay direct payments for conversion over five years dividing the five years into three stages. After five years, subsidy payments are still made for maintenance and administration. Other countries, including Germany, Switzerland and Norway, pay subsidies for three years to those farming households that obtained the certification for organic farming, while paying only basic payment after three years (USDA, 2001; Park et al., 2004; Stolze and Lampkin, 2009).

⁸ The suggested unit payments for environmentally friendly rice farming were drawn from the average of the revenue stream considered during the conversion period. For more detailed exposition on revenue change over time in environmentally friendly rice production, see Kim and Kim (2003).

6.2. Establishment of a proper monitoring system

The establishment of a proper monitoring system for farming households that participate in the EFDPP will be a key to extending the subsidy on a mid- to long- term basis and in securing systematic justification for the system. In the event that direct payments are to be made for farming households certified for EF farming, such as organic farming and no-pesticide farming, there will be no problem in monitoring the farming households concerned as the certifying authority has to issue a certification mark based on implementation status every year. However, if the number of farms implementing EF practices increases as well, major monitoring efforts would be needed regarding participation and payments.

The establishment of a database of eligible farming households will provide very important basic data in the future on various aspects like production processes, management of environmentally friendly agricultural practices and the amount of farm support.

For the healthy development of environmentally friendly agriculture in the future, an authority with an extensive remit for overseeing EF agriculture and food produced using EF practices would be needed. Such an authority is operational in some countries (e.g. Denmark). Such an authority could oversee the labeling of food products and guarantees to consumers regarding the environmental friendliness of the products. As the authority would have to continuously check and control the status of farming households involved in this program, it may be necessary to expand the resources of the National Agricultural Products Quality Management Service, which already takes care of certification, in order to administer the program⁹.

6.3. Necessity for introducing direct payment programs with menu types

The EFDPP is targeted to a switch in farming methods towards environmentally friendly practices. However the Korean government is currently considering extending this program so as to directly target biodiversity, landscape and low-carbon practices.

As the ultimate objective of EF farming is the “creation of harmony between agriculture and the environment”, the activities for healthy maintenance and preservation of agro-ecological system can be regarded as the activities of EF farming as well. Accordingly, we will have to develop and implement a policy program with diversified types of measure for achieving this healthy maintenance and preservation of agro-ecological system. The EFDPP with diversified types of measure would mean a program in which farmers can voluntarily select, from among various EF alternatives eligible for the direct payments, specifically those measures that it is possible for them to put into practice, given regional and local conditions. For example, farming practices like the implementation of crop cover in winter, the cultivation of water quality purification trees, and use of techniques for preventing soil erosion on slopes can contribute to the enhancement of multiple eco-system functions, such as the maintenance of healthy agro-ecological system and the preservation of the landscape.

7. Concluding Remarks

Positive environmental externalities produced by agriculture cannot be stimulated by price signals transmitting societal demand, since markets do not exist for these services. The evidence provided in this paper indicates that the three-year transitional payments are offered to farmers as an incentive for them to switch to environmentally friendly farming has had a significant response in Korea. The payment ceases after three years, and yet presumably the farmers who switched continue to provide

⁹ See <http://www.naqs.go.kr/english/index.jsp>

environmental public goods that they would not be providing had they remained within a conventional farming system. It follows that, although they are willing to continue producing the EF benefits even without a subsidy once the EF system is established, the level produced is below the social optimum since the value of the additional positive externality is not reflected in their remuneration. A payment system extending beyond the transitional period would undoubtedly provide a greater incentive for switching and would have more beneficial effects on the agro-ecological system. The precise justification for this payment, however, would have to be carefully studied since the figures quoted in this paper indicate that by the fifth year after conversion, EF farming is already more profitable (in terms of gross margin per hectare) than conventional farming. Hence, the WTO-compatible rationale for the payment as compensating farmers for income foregone does not apply.

Once the EF system is established, current form as a transitional payment, the EFDPP payment qualifies for green box status as a decoupled payment for environmental preservation. Moreover, in so far as it is more closely targeted to environmental and consumer needs than other policy options that might achieve similar effects, it is more efficient when compared to other policy options.

Since the EFDPP was introduced in South Korea in 1999, it has been highly evaluated by farmer recipients and by the officials in charge of policy administration, as a positive promotion program for environmentally friendly farming. However, systematic program evaluation has also revealed the need to increase the rate of subsidy, differentiate payments by year of implementation and establish a proper system for monitoring participants.

Welfare economics shows that the increased provision of positive externalities by means of a subsidy from the national treasury increases social welfare. If farmers can be incentivised by direct payments to implement EF farming, and we can get verifiable results in terms of improvements in the quality of the agro-ecological system, agriculture can be solidly established as a trusted industry by consumers. Moreover, if the EFDPP works as a valid catalyst for the conversion from conventional farming to EF farming, the EF farming in the agricultural sector of South Korea will be established earlier than planned and thus agriculture will be acknowledged for its new value as a bio-industry in harmony with the environment and national land environment preservation industry, instead of an industry that increases environmental burden. However, it is important to be aware that, as the environmental effects due to the implementation of environmentally friendly farming will be generated in the mid- to long term, public expenditure on these objectives may be regarded as a political cost burden in the short term.

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