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# The effect of the rural tourism policy on non-farm income in South Korea

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## HIGHLIGHTS

- This study investigates the effect of the rural tourism policy on non-farm income.
- A quantitative ex-post evaluation design is employed for the evaluation.
- The policy is proved to play a positive role in increasing non-farm income.
- The study concludes with proposing some policy and managerial implications.

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## ABSTRACT

There has been growing concern as to whether the growing investment in rural South Korea is achieving the desired ends. Empirical evidence is required to assess the current policies. Based on the logic of those policies, this study conducts an ex-post evaluation of outcomes following the termination of the Rural Traditional Theme Village program previously operated by the Rural Development Administration, a central government agency in South Korea. The research adopts farm households' non-farm income as an ex-post quantifiable indicator and assesses the impact of the Program on this indicator. It is found that the Program was evaluated positively and as being effective from both cross-sectional and longitudinal perspectives. It is concluded that in the absence of the program the farms would have experienced difficulties in making non-farm income due to the lack of internal competitiveness and the deterioration of human resources.



## 1. Introduction

Public programs are designed to achieve given objectives and outcomes. Identifying whether the program accomplishes the intended goals is one of key factors to guarantee public welfare and social advancement in societies (Bovens & Hart, 2012). At times though, unintended consequence results, and these often ambiguous or negative outcomes must be included in any assessment of the program's achievements (Vedung, 1995; Yang, 2009). The objective of the present study is to conduct an ex-post evaluation of outcomes following the termination of the Rural Traditional Theme Village (hereafter RTTV) program previously operated by the Rural Development Administration, a central government agency in South Korea (hereafter Korea). This study adopts farm households' non-farm income as an ex-post quantifiable indicator and assesses the impact of the Program on this indicator.

The current rural policy discourse has been converted into a viewpoint that emphasizes the spatial value of rural areas by putting rural space on a par with the agricultural sector (Brandth & Haugen, 2011; Seong, Cho, Lee, & Min, 2004; Woods, 2005). This discourse also transforms functions of the space from rural areas that are limited to food production to areas that attract experience- and leisure-oriented external consumers. In paralleling with the transformation, the agricultural and rural policy paradigm in Korea has been changed (Lee & Kim, 2011; Park & Yoon, 2009). With a huge investment on agricultural sector during the last two decades (OECD, 2008), latest agricultural policies in Korea have been expanded to spatial policies that focus on enhancement of settlement environment and community livability in rural communities. There are many reasons that Korean society feels responsible for the decline of the vitality in rural society. Rural areas in Korea have

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been marginalized because of an urban-centered growth pole strategy since the mid-1970s. Rapid urbanization has aggravated such rural problems as aging, the collapse of rural communities, and the degeneration of residential environment, etc. (OECD, 2008: 80–87).

Accompanying by the massive investment, the agricultural and rural policies to revitalize rural societies in Korea are confronted with harsh criticism. Some parties draw questions about the effectiveness of the policies (Lee, 2009; Lee & Nam, 2005), and even raise the moral hazard problem and distrust the policies (Lee & Kim, 2010). Nevertheless, agricultural and rural policies have been relatively free from rigorous evaluation measurements, with an emphasis on characteristics of the public property of agricultural sector and rural space. Although the increase in governmental investment can be justified by the multi-functionality of rural areas, limited budget and duality[2] of rural policies demand an objective evaluation of the agricultural and rural programs (Lee & Yun, 2008; Leeuw & Vaessen, 2009). A strong claim to construct a credible scientific schema that enables researchers to evaluate agricultural and rural policies is also true for diverse international contexts (Walker, Ryan, & Kelly, 2010).

This study begins to fill the academic and practical vacuum with one major research hypothesis: Does a public program that has been implemented in rural areas contribute to intended outcomes? Two sequential questions arise to satisfy the hypothesis. The first question is related to the "evaluation of what?" This paper evaluates the RTTV program,[3] which reflects the transition in the rural policy paradigm in Korea and is regarded as a representative rural tourism program. The program was introduced as a project to increase the non-farm income for farmers during the periods from 2002 to 2009.[4] The other question is the "evaluation based on what?" Previous studies have tended to focus on the evaluation of the implementation process, which includes the budget, financial effectiveness, or human resources. In contrast, this study maintains an ex-post evaluation based on the outcomes after the termination of the program. This study applies stochastic processes of binary logit model and decomposition method to evaluate the efficacy of the program. The binary logit model is applied to identify causal effect on cross-sectional and longitudinal approaches, and then the coefficients of the logit models are decomposed by Blinder–Oaxaca decomposition technique.

Incorporating the existing arguments regarding rural tourism and multi-functionality in agriculture, the present study is expected to provide two major anticipated outputs. One is the program effect which directly affects an increase in non-farm income. The other is the program effect which indirectly promotes the opportunity to increase non-farm income in spite of changes in endowment resources and time differences. Although these two expected outputs sound analogous, this study employs a binary logit model and decomposition method to investigate the program impact on farmers' non-farm income and separate the program net effect from the observed program impact.

[2] Lee and Yun (2008) explain that rural policy in Korea has a duality: financial resource providers and direct beneficiaries of the policy.

[3] In this paper, the evaluation is performed at the program level and is not performed system-wide or by project. This approach is appropriate because "*the most appropriate level for impact evaluation is at the program level, which includes costs of all successful and unsuccessful projects, thus, avoids selection bias, and may involve evaluation of one or more products of the research program*" (Maredia, Byerlee, & Anderson, 2000).

[4] The program operated by the Rural Development Administration invested approximately 178,000 USD to each rural village and total number of villages benefited from the program was 163 during the project period.

## 2. Research background

### 2.1. Rural tourism and public policy

Rural tourism is one of the major components representing the transition from an economy of production to an economy based on consumption in rural area (Woods, 2005: 172). It has brought a considerable change to the identity of rural areas from a place for food production to the consumption of rural amenities. It is widely accepted that the rural tourism is a composite of agricultural products, eco-products, cultural resources and spatial amenities, which includes diverse functions, such as economic, social, educational, environmental, recreational, and therapeutic activities (Lee & Kim, 2010).

Rural tourism may facilitate rediscovering the values of rural resources that have hitherto been disregarded in the modernization process of the world economy. It provides insights to both farmers and policymakers to adopt a wider perspective than to only focus on agricultural products. In this sense, rural tourism generally encompasses such holistic rural activities as agricultural production, lifestyle and rural amenities to attract people from both urban and rural areas. In this regard, historic buildings and traditional rural folklore as well as nature and landscape conservation in rural areas are receiving increasing attention. It also offers diverse implications for farm-based rural businesses and sustainable rural development plans (Lane, 1994).

Although there exists a fundamental debate about the driving agency of rural tourism, common understandings are converging to accentuate the importance of the public sector (Devine & Devine, 2011; Logar, 2010; Wang & Xu, 2011). Rural tourism, also called eco-tourism or agro-tourism, has been adopted by many countries in the world as one of the major rural policies to generate rural vitality (Brandth & Haugen, 2011; Cawley & Gillmor, 2008; Cawley, Halseth, Markey, & Bruce, 2009; Getz & Page, 1997; Lee & Nam, 2005; Liu, 2006; Logar, 2010; Ohe, 2006; Sharpley & Vass, 2006). Nonetheless, the policy implication of the boundary and application of rural tourism could be ambiguous because this program includes the multi-functionality of rural areas and is conducted in a variety of forms (Liu, 2006; Ohe, 2007).

In this line of reasoning, Fleischer and Felsenstein (2000) and Sharpley (2002) argue that rural tourism needs to overcome ongoing major challenges because diverse rural tourism practices remain invalid or as political rhetoric. Skeptical proponents of rural tourism maintain a position that rural tourism is a form of governmental intervention against market failure of rural areas. They argue that it has failed to meet the proper accomplishment of goals such as creating job opportunities, favorable employment conditions, and new revenue sources. Although it appears that rural tourism is not a panacea for a rural renaissance and is still a controversial entity, the rural tourism policy can arguably be considered as a way to revitalize rural societies around the world (Devine & Devine, 2011; Knowd, 2001; Sharpley, 2002).

At the other end of recent debate on public policy and rural tourism is on the methodological perspective. Although there exists a huge literature with regard to the implication of public policy on tourism research, the art and science of attributing ex-post scientific method to constructing better public programs is still in its infancy. Assessing the impact of agricultural and rural policies is in particular fraught with the drought of credible scientific premises (Walker et al., 2010).

Although tourism researchers have started to inquire the deficits of ex-ante approaches such as input–output analysis and cost–benefit analysis, the approaches are not completely equipped to explore questions of the achievements of anticipated objectives. This is particularly true for policy oriented agricultural and tourism researches (Das & Rainey, 2010; Dwyer, Forsyth, & Spurr, 2007;

Simmons, Becken, & Cullen, 2007, among many others). Although importance of ex-post quantitative evaluation in tourism study is beginning to be more visible in diverse perspectives (cf. Pearce & Butler, 2010; Tribe & Airey, 2007), the empirical application of the robust ex-post evaluation is yet to be scanty and fragile in practice largely due to lack of constructing more credible methodologies and paucity of empirical applications.

One of the recent developments is to apply cost–benefit and input–output types of deterministic methods to assess the ex-post policy impact. The cost–benefit and input–output analyses are not complicated and they are commonly used by diverse international development underlying billions of dollars of investment decisions every year. However, neither cost–benefit analysis, nor input–output analysis would be an appropriate analytical tool to evaluate ex-post outcome of a variety of public projects. The method can be applicable to analyze the ex-post impact analysis as explained by Walker et al. (2010). However, the ex-post application of the methods in tourism research is limited in that fundamental characteristic of the methods is inherently deterministic and predictive in nature.[5] The methods rely mainly on restrictive assumptions (Frechtling & Smeral, 2010) that are far deviated from the premises of 'cutting-edge research in tourism' that accentuate the importance of method and practicing in heterogenous spatial and temporal contexts (Chambers, 2007) with the impotence of hedging against contingencies.

We acknowledge the importance to the investigation of ex-post outcomes has become more commonplace in tourism studies with both quantitative (Baggio & Klobas, 2011; Das & Rainey, 2010; Goodwin, 2007; Riddington, McArthur, Harrison, & Gibson, 2010; Song & Witt, 2000; Song, Witt, & Li, 2008) and qualitative perspectives (George, Mair, & Reid, 2009; Hall & Kirkpatrick, 2005; Phillimore & Goodson, 2004). However, they haven't yet to expose themselves to the more rigorous scientific premise that concisely targets the intended output of public policy. Moreover, due to the dominance of positivist ideology in the public policy arena, Walker et al. (2010: 1456) argue that without the use of more persuasive quantitative techniques, the major element of key findings in policy impact analysis may be "cloaked in uncertainty and remains a subject of debate" in the policy making environment.

### 2.2. Ex-post evaluation and quantitative application

There have been growing concerns regarding the massive government investment and demands regarding whether government policy achieves the intended outcomes (OECD, 2008). However, Walker et al. (2010) argue that the evaluation study of agricultural and rural policies lacks the empirical evidence to prove the program's effectiveness. In this regard, an additional challenge originates from the demand to incorporate an ex-post empirical approach and quantitative methods to recent rural policies (Kaitibie, Omore, Rich, & Kristjanson, 2010; Khandker, Koolwal, & Samad, 2010; Leeuw & Vaessen, 2009).

To date, policymakers have put more emphasis on policy-making itself and on organizational and political legitimacy rather than a rigorous ex-post evaluation. Previous studies have overlooked the decent quantitative application of the ex-post evaluation in Korea (Choi, 2001; Kim, 2008). Naturally, the previous studies were inclined toward the assessment of ex-ante impacts rather than toward the ex-post evaluation. The ex-ante assessment that is delivered before the program is initiated can provide prior information about the program deliberation and prediction results. However, the assessment may reveal a fundamental deficit since it is impossible to reflect the empirical outputs of the program after the program has actually been undertaken.

Deficiencies in understanding the effectiveness of the program impact may hinder identifying credible evaluation model. In addition, due to "*the politics of the budgetary processes*,[6]" a preliminary feasibility study regarding whether to inject budgetary investments may stand against program outputs, particularly in agricultural and rural projects. In contrast, based on a retrospective design, ex-post evaluation can examine the actual program impact. By doing so, planners and policy-makers are able to draw more concrete conclusions that can be boiled down to developing better programs in the future. This intuition implies that an ex-post evaluation can contribute to the establishment and development of more robust programs in diverse agricultural and rural policy contexts.

The policy evaluation that policy-makers expect could be the investigation into causality from input to output as does in tourism research (Cave, Gupta, & Locke, 2009). However, can one policy be satisfied with causal inference conditions and a cause of changes in social values? One policy is rarely possible because there are tremendous extraneous variables beyond the policy. Public values also change through unquantifiable mechanisms that are inherent in the social phenomena. In reality, this situation causes intangible and intricate program-working mechanisms. Then, what should we do to explore the impact that a policy has triggered with limited variables? Identifying causal effect through a quasi-experimental method can be one of the answers (Campbell & Stanley, 1963; Guba & Lincoln, 1981) and quantitative perspective is correctly situated in the criterion.

If the quantification of indicators to evaluate program effectiveness is possible, then quantitative methods that are based on stochastic approaches could be more effectively utilized in the program evaluation (Jae, 2009; Sadoulet & Janvry, 1995; Walker, 2000; Zapata, Sambidi, & Dufour, 2007).[7] Quantitative approach that is based on empirical data and analytical insight is publicly visible, and the re-production and verification of the results are guaranteed. Further, the evaluation using the quantitative method can be employed as a useful and persuasive means for estimating the tangible values of the program effects. Nevertheless, even in the applications of more advanced forms of statistical techniques that have been recently published (Feiock & Stream, 2001; Lacombe, 2004; McNamara, 1999; Zapata et al., 2007), it remains unclear how the changes that are triggered by the net effect of the policy would be estimated. We believe that further investigations are required to identify these changes and to distinguish these changes from endowed resources of policy-implemented group (region) and maturation effects over time.

In sum, more rigorous quantitative application is needed to apply ex-post perspective in tourism research to discern positive or negative policy impact on intended outcomes. That is, a stochastic method equipped with a robust quantitative assessment of the policy impact is needed to help resolve the debate and inform government policy on tourism management. By incorporating an ex-post and quantitative perspective, this study tries to examine the role of the RTTV in Korea as a determinant of the propensity to improve the primary indicator, which is the non-farm income. We

[5] Please refer to Mirowski (1989) for more intensive discussions between deterministic and probabilistic models in the social science perspective and Philbrick and Kitanidis (1999) in the planning and management perspective.

[6] This quotation is inspired by the book, titled "The New Politics of the Budgetary Process" written by Wildavsky A. & Caiden N. in 1988.

[7] Qualitative assessment should not be ignored because there is an increasing interest in combining quantitative and qualitative assessments, which would allow planners and policy-makers to consider more valuable feedback (Phillimore & Goodson, 2004).

believe the present study is one of strong candidates that respond calling for a rigorous ex-post quantitative assessment that can incorporate logical and credible evidence of public policy. Next section presents the detailed explanations about the methodologies that incorporate the ex-post impact assessment on the rural tourism policy in Korea.

## 3. Methodology

### 3.1. Binary logit model with decomposition technique

The present study conducts an econometric analysis and simulations between an experimental group and a comparison group by using the binary logit model and decomposition technique. The binary logit model is one of the frequently used discrete choice models when the dependent variable is dichotomous (Lee, Park, Min, & Yoon, 2005). As mentioned above, the non-farm income of farm households is postulated for the evaluation index to analyze the ex-post outcome in this study. The dependent variable is, therefore, the discrete type that describes whether non-farm income exists in farm households. In this study, the binary logit model is applied and focuses on identifying the correlation between non-farm income and other controlled variables as quantitative indicators. The following equation of the binary logit model is employed:

$$\text{Log}\left(\frac{(\text{Prob } (y=1))}{(\text{Prob } (y=0))}\right) = \sum_{k=1}^{K} \beta_k x_k \tag{1}$$

where $Y$: non-farm income reported (=1), otherwise (=0)

$X$: $n \times k$ Independent Variable Matrix
$\beta$: $k \times 1$ Model Parameters Vector

Using equation (1), this study applies the decomposition method,[8] paying special attention to the application of the maximum likelihood estimation (Ault, Ekelund, Jackson, Saba, & Saurman, 1991). To identify the net program impact evaluation using the decomposition method, equation (1) is divided into two equations, (2) and (3), as shown below.

$$\text{Group } (A) : E(Y_A) = \sum_{j=1}^{k} \beta_j^A \overline{X}_j^A \tag{2}$$

$$\text{Group } (B) : E(Y_B) = \sum_{j=1}^{k} \beta_j^B \overline{X}_j^B \tag{3}$$

In a cross-sectional analysis, as shown in Fig. 1, equation (2) is for the area ($A$) where the program had been implemented and equation (3) is for the area ($B$) where the program had not been implemented. In contrast, in a longitudinal perspective, which Fig. 1 portrays, equation (2) is for the group in ($A$) period after the program had been implemented, whereas the other equation is for the identical group in ($B$) period before the program had been implemented.

Next, because equations (2) and (3) are defined as forms of the expectation value, the expected difference between two groups can be directly compared. The theoretical background of the

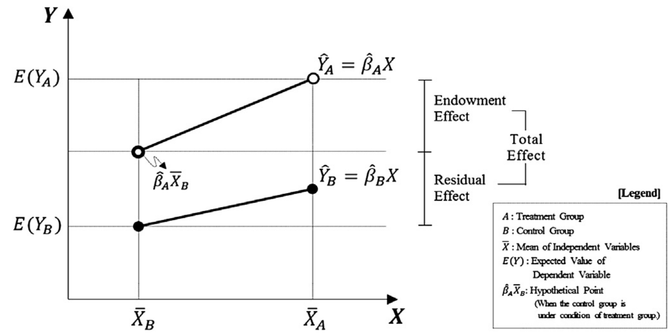


**Fig. 1.** Graphical expression of decomposition technique by treatment and control groups.

comparison is based on determining the difference between *Do Something* and *Do Nothing*; however, in this study, the estimation of the program effect contains pair-wise counterfactual simulations beyond the one-dimensional comparison. This estimation is mathematically decomposed as follows:

$$\begin{aligned} E(Y_A) - E(Y_B) &= \sum_{j=1}^{k} \beta_j^A \overline{X}_j^A - \sum_{j=1}^{k} \beta_j^B \overline{X}_j^B \\ &= \sum_{j=1}^{k} \beta_j^A \overline{X}_j^A - \sum_{j=1}^{k} \beta_j^A \overline{X}_j^B + \sum_{j=1}^{k} \beta_j^A \overline{X}_j^B - \sum_{j=1}^{k} \beta_j^B \overline{X}_j^B \\ &= \left(\sum_{j=1}^{k} \beta_j^A \overline{X}_j^A - \sum_{j=1}^{k} \beta_j^A \overline{X}_j^B\right) + \left(\sum_{j=1}^{k} \beta_j^A \overline{X}_j^B - \sum_{j=1}^{k} \beta_j^B \overline{X}_j^B\right) \end{aligned}$$

$$= \sum_{j=1}^{k} \beta_j^A \left(\overline{X}_j^A - \overline{X}_j^B\right) + \sum_{j=1}^{k} \overline{X}_j^B \left(\beta_j^A - \beta_j^B\right) \tag{4}$$

$$= \sum_{j=1}^{k} \beta_j^A \left(\overline{X}_j^A - \overline{X}_j^B\right) + \left(\beta_1^A - \beta_1^B\right) + \sum_{j=2}^{k} \overline{X}_j^B \left(\beta_j^A - \beta_j^B\right) \tag{5}$$

The left-hand side of equation (4) denotes the difference in the program impact between group (a) and (b). The first part of the right-hand side of formula (4) is the effect that is explained by the difference in independent variables between two groups, which is called the endowment effect. The second part of this formula is the residual effect, which is not clarified by the endowment effect. The total effect is the summation of endowment and residual effects. Again, equation (5) shows that the residual effect can be separated into the constant effect and coefficient effect. The constant effect represents a direct effect because the constant effect indicates the difference between program implementation and non-implementation, which is not described by effects of independent variables. The latter, in contrast, is regarded as an indirect effect. This effect implies what is explained by the difference in the influence of independent variables between the two groups.[9]

From a cross-sectional perspective, the treatment group is program-implemented areas in 2010 and the control group is not-

[8] The decomposition technique that is applied in this paper is an adaptation of the Blinder–Oaxaca method (Blinder, 1973; Oaxaca, 1973), which has been employed in diverse disparity studies in the maximum likelihood estimation (Ault et al., 1991; Ha & Lee, 2001a, 2001b; Jackson & Lindley, 1989; Wachter & Megbolugbe, 1992).

[9] It is possible that the residual effect may contain an unintentional but side effect of any potentially important variables other than the effect of RTTV such as job opportunities of household members that are outside of tourism activities. However, the problem of the omitted variables is empirical and there is little empirical evidence about the error rates when using the Korean Agricultural Census to model the effect of non-farm income. The limitation is equally applied to other empirical studies that apply the decomposition method (cf. Ault et al., 1991: 751–752; Wachter & Megbolugbe, 1992: 359).

implemented areas in 2010. On the other hand, from a longitudinal perspective, the treatment group is areas after implementation of the program and the control group is areas before the implementation of the program. Fig. 1 depicts the decomposed effects based on the control group, and the magnitude of the endowment effect is the difference between $\widehat{\beta}_A\overline{X}_B$ and $\widehat{\beta}_A\overline{X}_A$, which is explained by the difference between explanatory variables. The residual effect is the rest of total effect in this way. The endowment effect, residual effect, and total effect can be graphically understood as Fig. 1, which is specified below.

Although most empirical studies that apply the Oaxaca–Blinder decomposition method disregard the stochastic characteristics of group mean differences in endowment and residual effects, the present study adopts empirical Chow-type tests for evaluating the statistical significance of these differences, by applying a method that was suggested by Ault et al. (1991) and Wachter and Megbolugbe (1992).

A series of the hypothesis tests that were suggested by Ault et al. (1991) concentrates on determining whether the tests are satisfied with the prerequisites for the interpretation of decomposition results. Here, $L1$ to $L5$ indicate −2LL (Log Likelihood) of Models 1–5 in Tables 2 and 5. First, heteroscedasticity must be examined because the premise that the variances of the underlying models are equal is a starting point for pooling data and decomposing logit coefficients. To test heteroscedasticity in the models, the test statistic is as follows:

$$T_1\ (\text{Test for Heteroscedasticity}) : L5 - (L1 + L2) \sim \chi^2(1) \tag{6}$$

Second, the equality of the coefficients between program-conducted areas and areas without the program should be demonstrated through a hypothesis that tests whether there is a residual effect as shown below:

$$T_2\ (\text{Test for Residual Effect}) : L3 - (L1 + L2) \sim \chi^2(K + 1) \tag{7}$$

Third, a test for the coefficient effect can be performed using the joint significance of the likelihood ratio statistic as follows:

$$T_3\ (\text{Test for Coefficient Effect}) : L4 - (L1 + L2) \sim \chi^2(1) \tag{8}$$

Finally, an asymptotic $t$-test ($T_4$) to test the statistical significance of the constant effect, which incorporates a program impact dummy in the fully interactive model (Model 5 in Tables 2 and 5) can be used.

### 3.2. Data and variables

The data for the analysis are drawn from the 2% Korea Agricultural Census of the two different years, 2000, when the RTTV was not enforced, and 2010, when the program had been completed. The data that were generated from the census contain a set of individual and household characteristics at the micro-level, which allow us to discern whether the observations are in the regions where the program had been implemented.

The original census data consist of 1,383,468 farm households in 2000 and of 1,177,318 farm households in 2010. The data maintain the principle of complete enumeration survey, and the sample of the present study is confined to 150 local villages that are located within the Eup and Myeon level administrative districts,[10] where the RTTV had been implemented from 2002 to 2009. After this sampling process, the final sample for our study contains 131,663 farm households in 2000 and 135,324 farm households in 2010.

We selected the probable determinants to affect non-farm income, which were based on the previous literature and on information available in the census. Table 1 displays an explanation of dependent and independent variables for our regression models. The construction of variables can be divided into two parts. One is determining the dependent variable as the evaluation index regarding the "impact on what?" As illustrated in the previous section, the RTTV focuses mainly on tourism-related means to improve the rural living standard through an increase in the non-farm income, but this study utilizes non-farm income of farm households as a primary indicator of evaluation. Furthermore, this selection is because discrete characteristic of non-farm income is not only quantifiable variable in hand but also because non-farm income plays a crucial role in the evaluation of the program's effectiveness. Furthermore, this indicator is a top priority of the intended outcomes of the program, as explained in Fig. 1. Because there is no linear information regarding non-farm income in the Korean Agricultural Census due to the legal protection of personal information, the variable simply reflects whether there has been non-farm income for farming households in the year before the census. Inevitably, we position this study as an investigation of activating farm households to obtain non-farm income (yes–no) as the dependent variable.

The other part of constructing variables is postulating independent variables to identify the "impact of what?" By grasping which properties of a household would positively affect the increase in non-farm income, it is possible to interpret causal effects of the program and to provide future indications to policies that are aimed at boosting rural income. In particular, based on the estimated coefficients, decomposition results can be calculated. In this sense, unlike monitoring processes that addresses implementation- and performance-related indicators, this evaluation procedure incorporates several characteristics of the household and householder. All the independent variables in this analysis can be

**Table 1**
Explanation of variables.

| Variables | Explanation | Ref.[a] | Model[b] |
|---|---|---|---|
| Dep. | Non-farm income reported (=1), otherwise (=0) | *D* | All |
| **Demographic** | | | |
| Age | Age of a householder | *C* | |
| Gender | Gender of a householder; male (=1), female (=0) | *D* | |
| HHnumber | Number of family members | *C* | |
| **Socio-economic** | | | |
| Edu1 | Education level of a householder; high school diploma (ref.) Uneducated, elementary and middle (=1), otherwise (=0) | *D* | |
| Edu2 | University or graduate school (=1), otherwise (=0) | *D* | |
| Career | Work experience in farming for a householder | *C* | |
| Computer | Computer usage (=1), otherwise (=0) | *D* | |
| Large Vehicle | Possession of large vehicle (=1), otherwise (=0) | *D* | |
| **Regional/agricultural** | | | |
| Type1 | Vegetable, upland crop (=1), otherwise (=0) | *D* | |
| Type2 | Fruit, special crop, flower (=1), otherwise (=0) | *D* | |
| Type3 | Livestock, silkworm (=1), otherwise (=0) | *D* | |
| District | Eup (=1), Myeon (=0) | *D* | |
| Program | Program implemented areas (=1), otherwise (=0) | *D* | 4–5 |
| **Interaction** | | | |
| Int_(All) | Interaction with program implementation for all independent variables | | 5 |

[a] Reference; *D* (=dummy variable), *C* (continuous variable).
[b] Model number that each variable is applied to.
Source: 2000 and 2010 Korea Agricultural Census.

[10] This study excludes the farm households that are in the level of Dong districts from the samples. In the Korean *administrative system*, Eup, Myeon, and Dong are the smallest and are primarily administrative areas. Generally, Eup and Myeon units are distributed in rural regions; in contrast, Dong is an administrative unit that is distributed in urban areas.

**Table 2**
Cross-sectional analysis on the probability of making non-farm income.

| | Model 1 Program implemented | Model 2 Program not-implemented | Model 3 Pooled-no group effects | Model 4 Pooled-group effects | Model 5 Pooled-fully interactive |
|---|---|---|---|---|---|
| Constant | 1.4093*** | 1.2213*** | 1.3314*** | 1.2352*** | 1.2214*** |
| **Demographic** | | | | | |
| Age | −0.0276*** | −0.0280*** | −0.0279*** | −0.0278*** | −0.0280*** |
| Gender | −0.5302*** | −0.4588*** | −0.4948*** | −0.4964*** | −0.4588*** |
| HHnumber | 0.4220*** | 0.4230*** | 0.4200*** | 0.4224*** | 0.4230*** |
| **Socio-economic** | | | | | |
| Edu1 | 0.1508*** | 0.1692*** | 0.1621*** | 0.1600*** | 0.1692*** |
| Edu2 | **−0.0691**** | 0.0051 | −0.0274 | −0.0287 | 0.0051 |
| Career | −0.0101*** | −0.0109*** | −0.0104*** | −0.0105*** | −0.0109*** |
| Computer | 0.3958*** | 0.5157*** | 0.4557*** | 0.4555*** | 0.5157*** |
| Large Vehicle | −0.1883*** | −0.2328*** | −0.2084*** | −0.2113*** | −0.2328*** |
| **Regional/agricultural** | | | | | |
| Type1 | −0.1386*** | −0.2920*** | −0.2039*** | −0.2113*** | −0.2920*** |
| Type2 | −0.3751*** | −0.5455*** | −0.4749*** | −0.4664*** | −0.5455*** |
| Type3 | −0.6496*** | −0.6871*** | −0.6678*** | −0.6693*** | −0.6871*** |
| District(Eup) | 0.1984*** | 0.2460*** | 0.1947*** | 0.2294*** | 0.2460*** |
| Program | | | | 0.1717*** | 0.1880* |
| **Interaction** | | | | | |
| Int_Age | | | | | 0.0004 |
| Int_Gender | | | | | −0.0714 |
| Int_HHnumber | | | | | −0.0010 |
| Int_Edu1 | | | | | 0.0008 |
| Int_Edu2 | | | | | −0.0184 |
| Int_Career | | | | | −0.0742 |
| Int_Computer | | | | | −0.1200*** |
| Int_Vehicle | | | | | 0.0445 |
| Int_Type1 | | | | | 0.1533*** |
| Int_Type2 | | | | | 0.1704*** |
| Int_Type3 | | | | | 0.0374 |
| Int_District | | | | | −0.0476 |
| ***n*** | 66,778 | 68,546 | 135,324 | 135,324 | 135,324 |
| **−2LL** | 82,080 (*L1*) | 82,296 (*L2*) | 164,660 (*L3*) | 164,458 (*L4*) | 164,377 (*L5*) |
| ***R-square*** | 0.1393 | 0.1674 | 0.1522 | 0.1534 | 0.1540 |
| ***Max-rescaled R-square*** | 0.1862 | 0.2234 | 0.2032 | 0.2049 | 0.2056 |

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

divided into three categories: demographic, socio-economic, and regional/agricultural variables, as explained in Table 1.[11]

## 4. Results

Based on the indicators that were established in the previous section, this part conducts a regression analysis and simulation using a decomposition technique. The analysis is divided into two different dimensions: spatial and longitudinal.

### 4.1. Cross-sectional evaluation on making non-farm income

#### 4.1.1. Impact on program-implemented and not-implemented areas

The regression result in Table 2 indicates the causality of independent variables to non-farm income for farm households. The interpretation of the coefficients is used to determine the causal effect on non-farm income in program-implemented regions and not-implemented regions. Five logit models are used to conduct a set of likelihood ratio tests and an asymptotic *t*-test, which elucidate the effect of the program on non-farm income.[12] The results of the first two regressions are for program-implemented areas and not-implemented areas, respectively. The remaining three regressions are derived from a pooled sample, which is composed of both program-implemented and not-implemented areas. Specifically, Model 1 is estimated only for farm households living in rural areas where the program had been implemented during the period from 2002 to 2009. Model 2 uses a sample of those households who lived in rural areas where the RTTV was not implemented. Model 3 merges the previous two samples without any additional variables. Model 4 adds a dummy variable that estimates the program impact when there is a difference between program-implemented and not-implemented areas. Model 5 includes interaction variables in the form of the program impact variable with all other independent variables. Model 5 is a fully interactive model that contains 12 additional interaction variables by multiplying each independent variable with the program implementation variable. The coefficients of the interaction variables are, in fact, the difference in

[11] Descriptive statistics of dependent and independent variables that describe changes between program-implemented and not-implemented areas, and ex-ante (2000) and ex-post (2010) characteristics of the implemented areas are presented in Appendix.

[12] The logic of the decomposition method, which conducts a series of five logit models, can be referred from the relevant literature (Ault et al., 1991; Wachter & Megbolugbe, 1992).

the effect of these variables on the probability of non-farm income for the program-implemented areas compared with the not-implemented areas. A statistically significant interaction variable indicates that the effect of this variable on the chance of non-farm income is significantly different for the program-implemented areas than for the not-implemented areas.

Most independent variables in the five models that affect non-farm income are satisfied with our expectation and are statistically significant at $p < 0.01$ (Table 2). The probability of non-farm income decreases as the householder's age (Age) and length (in years) of the agricultural career of the householder (Career) increases, regardless of program implementation. The propensity to earn non-farm income is lower when the household head is male (Gender). The larger the number of family members (HHnumber), the higher the non-farm income would be. This variable implies that more family members represent a more diverse division of labor to incur additional income for the farm households.

Of particular interest are the signs of the coefficients for two education variables (Edu1, Edu2). Farming households with less than a high school diploma (Edu1) are more likely to earn non-farm income than those households with a high school diploma for both program-implemented (Model 1) and not-implemented areas (Model 2). This probability is true for the highly educated farming households (Edu2) in Model 2; however, the sign of the variable is negative and statistically significant in Model 1. When combining two samples in Model 3, the result of the highly educated group loses statistical significance. This loss implies that the RTTV discourages achieving additional non-farm income for the highly educated groups. This observation makes sense because the policy had been targeted to rural areas with less regional competence, where less human capital resources are present.

Computer usage (Computer) has a positive effect on non-farm income, which is parallel to the previous finding (Ryu, Cho, & Lee, 2006). The chance of earning non-farm income other than agricultural products is also augmented by computer usage because the capability of a computer enlarges the chance of getting a job outside of the agricultural sector. In general, the application of a computer via internet communication is a vital instrument to connect farmers' agricultural products directly with urban consumers. However, the capability also enlarges the chance of earning from other resources as well. The ownership of large vehicle (Large Vehicle) shows a negative sign to trigger non-farm income because the vehicle is primarily used to transport agricultural products and is less related to generating non-farm income.

Because agricultural income is, on average, high for such crops as vegetables (Type1), fruit (Type 2), and livestock (Type 3) in Korea, the probability of obtaining non-farm income is much less for the farmers who cultivate profitable crops than farmers who are primarily engaged in non-profitable crops, such as rice. All these findings are identical for Models 1–3. The district (Eup) also shows a positive association with the probability of non-farm income because more urbanized areas provide better job opportunities than less urbanized areas (called, Myun) in rural districts outside of the agricultural sector.

Model 4 adds a dummy variable that differentiates the program implementation. A comparison of the corresponding coefficients in Model 3 and Model 4 reveals that the addition of the program implementation dummy variable caused almost no change in the coefficient estimates of our basic variables. The signs on all of the coefficients remain the same, and their magnitudes are quite stable. Those variables that were significant before adding the dummy variable sustain their statistical significance, and those variables that were not significant remain insignificant. Of particular interest is the sign and significance of the program implementation dummy variable. The chance of earning non-farm income is 54.3% higher for farmers that reside in the program-implemented area than for those farmers living in the not-implemented area (Program), and the point estimate is statistically significant at $p < 0.01$.

Model 5 tests the assumption of no correlation between two areas with the program implementation. A statistically significant interaction variable indicates that the effect of this variable on the program implementation is significantly different for the program-implemented areas than for the not-implemented areas. The results reveal that only three of the interaction coefficients are statistically significant (Int_Computer, Int_Type1, Int_Type2). The insignificance of all of the other interaction coefficients indicates that the effects of these variables on the probability of non-farm income do not differ for the program-implemented areas compared with the not-implemented areas.

#### 4.1.2. Decomposition for cross-sectional program effectiveness

To determine the quantitative implications of the estimates above, the regression results must be simulated to calculate the mean differences of program-implemented and not-implemented areas of the RTTV, while controlling for other demographic, socio-economic and agricultural/regional variables. What is the net effect of mean differences of the program on the program-treated areas compared with program-enforced and non-enforced regions? What would be the regions where the program had not implemented if this program had been enforced? To address these sequential questions, a treatment group should be set similar to the regions where the program had been implemented. In contrast, a control group includes the regions where the policy had not implemented.

To begin with, based on the regression results of Table 2, the following four tests were conducted. The results of the hierarchical and sequential tests, which were explained previously, are presented in Table 3. and allow us to legitimately conduct the decomposition analyses and to verify the justification of the results. A likelihood ratio test of the null hypothesis of homogenous variance is accepted ($T_1$). Other hypotheses of no residual effect ($T_2$) and no coefficient effect ($T_3$) are rejected at the 5% significant level. However, the hypothesis regarding whether there is no constant effect is not rejected at the 5% significant level ($T_4$), but is rejected at the 10% significant level. The results imply that the application of our data to the decomposition method is statistically significant.

As shown in Table 4, the observed value of earning non-farm income is slightly higher for the implemented areas (54.21%) than for the not-implemented areas (52.39%). The estimated values of non-farm income for both groups are slightly different from the observed values that confirm the construction validity of our regression models in Table 2. Table 4 shows the decomposition of the total difference (0.0189) between implemented areas and

**Table 3**
Hypothesis testing for cross-sectional decomposition methods.

| | Null hypothesis ($H_0$) | Test statistics | DF | $x^2_{0.05}$ (RT) | |
|---|---|---|---|---|---|
| $T_1$ | $\sigma^2_A = \sigma^2_B$ | 1 | 1 | 3.84 | Not reject $H_0$ |
| $T_2$ | There is no residual effect. | 284 | 13 | 22.36 | Reject $H_0$ |
| $T_3$ | There is no coefficient effect. | 82 | 12 | 21.03 | Reject $H_0$ |
| $T_4$ | There is no constant effect. | 3.3 | 1 | 2.71[a] | Reject $H_0$ |

[a] Null Hypothesis of $T_4$ is rejected when significance level ($\alpha$) is 0.10, $x^2_{0.10}$ (RT) = 2.71.

**Table 4**
Cross-sectional decomposition on probability of non-farm income.

| | Implemented | | Not-implemented |
|---|---|---|---|
| **Observed** | 0.5421 | | 0.5239 |
| Difference | | 0.0182 | |
| **Estimated** | 0.5547 | | 0.5358 |
| Hypothetical estimates | | 0.5748 | |
| Difference | | 0.0189 | |
| Endowment effect | | −0.0202 | |
| Residual effect | | 0.0391 | |
| **Gap (%) explained by** | | | |
| Endowment effect | | −106.88% | |
| Residual effect | | 206.88% | |

not-implemented areas into the endowment effect (−0.0202) and the residual effect (0.0391). This result implies that the contribution of endowed resources of our independent variables to earn non-farm income is negative (−106.88%), which is explained by the different characteristics of independent variables between the groups.

A negative endowment effect implies that characteristics of independent variables to earn non-farm income for the implemented areas are less favorable than those characteristics of the not-implemented areas. The results also imply that endowed resources of the control group would produce a higher interaction effect with the program implementation. Specifically, the hypothetical estimate would have been higher than the expected probability of non-farm income in program-implemented areas, had the program been enforced in the areas where program had not been implemented. In contrast, the positive residual effect may represent direct and indirect program effects that enhance the chance of making non-farm income (206.88%) in the program-implemented areas. Beyond the blind obedience of efficiency, this result may provide evidence to evaluate the impact of the policy positively because the program had been practiced in the areas lacking endowed human and physical resources and had generated a positive net effect on earning non-farm income. In summary, from a cross-section perspective, the policy to enhance the chance of earning non-farm income has much more positive and effective influence on farmers who reside in the program-implemented areas with less competent characteristics of making non-farm income.

### 4.2. Longitudinal evaluation on earning non-farm income

#### 4.2.1. Impact of before and after the program implementation

The regression result of the longitudinal analysis in Table 5 describes the causal effect of independent variables on the

**Table 5**
Longitudinal analysis on the probability of making non-farm income.

| | Model 1 After implementation | Model 2 Before implementation | Model 3 Pooled-no timing effect | Model 4 Pooled-timing effect | Model 5 Pooled-fully interactive |
|---|---|---|---|---|---|
| Constant | 1.4093*** | −0.8405*** | −0.5623*** | −0.2200*** | −0.8405*** |
| **Demographic** | | | | | |
| Age | −0.0276*** | −0.0055*** | −0.0034*** | −0.0176*** | −0.0055*** |
| Gender | −0.5302*** | −0.3743*** | −0.2388*** | −0.4498*** | −0.3743*** |
| HHnumber | 0.4220*** | 0.4559*** | 0.3517*** | 0.4280*** | 0.4559*** |
| **Socio-economic** | | | | | |
| Edu1 | 0.1508*** | 0.0921*** | −0.0671*** | 0.1131*** | 0.0921*** |
| Edu2 | **−0.0691**** | 0.0102 | 0.0220 | −0.0350 | 0.0102 |
| Career | −0.0101*** | −0.0193*** | −0.0138*** | −0.0133*** | −0.0193*** |
| Computer | 0.3958*** | 0.1194*** | 0.6976*** | 0.2967*** | 0.1194*** |
| Large Vehicle | −0.1883*** | −0.3618*** | −0.1283*** | −0.2691*** | −0.3618*** |
| **Regional/agricultural** | | | | | |
| Type1 | **−0.1386***** | 0.0238 | 0.0389*** | −0.0516*** | 0.0238 |
| Type2 | −0.3751*** | −0.2417*** | −0.2082*** | −0.3120*** | −0.2417*** |
| Type3 | −0.6496*** | −0.1629*** | −0.3071*** | −0.4666*** | −0.1629*** |
| District(Eup) | 0.1984*** | 0.2278*** | 0.2177*** | 0.2131*** | 0.2278*** |
| Program | | | | 1.0684*** | 2.2499* |
| **Interaction** | | | | | |
| Int_Age | | | | | −0.0221*** |
| Int_Gender | | | | | −0.1559*** |
| Int_HHnumber | | | | | −0.0339*** |
| Int_Edu1 | | | | | 0.0092* |
| Int_Edu2 | | | | | 0.0587 |
| Int_Career | | | | | −0.0793*** |
| Int_Computer | | | | | 0.2763*** |
| Int_Vehicle | | | | | 0.1735*** |
| Int_Type1 | | | | | −0.1624*** |
| Int_Type2 | | | | | −0.1334*** |
| Int_Type3 | | | | | −0.4868*** |
| Int_District | | | | | −0.0294 |
| ***n*** | 66,778 | 64,885 | 131,663 | 131,663 | 131,663 |
| ***−2LL*** | 82,080 (*L1*) | 73,792 (*L2*) | 162,182 (*L3*) | 156,344 (*L4*) | 155,873 (*L5*) |
| ***R-square*** | 0.1393 | 0.1226 | 0.1296 | 0.1674 | 0.1703 |
| ***Max-rescaled R-square*** | 0.1862 | 0.1706 | 0.1737 | 0.2243 | 0.2283 |

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

probability of earning non-farm income among farm households. As did in the previous section, we applied five logit models to analyze a longitudinal perspective on the probability of earning non-farm income. However, the sample composition of this regression is different from that of the cross-sectional analysis that was shown previously. The first two columns of Table 5 list the results of the earning non-farm income model for after- and before-program implementation, respectively. The remaining three models refer to a pooled sample, which is composed of both after- and before-program implementation. Model 1 utilizes the 2010 census data of farm households that were living in the program-implemented areas in 2010. Model 2 is based on households of the 2000 census data who lived in the same regions in Model 1. Model 3 combines observations of Model 1 and Model 2, and Model 4 adds a dummy variable that differentiates the timing of the program implementation. Model 5 is a fully interactive model, and the explanation of the models is the same as in the previous section.

The results of the probability of earning non-farm income models, which were estimated for before- and after-program implementation, are acceptable. All coefficients have like signs and similar orders of magnitude for both samples. Because the signs and size of all other logit coefficients that are presented in Table 5 are essentially analogous to those coefficients of the previous section, we will not reiterate these points here, except for some variables that show some different results. However, there exist a few distinctive points, which are different from the cross-sectional investigation of the previous section.

We pay the same level of attention to education variables as Edu2 did in Table 2. Coefficient estimates of Edu2 in Model 1 and Model 2 show opposite signs. We can interpret this result as an indication that the RTTV does not necessarily increase the probability of non-farm income for the highly educated group. The rate of return by crop is higher for such crops as vegetables or upland crops (Type1), fruit, special crop or flower (Type 2), and livestock or silkworm (Type 3) in Korea, and we expect that the probability of obtaining non-farm income is much less for farmers who cultivate the profitable crops than for farmers who are primarily engaged in non-profitable crops, such as rice. Unlike the findings that are in line with the expectation in the cross-sectional analysis, the longitudinal analysis shows somewhat different result for vegetables and upland crops (Type 1).

Before the program implementation, the probability of earning non-farm income for farm households whose major crops are vegetables or upland crops is negative in Model 1. However, the reverse is true after the program implementation in Model 2, although the results are not statistically significant. The pooled sample of Model 3 shows a positive impact on non-farm income with its significance at $p < 0.01$. When the program dummy variable is included in Model 4, the variable changes its direction again. When we adopt a fully interactive model in Model 5, the variable loses its statistical significance. The results imply that during the interval before and after the RTTV, the rate of return for vegetables and upland crops in the Korean market has been greatly increased; therefore, there is no reason for farmers who are mainly engaged in crops to pursue additional income other than revenue from their major crops, such as vegetables and upland crops.

Unlike the results of the fully interactive model, similar to the cross-sectional analysis, the results of interaction coefficients show different results. The results reveal that only two (Int_Edu2, Int_District) of the interaction coefficients lose their statistical significance among twelve interaction variables. Statistically significant interaction variables indicate that the effect of this variable on non-farm income is significantly different for post-implementation than for pre-implementation. The positive association to enhance the chance of earning non-farm income is found in the farm household characteristics of the less-educated group, farmers with computer competency, and the possession of large vehicles once the RTTV has been implemented. After the program implementation, the chance of earning non-farm income decreases with older farming households, male householders, larger farm households, longer farming careers, and profitable crops.

The program dummy variable that differentiates post-implementation from pre-implementation is positive for both Model 4 and Model 5, which implies that chance of earning non-farm income has been significantly increased after the program implementation. However, how these results correspond with our earlier findings of the mean difference of making non-farm income between pre-implementation and post-implementation remains unresolved. The answer lies in a decomposition analysis of the mean difference between two samples, which will be investigated in the following section.

#### 4.2.2. Decomposition for longitudinal program effectiveness

When eliminating the maturation effect[13] between pre- and post-implementation, does the enforcement of the program have a positive impact on the growth of non-farm income in these areas? To answer this question, the post-implementation group is established as a treatment group, and the pre-implementation group is regarded as a control group through random assignment.

Four statistical hypotheses will be tested before decomposition analysis is applied to evaluate longitudinal program effectiveness, as in the previous section. The elicitation process of test statistics is identical to that in the previous section, and Table 6 shows the consequences of four statistics. The results of the four tests demonstrate that the hypotheses of homoscedasticity, the presence of residual effect, coefficient effect, and constant effect satisfy the assumptions of each statistic that guarantee a foundation for the following decomposition analysis.

Table 7 shows the observed difference, the endowment effect, and the residual difference, which are modified in accordance with equation (5) and coefficient estimates of the logit models that are shown in Table 5. Our computations indicate that the observed value of earning non-farm income is much higher for the post-implemented sample (54.21%) than for the pre-implemented sample (33.18%). The estimated values of non-farm income for both samples are slightly different from the observed values that, again, confirm the construction validity of our regression models in Table 5. Although the difference is higher for the estimated value (0.2418) than the observed value (0.2103), this result is a statistically more appropriate estimate of the mean non-farm income because this result takes into account a rather idiosyncratic form of the distribution of data on non-farm income.

Table 7 shows the decomposition of the total difference (0.2418) between the post-implemented sample and pre-implemented sample into the endowment effect (−0.0179) and the residual difference (0.2597). This result implies that the contribution of endowed resources of our independent variables to earn non-farm income is negative (−7.39%), which is explained by the different characteristics of independent variables between the samples.

[13] The maturation effect originally indicates "*any biological or psychological process within an individual that systematically varies with the passage of time, specific external events (SAGE Research Methods)*". This study, however, expands the definition to changes in environmental and endowed resources in particular regions and applies to a comparison between pre- and post-implementation of the RTTV.

**Table 6**
Hypothesis testing for longitudinal decomposition methods.

| | Null hypothesis ($H_0$) | Test statistics | DF | $x^2_{0.05}$ (RT) | |
|---|---|---|---|---|---|
| $T_1$ | $\sigma_A^2 = \sigma_B^2$ | 1 | 1 | 3.84 | Not reject $H_0$ |
| $T_2$ | There is no residual effect. | 6310 | 13 | 22.36 | Reject $H_0$ |
| $T_3$ | There is no coefficient effect. | 472 | 12 | 21.03 | Reject $H_0$ |
| $T_4$ | There is no constant effect. | 487 | 1 | 3.84 | Reject $H_0$ |

A negative endowment effect implies that characteristics of independent variables to earn non-farm income for post-implemented sample are less favorable than those characteristics of the pre-implemented sample. In contrast, the positive residual effect may represent direct and indirect program effects to enhance the chance of earning non-farm income (107.39%) for the post-implemented sample. This result may provide evidence to evaluate the impact of the policy positively because the program had been practiced in the areas that lack endowed human and physical resources and had generated a positive net effect on earning non-farm income.

The differences in independent variables for two samples can be interpreted as a maturation effect over time. However, our finding indicates that if the government intervention had been implemented in 2000 for the program-implemented areas, the positive causal effect to increase non-farm income between independent variables and dependent variable would be higher. In this regard, the negative judgment regarding the endowment effect does not originate from the maturation effect of regional endowed resources. Rather, environmental and structural factors of the implemented areas could have been deteriorated over time. This observation could also be associated with the fact that the living environment in rural areas has been worsened; furthermore, coupled with changes in the external agricultural environment, such as FTA and UR, the competitiveness in rural areas has been vanished. Therefore, it is expected that the probability of increasing non-farm income would be noticeably lower, had the program not been implemented during the actual implementation period.

Along with this assessment, the results of the cross-sectional analysis that are presented in Table 4 make it possible to determine that the timing of the program implementation and the selection of implementation areas are quite appropriate.[14] If there had been no government intervention, such as the RTTV, then the program-implemented areas could have difficulties in promoting economic opportunities, such as earning non-farm income, due to a lack of competitiveness against other areas and a deterioration of its own income conditions.

## 5. Summary and discussion

Korea has adopted an urban-centered growth pole strategy for industrialization to modernize the economy since the mid-1970s. This strategy gave rise to spatial imbalances among many areas, particularly between urban and rural areas. Moreover, the period of developmental dictatorship produced challenges in spatial policy by widening rural-urban disparity. The imbalances yielded a dichotomous perception that described urban and rural areas and still is a barrier for the efficient use of resources and social integration. The newly developed agricultural and rural policy paradigm appeared in such an environment to revitalize the rural society to achieve social cohesion.

[14] As Lee and Yun (2008) pointed out, this success story can also be attributed to a close collaborative work between Rural Development Administration and well-trained local extension workers.

**Table 7**
Longitudinal decomposition on probability of making non-farm income.

| | Implemented | | Not-implemented |
|---|---|---|---|
| **Observed** | 0.5421 | | 0.3318 |
| Difference | | 0.2103 | |
| **Estimated** | 0.5547 | | 0.3128 |
| Hypothetical Estimates | | 0.5726 | |
| Difference | | 0.2418 | |
| Endowment effect | | −0.0179 | |
| Residual effect | | 0.2597 | |
| **Gap (%) explained by** | | | |
| Endowment effect | | −7.39% | |
| Residual effect | | 107.39% | |

The Rural Traditional Theme Village (RTTV) program in Korea operated by the Rural Development Administration stands as exemplary component of the policy paradigm. It represents one of the most significant policies that reflect the recent trend of rural changes from an economy that is based on production to an economy that is based on consumption. In this sense, there has been increasing interest in the incisive evaluation of this program to consolidate the validity of political investment and to investigate the effectiveness of the new policy paradigm.

This study conducted an ex-post evaluation on the outcomes after the termination of the program. This study adopted farm households' non-farm income as an ex-post quantifiable indicator and then assesses the impact of the program on this indicator. The effect of the RTTV, which was enforced by the Rural Development Administration in Korea, is evaluated positively and effectively in both the cross-sectional and longitudinal perspectives. The findings of this study can be summarized as follows.

In a cross-sectional analysis that compares the program-implemented areas with the not-implemented areas, the chance of earning non-farm income is slightly higher for the program-implemented areas than for the not-implemented areas. Decomposing the total difference (0.0189) in the probability of non-farm income between program-implemented areas and not-implemented areas, the endowment effect is explained by −0.0202, and the residual effect is 0.0391. This result implies that the contribution of endowed resources of our independent variables to earn non-farm income is negative (−106.88%), which is explained by the different characteristics of independent variables between the groups. A negative endowment effect implies that characteristics of independent variables to earn non-farm income for the implemented areas are less favorable than those characteristics of the not-implemented areas. The results also imply that endowed resources of control group would produce a higher interaction effect with the program implementation. In contrast, the positive residual effect may represent direct and indirect program effects that enhance the chance of earning non-farm income in the program-implemented areas. The results may provide evidence to evaluate the impact of the policy positively because the program had been practiced in areas lacking endowed human and physical resources and had generated a positive net effect on earning non-farm income.

In a longitudinal perspective, this study found that the observed value of earning non-farm income is much higher for the post-implemented sample than for the pre-implemented sample. The estimated values of non-farm income for both samples are slightly different from the observed values, which, again, confirm the construction validity of our regression models.

When decomposing the total difference (0.2418) between the post-implemented sample and the pre-implemented sample, we found that −7.39% is attributable to endowment effect and 107.39% is explained by residual difference between the samples. A negative endowment effect implies that characteristics of independent variables to earn non-farm income for post-implemented sample are less favorable than those characteristics of the pre-implemented sample. In contrast, the positive residual effect may represent direct and indirect program effects that enhance the chance of earning non-farm income for the post-implemented sample. This result can provide an evidence to positively evaluate the impact of the policy because the program had been practiced in areas lacking endowed human and physical resources and had generated a positive net effect on earning non-farm income.

Combining these two analyses of the probability of earning non-farm income, the results enable us to determine that the timing of the program implementation and the selection of implementation areas of the RTTV program were quite appropriate. If there had been no government intervention, the program-implemented areas could have difficulties in promoting economic opportunities, such as earning non-farm income, due to the lack of competitiveness compared with other areas and the deterioration of its own income conditions.

Future studies must pursue a more comprehensive analysis to evaluate program effectiveness in a newly developed agricultural and rural policy paradigm. Above all, further studies must adopt a linear form of non-farm income to identify the amount of increments and differentials in non-farm income among farming households. In addition to independent variables that are controlled by the quantitative model of the present study, other indicators regarding contextual effects on local and national scopes must be identified because these indicators may also influence the residual effect that this research may fail to capture. Moreover, to develop an evaluation system that covers the transition in rural policy paradigm, various theories and methodologies of the program evaluation must be applied to relevant policies.

We found that rural tourism can be a good way to revitalize rural society. A positive effect of the RTTV on obtaining non-farm income for farm households is a good indication for future rural policy in Korea. The rural tourism policy arguably contributes to diversifying rural income sources, alleviating income instability, and promoting endogenous rural vitalization through activating farm households to create non-farm income. The results of the present study may give us the following policy and managerial implications.

First, Korea is now more than ever dependent upon rural tourism for rural development with agricultural sector losing its significance over time. If government accepts the rural tourism policy as a prime economic force to rebuild rural Korea, policy-makers or planners have to ensure that rural tourism should serve as an opportunity to provide a mix of attractions that appeal diverse segments of rural amenities. Second, the objective of rural tourism policy is to achieve independent management and sustainable growth after the implementation. However, unlike the premise, the participating villages show deepening dependence on government support. Thus government should take a long-term perspective of sustainable agriculture and rural development and need to introduce market-friendly policies such as reinforcement of liaison between rural and urban areas for inflow of urban capital into rural areas. Finally, few government agencies provide management programs after the implementation of the program. This makes it difficult for participating farmers to sustain program. Government should prepare supplementary program for farm households to guarantee continuous successful management of the program.

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## Appendix. Comparisons of descriptive statistics for implemented- and not-implemented areas in 2000 and 2010

| Variables | Cross-sectional comparison | | | | Longitudinal comparison | | | |
|---|---|---|---|---|---|---|---|---|
| | Implemented | | Not-implemented | | Before-implementation | | After-implementation | |
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Non-farm income | 0.54 | 0.50 | 0.52 | 0.50 | 0.33 | 0.47 | 0.54 | 0.50 |
| **Demographic** | | | | | | | | |
| Age | 60.19 | 10.89 | 59.91 | 10.98 | 58.49 | 11.56 | 60.19 | 10.89 |
| Gender | 0.92 | 0.27 | 0.92 | 0.27 | 0.83 | 0.37 | 0.92 | 0.27 |
| HHnumber | 2.77 | 1.29 | 2.85 | 1.32 | 2.82 | 1.47 | 2.77 | 1.29 |
| **Socio-economic** | | | | | | | | |
| Edu1 | 0.64 | 0.48 | 0.61 | 0.49 | 0.83 | 0.38 | 0.64 | 0.48 |
| Edu2 | 0.09 | 0.29 | 0.10 | 0.30 | 0.03 | 0.17 | 0.09 | 0.29 |
| Career | 31.81 | 16.09 | 31.07 | 16.24 | 33.33 | 15.01 | 31.81 | 16.09 |
| Computer | 0.53 | 0.50 | 0.56 | 0.50 | 0.20 | 0.40 | 0.53 | 0.50 |
| Large Vehicle | 0.25 | 0.43 | 0.23 | 0.42 | 0.17 | 0.37 | 0.25 | 0.43 |
| **Regional/agricultural** | | | | | | | | |
| Type1 | 0.32 | 0.47 | 0.28 | 0.45 | 0.27 | 0.45 | 0.32 | 0.47 |
| Type2 | 0.16 | 0.36 | 0.20 | 0.40 | 0.11 | 0.31 | 0.16 | 0.36 |
| Type3 | 0.10 | 0.31 | 0.10 | 0.30 | 0.05 | 0.23 | 0.10 | 0.31 |
| District | 0.15 | 0.36 | 0.29 | 0.46 | 0.13 | 0.34 | 0.15 | 0.36 |
| ***n*** | 66,778 | | 68,546 | | 64,885 | | 66,778 | |

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