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Abstract

This study examines the effects of policy changes and improvements in the agritourism sector in a developing country. We analyze the economy of a developing country, which consists of two regions: an urban area where the manufacturing sector is located and which has a certain level of unemployment à la Harris and Todaro (1970), and a rural area where both the agricultural and agritourism sectors are located. We demonstrate that encouraging labor outflow is reasonable, while the effects of a decrease in the minimum urban wage or the effects of additional foreign capital investment are not clear. We also assert that under certain conditions, an enhancement of the ratio of agricultural goods to touristic services in the agritourism sector will improve domestic welfare and reduce the urban unemployment rate. Furthermore, we conclude that agricultural-good-intensive tourism and environmentally friendly agritourism cause positive effects on welfare and employment.

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Agritourism, Unemployment, and Urban-Rural Migration

1 Introduction

Agritourism is a type of tourism that involves the agricultural and tourism industries. In most cases, it consists of rural farms providing an agricultural environment that is open to the public and which attracts visitors for agricultural operations, recreation, entertainment, and/or educational experiences.[1] Generally speaking, agritourism is considered beneficial to producers and communities. Farmers take advantage of the opportunities available to generate additional income and obtain a direct marketing channel to consumers, while the tourism industry benefits from the increase in the number of visitors and in their length of stay. Moreover, agritourism provides local communities with the potential to increase their tax bases and to expand employment opportunities, and at the same time, it offers educational experiences to the public, helps in agricultural land preservation, and allows states to develop business enterprises.

While agritourism have mainly witnessed in the United States and Europe, it is widespread in Asian developing countries such as Thailand, the Philippines, and Cambodia. However, this activity varies in different ways. In the United States, the agritourism sector mainly targets U.S. residents, while in developing countries, it is focused primarily on foreign tourists. For example, Thailand offers foreign visitors several types of one-day agritourism trips, which include visits to fruit farms and farmers' houses, harvesting and cooking experiences, and the opportunity to enjoy traditional foods served by English-speaking local guides.[2]

We need to state that the effects of the spread of agritourism on labor markets in de-

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[1] For example, the National Agricultural Law Center (https://nationalaglawcenter.org/) reports that pumpkin picking patches, corn mazes, U-Pick operations, petting and feeding zoos, hay rides, cut-your-own Christmas tree farms, dude ranches, demonstration farms, agricultural museums, living history farms, on-farm farmers' markets, winery tours and wine tasting, rural bed and breakfasts, and garden tours are conducted in the United States.

[2] Responsible Thailand (www.responsiblethailand.co.uk/).

veloping countries differ from those experienced in developed countries. Since agritourism contributes towards creating job opportunities in rural areas, it may attract urban workers, which will help reduce the economic decline of rural areas due to the labor shortage caused by the decreasing population in developed countries. In contrast, in developing countries agritourism promotion mitigates the urban-rural migration caused by an excess supply of labor and may directly reduce the number of unemployed urban workers or those engaged in informal jobs.

Our focus is on developing countries with agritourism sectors. Because developing countries tend to have low wage level, international labor outflow happens as well as urban-rural migration. Remittance from these people plays an important factor for economic development of developing countries,[3] and governments in developing countries admit such international labor outflow in most cases. In 2018, the amount of remittance to developing countries is 529 billion USD, which is occupied about 77% of the amount of worldwide, and 0.6% of global GDP in 2018.[4] Additionally, in developing countries domestic capital tends to be scarce. Thus, governments in developing countries often have some policies for foreign direct investment (FDI). Although these policies have already been considered, existing research seems to have overlooked the existence of the agritourism sector. In developing countries with agritourism sectors, are these policies good for the economies?

The purpose of this study is to examine the effects of different policies in a developing country with an agritourism sector. We investigate the effects of those policies on labor supply, the minimum wage rate, and foreign capital. In addition, we consider the effects of changes in the agritourism industry, focusing on an increase in labor productivity, a shift to agricultural good-intensive tourism, and more environmentally friendly agritourism.

In this study, we analyze the economy of a developing country, which consists of two

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[3]Meyer and Shera (2017) empirically tested the impact of remittances on economic growth by using the data of six high remittances receiving countries, and showed significant relationships between remittance and economic growth in these countries.

[4]Global Knowledge Partnership on Migration and Development (KNOMAD; `https://www.knomad.org/`); World Bank (`https://www.worldbank.org/`).

regions: an urban area where the manufacturing sector is located and which has a certain level of unemployment à la Harris and Todaro (1970) and a rural area where both the agricultural and agritourism sectors are located. Labor is a necessary input of every sector while foreign capital investment is a specific factor of production for the manufacturing of goods. The agritourism sector is supposed to supply a combined good whose primary components are touristic services (also supplied by labor input) and agricultural goods. The productivity of agricultural goods depends on the stock level of environmental capital, which will be damaged by the manufacturing sector but saved by agritourism.

The main results of our study are as follows. First, labor outflow from the region has positive effects on the domestic residents' welfare and contributes to the reduction of the urban unemployment rate. Second, the effects of a decrease in the minimum wage and of additional FDI are not clear. It implies these policies in developing countries may not be effective in an economy with an agritourism sector. In addition, appropriate policies may foster innovation in the agritourism sector, which will enhance the ratio of agricultural goods to touristic services and improve the welfare of domestic residents while reducing the urban unemployment rate. Furthermore, we conclude that agricultural-good-intensive tourism and environmentally friendly agritourism also cause positive effects on welfare and employment.

Before proceeding, we discuss how this study relates to existing research. Considering the importance of agritourism, research has been carried out that covers several aspects of agritourism, which can be categorized into three major groups. Studies in the first group, which include McGehee and Kim (2004), and Galuzzo (2018), define the properties of agritourism by focusing on the incentives of the supply side of starting a business. Studies in the second group including Carpio et al. (2008), Santeramo and Barbieri (2017), and Sidali et al. (2019), investigate the incentives of the demand side such as tourists' preferences and properties. Finally, the third group of studies, which include Maude and van Rest (1985), Schilling et al. (2012, 2014), and Jeczmik et al. (2015), focus on the economic effects of agritourism, considering several specific aspects such as natural environmental protection

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and the income growth of the rural population. It is important to note that most of the studies in this group are empirical and include case studies in countries such as the U.S., the U.K., and Italy, while only a few theoretical studies have been carried out.

Considering environmental protection aspects, several theoretical studies have focused on the economic effects of tourism promotion. Following the pioneering study by Copeland (1991), most recent studies, including those of Beladi, et al. (2009), Chao et al. (2008, 2011), Chao and Sgro (2008), Hazari and Sgro (2004), Hazari and Hoshmand (2011), and Yanase (2017), used a trade model to investigate the tourism industry. Furukawa et al. (2019) focused on a rural area of a developed country and studied the effects of the inflow of capital, labor, and tourists from outside the area, while Yabuuchi (2013, 2015) studied the economic effects of tourism promotion in developing countries by applying an extended Harris-Todaro urban-rural migration model. The studies above investigate the combined effects of tourism promotion and environmental protection prompted by a pollution tax, considering production and consumption externalities. We need to state that we are not aware of theoretical studies that focus on the effects of economic policies under the existence of the agritourism sector. This industry contributes to the increase in employment in the agricultural sector, inducing part of the agricultural goods produced to be indirectly consumed by foreign tourists, and thus, leading to a reduction in the number of agricultural goods available for the domestic population. Considering that agritourism may foster environmentally friendly actions such as planting trees or cleaning beaches, this sector contributes to the improvement of the natural environment, which directly determines the productivity of agriculture (Copeland and Taylor, 1999). Hence, our study combines the literature on agritourism and environmental protection and contributes to the existing research by providing new insights on policies in developing countries.

The remainder of this study is organized as follows. In section 2, we present our model. Section 3 is dedicated to analysis, while section 4 presents our concluding remarks.

2 The Model

We extend the basic model of Copeland and Taylor (1991), and assume a small developing country with three industries: the smokestack manufacturing industry, which is located in an urban area and generates pollution; the environmentally sensitive agricultural industry, located in a rural area and suffering from the pollution; the agritourism industry, which is environmentally friendly and also located in a rural area. The primary factors of production are labor, foreign capital and environmental stock. Foreign capital is the specific factor in the production of the manufacturing good while the level of environmental stock regulates the productivity of the agricultural good.[5] We assume that the agritourism industry manages to supply touristic services combining agricultural goods (e.g. local foods) and labor input (e.g. accommodation services). Additionally, as opposed to traditional tourism which could harm natural environment, agritourism contributes environmental protection.[6]

The production functions of the manufacturing, agricultural, and agritourism industries in this country are defined as

$$M = F(K^*, L_M), \tag{1}$$

$$A = \sqrt{E} \cdot L_A, \tag{2}$$

$$S = \beta \cdot L_S, \tag{3}$$

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[5]Here we consider the case of lower developed contries in Asia, such as Cambodia, where manufacturing sector is mainly managed by foreign capital owners. Cambodia has a generally open and liberal for foreign investment regime: it has generally maintained liberal policies regulating foreign investment, which include incentives to investors as 100% foreign ownership of companies, corporate tax holidays of up to eight years, a 20% corporate tax rate after the incentive period ends, duty-free import of capital goods, and no restrictions on capital repatriation. To facilitate foreign investment, Cambodia has also created special economic zones (SEZs), which provide companies with immediate access to land, infrastructures and other services to facilitate the ease of doing business. According to UNCTAD (2019) says the Cambodian total stock of FDI stood at USD 23.7 billion in 2018, representing almost 97% of the country's GDP. The main investing countries are China (Chinese FDI alone surpassed all other FDI sources combined), Hong Kong, the US, and the Netherlands. Following the Cambodia Industrial Development Policy 2015-2025, the number of big businesses with more than 100 employees which mainly specialize in manufacturing (e.g. garment) industries represents only 0.6% of total companies although accounting for more than 76% of total gross sales. On the other hand, most of the domestic medium and small businesses with less than 100 employees are specialized in the production of foods, beverages, and tobaccos. Considering this situation we ignore the small share of local capital managed industries and assume a manufacturing sector only managed by foreign investors.

[6]For example, we can imagine a rural tour for the people from developed countries with accommodation, local foods as well as experiences such as planting fruits trees or voluntary beach cleaning activities.

where E is environmental stock; M, K^*, and L_M are respectively, the output, foreign capital input and labor input of the manufacturing industry; A and L_A are the output and labor input of the agricultural industry; S and L_S are the output and labor input of the agritourism services; and β is the parameter that reflects the productivity of the agritourism industry. We assume that the production function of manufactured good is linearly homogeneous.[7]

One unit of agritourism is supplied to foreign tourists as a combination of one unit of service and q unit of agricultural goods. Thus, the total output of agritourism can be expressed as follows:

$$X = S = \beta \cdot L_S = q^{-1} \cdot A_T = q^{-1} \cdot (A - D_A), \tag{4}$$

where X denote the output of agritourism, A_T denotes the total amount of agricultural goods supplied to foreign tourists, and D_A denotes the domestic aggregate demand of agricultural goods.

The production activity in the manufacturing industry causes pollution which harms natural environment. We assume the level of environmental stock is a decreasing function of the amount of pollution emitted by the manufacturing industry. Moreover, we consider the positive effects on natural environment caused by agritouristic activities. Therefore, the net stock of environmental capital is

$$E = \bar{E} - \lambda_1 M + \lambda_2 X, \tag{5}$$

where $\bar{E}$ is the natural stock level of environmental capital before damages; λ_1 and λ_2 are, respectively, parameters which reflect the magnitude of effects on natural environment caused by one unit of manufacturing and agritourism output.

The minimum wage rate of the manufacturing industry located in urban area is $\bar{w}$, which is exogenously determined by the negotiation between employers and labor unions. Similarly to the HarrisTodaro framework, urban workers can obtain $\bar{w}$ by the manufacturing industry if employed, but they did not receive wage if not employed. The possibility of a worker being

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[7]This assumption implies that $M - F_L L_M - F_K K^* = 0$ and $F_{LL} L_M + F_{LK} K^* = 0$.

employed or not in every period depends only on a random probability. On the other hand, as we do not assume fixed wage rates in the agricultural and agritourism industry, the wage rate w in both sectors are equal. In the equilibrium after domestic labor mobility between the two regions, we have

$$w(L_M + L_U) = \bar{w}L_M, \tag{6}$$

or

$$w(1 + \eta) = \bar{w}, \tag{7}$$

where L_U denotes the number of unemployed workers, and $\eta \equiv L_U/L_M$ is the ratio of unemployed to employed workers in the urban area.

Regarding the industry structure, we assume perfect competition with free entry both in the manufacturing and agricultural industries. Let π_M and π_A be the total profits of the manufacturing and agricultal industries, respectively, expressed as follows:

$$\pi_M = p_M M - \bar{w}L_M - r^* K^*, \tag{8}$$

$$\pi_A = A - wL_A, \tag{9}$$

where the agricultural good is the numeraire, p_M denotes the price of the manufactured good, and r^* denotes the rental price of foreign capital. Under the assumption that both goods are produced, profit maximization conditions in the manufacturing and agricultural industries yield

$$\frac{\partial \pi_M}{\partial L_M} = p_M F_L(K^*, L_M) - \bar{w} = 0, \tag{10}$$

$$\frac{\partial \pi_M}{\partial K^*} = p_M F_K(K^*, L_M) - r^* = 0, \tag{11}$$

$$\frac{\partial \pi_A}{\partial L_A} = \sqrt{E} - w = 0. \tag{12}$$

The full employment condition is

$$L_M + L_A + L_S + L_U = L, \tag{13}$$

where L is the domestic labor endowment.

We also assume perfect competition with free entry in the agritourism industry. Thus, the price of one unit of agritourism good should be equal with its marginal cost, $\beta w + q$.

Remembering that agritourism goods are consumed by foreign visitors on the demand side, we specify the following social utility function of domestic residents:

$$U = D_M^\alpha D_A^{1-\alpha}, \quad 0 < \alpha < 1, \tag{14}$$

where D_M and D_A are the domestic residents' aggregate consumption levels of manufactured and agricultural goods, respectively, and α is the parameter which reflects the preferences on the manufactured good. Because each firm obtains zero profit and capital owners are foreign investors, the GDP of this country is equal to the labor income, $w(L_A + L_S) + \bar{w}L_M = wL$. Therefore, the demand for each good is obtained by solving the utility maximization problem, subject to the following budget constraint:

$$D_A + p_M D_M = wL. \tag{15}$$

Hence, we have

$$p_M D_M = \alpha wL, \tag{16}$$

$$D_A = (1 - \alpha)wL. \tag{17}$$

We assume that foreign investors do not consume any goods in the country and remit all their income to their home country by manufactured good. Also, we need to remember that agritourism goods are consumed by foreign visitors. Thus, we have,

$$D_M = M - p_M^{-1} r^* K^*. \tag{18}$$

$$D_A = A - A_T. \tag{19}$$

3   Effects of Policies

Because of the zero-profit condition and (9), A is equal to wL_A, and A_T is equal to $\beta q L_S$ from (4). Thus, from (17) and (19), we have

$$(1 - \alpha)wL = wL_A - \beta q L_S. \tag{20}$$

From (6), (13), and (20), we obtain

$$\alpha wL - (w + \beta^{-1}q)L_S = \bar{w}L_M. \tag{21}$$

Also from (11), (16), and (18), we have

$$p_M\{F(K^*, L_M) - F_K(K^*, L_M)K^*\} = \alpha wL. \tag{22}$$

Finally, from (5) and (12), we can assert

$$\bar{E} - \lambda_1 F(K^*, L_M) + \lambda_2 \beta L_S = w^2. \tag{23}$$

Now we have four endogenous variables, L_M, L_S, w, and p_M will be determined in equilibrium by four equations, (10), (21), (22), and (23) given the exogenous variables $\bar{E}$, L, α, β, q, $\bar{w}$, K^*, λ_1, and λ_2.

Totally differentiating (10), (21), (22), and (23),

$$
\begin{bmatrix}
-\bar{w} & -(w + \beta q) & \alpha L - L_S & 0 \\
p_M F_{LL} & 0 & 0 & F_L \\
p_M(F_L - F_{LK}K^*) & 0 & -\alpha L & F - F_K K^* \\
-\lambda_1 F_L & \lambda_2 \beta & -2w & 0
\end{bmatrix}
\begin{bmatrix}
dL_M \\
dL_S \\
dw \\
dp_M
\end{bmatrix}
$$

$$
=
\begin{bmatrix}
-\alpha w \\
0 \\
\alpha w \\
0
\end{bmatrix} dL
+
\begin{bmatrix}
L_M \\
1 \\
0 \\
0
\end{bmatrix} d\bar{w}
+
\begin{bmatrix}
0 \\
-p_M F_{LK} \\
p_M F_{KK} K^* \\
\lambda_1 F_K
\end{bmatrix} dK^*
+
\begin{bmatrix}
qL_S \\
0 \\
0 \\
-\lambda_2 L_S
\end{bmatrix} d\beta
+
\begin{bmatrix}
\beta L_S \\
0 \\
0 \\
0
\end{bmatrix} dq
+
\begin{bmatrix}
0 \\
0 \\
0 \\
-\beta L_S
\end{bmatrix} d\lambda_2.
$$

$$\tag{24}$$

The determinant of the matrix of (24) is

$$\Delta = -p_M F_{LL}\{(\alpha L - L_S)\lambda_2 \beta(F - F_K K^*) - 2w(w + \beta q)(F - F_K K^*)\}$$

$$+ F_L\{-\alpha L(w + \beta q)\lambda_1 F_L + (\alpha L - L_S)\lambda_2 \beta(F_L - F_{LK}K^*)$$

$$-\bar{w}\alpha L \lambda_2 \beta - 2wp_M(w + \beta q)(F_L - F_{LK}K^*)\}. \tag{25}$$

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Here, we assume

Assumption 1. $\alpha < L_S/L$.

which implies that the preference on manufactured good is sufficiently small. Then the sign of the determinant Δ is negative.

3.1 Policy changes in developing countries

In this subsection, we discuss the effects of specific policy changes in developing countries. A developing country, as Cambodia or Myanmar, which intends to enhance domestic economic welfare as well as to reduce unemployment rate in urban area introduces the following economic policies: 1) A policy aimed at encouraging labor outflow which may contribute to reduce the labor supply surplus and the number of urban unemployed workers, 2) A policy to foster urban employment by decreasing urban minimum wage rate, which may cause positive effects on the average income of domestic residents, and 3) A foreign investment policy to sustain the growth of the manufacturing sector, which may expand the employment of urban area.

3.1.1 Labor outflow

First, let us consider a decrease in labor endowment due to emigration. From (24), simple calculation yield

$$\frac{dL_M}{dL} = \frac{1}{\Delta} F_L \left\{ (\alpha_L - L_S)\alpha w \lambda_2 \beta - \alpha^2 w \lambda_2 \beta - 2\alpha w^2 (w + \beta q) \right\} > 0, \tag{26}$$

$$\frac{dL_S}{dL} = -\frac{1}{\Delta} F_L^2 \alpha w L_S \lambda_1 > 0, \tag{27}$$

$$\frac{dw}{dL} = \frac{1}{\Delta} \alpha w (w + \beta q) \lambda_1 F_L^2 < 0, \tag{28}$$

$$\frac{dp_M}{dL} = \frac{1}{\Delta} p_M F_{LL} \alpha w \left\{ L_S \lambda_2 \beta + 2w(w + \beta q) \right\} > 0. \tag{29}$$

Therefore, we can conclude that in this case labor outflow caused by emigration will reduce the output of the manufactured good while the effects on tourism are not clear. Regarding

the effect on the environmental capital stock, we have the following relationship from (12),

$$sgn \, dw = sgn \, dE. \tag{30}$$

Next, we consider the effect on welfare. In this model, as the competing firms in the manufacturing industry obtain zero profit and capital owners are foreigners, national welfare will be equal to the economic welfare of the workers. The expenditure function of a representative worker is defined as

$$e(p_M, u) = w, \tag{31}$$

where u denotes the utility level of a representative worker in this country. Totally differentiating (31),

$$\frac{\partial e}{\partial p_M} dp_M + \frac{\partial e}{\partial u} du = dw. \tag{32}$$

From Shepard's lemma, we have $\partial e/\partial p_M = m$, where m denotes per capita consumption of the manufactured good, that is,

$$m = \frac{M - (r^* K^*/p_M)}{L} = \frac{\bar{w} L_M}{p_M L}. \tag{33}$$

Then (32) yields

$$\frac{\partial e}{\partial u} \cdot \frac{\partial u}{\partial L} = \frac{\partial w}{\partial L} - m \frac{\partial p_M}{\partial L} < 0. \tag{34}$$

As the sign of (34) is negative, labor outflow is welfare improving for this developing country.

Finally, from (7), the effect on ration of unemployed to employed workers in the urban area unemployment rate, η, can be expressed

$$d\eta = -\frac{1 + \eta}{w} dw + \bar{w}. \tag{35}$$

Thus

$$\frac{d\eta}{dL} = -\frac{1 + \eta}{w} \cdot \frac{dw}{dL} > 0. \tag{36}$$

As the sign of (36) is positive, labor outflow will reduce the ratio of unemployed to employed workers.

Thus, we establish the following proposition.

Proposition 1. *(i) Under Assumption 1, labor outflow will reduce the labor input to the manufacturing industry as well as the agritourism industry. As a result, the competitive wage rate will increase while the price of manufactured good will decrease.*
(ii) Labor outflow will cause positive effects on natural environmental stock and domestic economic welfare. It will also reduce the ratio of unemployed to employed workers in urban area.

In contrast to the traditional analysis of Harris and Todaro (1970), which concludes that labor outflow produces a negative effect on welfare, we find that exporting workers could be good policy in terms of environment, employment and welfare for developing countries.

3.1.2 Decrease in urban minimum wage rate

Second, let us consider a decrease in the urban minimum wage rate due to the negotiation between the employers and the labor union or some political consideration. From (24), simple calculations yield

$$\frac{dL_M}{d\bar{w}} = \frac{1}{\Delta} \left[(F - F_K K^*) \left\{ 2w(w + \beta q) - (\alpha L - L_S)\lambda_2 \beta \right\} + F_L L_M \alpha L \lambda_2 \beta \right] < 0, \tag{37}$$

$$\frac{dL_S}{d\bar{w}} = \frac{1}{\Delta} \lambda_1 F_L \left\{ \alpha L L_M F_L - (F - F_K K^*)(\alpha L - L_S) \right\} < 0, \tag{38}$$

$$\frac{dw}{d\bar{w}} = -\frac{1}{\Delta} \lambda_1 F_L (F - F_K K^*)(w + \beta q) > 0, \tag{39}$$

$$\frac{dp_M}{d\bar{w}} = \frac{1}{\Delta} \left[-\alpha L \lambda_2 \beta p_M F_{LL} L_M - p_M (F_L - F_{LK} K^*) \left\{ 2w(w + \beta q) + (\alpha L - L_S)\lambda_2 \beta \right\} \right.$$
$$\left. -\alpha L \left\{ \lambda_2 \beta \bar{w} + (w + \beta q)\lambda_1 F_{LL} \right\} \right], \tag{40}$$

$$\frac{\partial e}{\partial u} \cdot \frac{du}{d\bar{w}} = \frac{dw}{d\bar{w}} - m \frac{dp_M}{d\bar{w}}, \tag{41}$$

$$\frac{d\eta}{d\bar{w}} = -\frac{1 + \eta}{w} \cdot \frac{dw}{d\bar{w}} + 1. \tag{42}$$

Under Assumption 1, decreasing urban minimum wage rate will reduce the competitive wage rate and the environmental stock level while the sign of (42), is not clear, making us unable to

identify the effect on the ratio of unemployment to employment in urban areas. Furthermore, we make the following assumption:

Assumption 2. F_{LL} *is sufficiently small.*

Assumption 2 implies that if the marginal products of labor in the manufacturing sector is sufficiently inelastic to additional labor input, the positive second term of RHS (40) dominates the negative first and third terms. Thus, we can conclude that the sign of equation (40) will be positive, while the sign of equation (41) is not clear even in this case. Hence, we cannot obtain a clear result on the effects on economic welfare.

Proposition 2. *(i) Under Assumption 1, decreasing urban minimum wage rate will enhance the employment of urban area and expand the output of agritourism industry while reducing the competitive wage rate and the environmental stock level.*
(ii) Under Assumption 1 and 2, decreasing urban minimum wage rate will reduce the relative price of the manufactured good while effects on the ratio of unemployment to employment in urban areas and on the economic welfare of domestic residents are not clear.

In this case, the effect on economic welfare is not clear because of not only decreasing the price of manufactured good but also competitive wage rate. Also, the effect on the urban unemployment rate is not clear. Thus, we need to remark that there is a possibility that decreasing urban minimum wage may not be welcomed by domestic residents.

3.1.3 Increase in foreign capital investment

Third, let us consider an increase in foreign capital investment. From (24), simple calculations yield

$$\frac{dL_M}{dK^*} = \frac{1}{\Delta}\alpha L F_L(w + \beta q)\lambda_1 F_K < 0, \tag{43}$$

$$\frac{dL_S}{dK^*} = \frac{1}{\Delta}\lambda_1 F_L F_K \{(\alpha L - L_S)p_M F_L - \bar{w}\alpha L\} > 0, \tag{44}$$

$$\frac{dw}{dK^*} = -\frac{1}{\Delta}(w + \beta q)\lambda_1 F_K p_M F_L^2 < 0, \tag{45}$$

$$\frac{dp_M}{dK^*} = \frac{1}{\Delta}\left[\{2w(w + \beta q) + (\alpha L - L_S)\lambda_2\beta p_M^2\}\{F_{LL}F_{KK}K^* + (F_L - F_{LK}K^*)F_{LK}\}\right.$$
$$\left. -\alpha L(w + \beta q)\lambda_1 p_M\{F_L F_{LK} - F_{LL}F_K\} + \alpha L\lambda_2\beta p_M\bar{w}F_{LK}\right] < 0, \tag{46}$$

$$\frac{\partial e}{\partial u} \cdot \frac{du}{dK^*} = \frac{dw}{dK^*} - m\frac{dp_M}{dK^*}, \tag{47}$$

$$\frac{d\eta}{dK^*} = -\frac{1 + \eta}{w} \cdot \frac{dw}{dK^*} > 0. \tag{48}$$

Under Assumption 1, decreasing urban minimum wage rate will expand the agritourism industry but reduce labor input of the manufacturing industry, competitive wage rate and environmental stock level. As a result, the urban unemployment ratio will increase. As relative price of manufactured good also decreases, welfare effects on domestic residents are not clear.

Proposition 3. *Under Assumption 1, by increasing foreign capital investment, labor input in manufacturing industry decreases while it increases in the agritourism industry. As both the wage rate and the price of manufactured good decrease, the effect on economic welfare is not clear.*

Compared to the case of decreasing urban minimum wage, we need to highlight that a policy aimed at increasing foreign capital investment will probably not be welcomed by domestic residents, as it would inevitably produce an increase in the urban unemployment ratio.

3.2 Improvement of the Agritourism Sector

Next, let us discuss the technical improvements of the agritourism sector which may contribute to enhance economic welfare as well as reduce urban unemployment and increase the labor productivity of the tourism sector. These improvements include: 1) An improvement of labor productivity in the tourism sector, 2) A shift to agricultural-good-intensive tourism, and 3) The introduction of environmentally friendly technology.

3.2.1 Increase in labor productivity of tourism

Let us consider an increase in labor productivity of agritourism sector, namely an increase in β. This technological improvement implies the same amount of tourism good could now be produced by less labor input than before. From (24), simple calculations yield

$$\frac{dL_M}{d\beta} = \frac{1}{\Delta} F_L \lambda_2 L_S \alpha w L > 0, \tag{49}$$

$$\frac{dL_S}{d\beta} = -\frac{1}{\Delta} \left[p_M F_{LL} L_S (F - F_K K^*) \{ (\alpha L - L_S) \lambda_2 - 2wq \} \right.$$
$$\left. + F_L \{ \alpha L L_S (q \lambda_1 F_L + \lambda_2 \bar{w}) + L_S p_M (2wq - \lambda_2 (\alpha L - L_S)) (F_L - F_{LK} K^*) \} \right] < 0, \tag{50}$$

$$\frac{dw}{d\beta} = -\frac{1}{\Delta} w \lambda_2 L_S p_M F_L^2 > 0, \tag{51}$$

$$\frac{dp_M}{d\beta} = \frac{1}{\Delta} p_M F_{LL} \alpha L w \lambda_2 L_S > 0, \tag{52}$$

$$\frac{\partial e}{\partial u} \cdot \frac{\partial u}{\partial \beta} = \frac{\partial w}{\partial \beta} - m \frac{\partial p_M}{\partial \beta}, \tag{53}$$

$$\frac{d\eta}{d\beta} = -\frac{1 + \eta}{w} \cdot \frac{dw}{d\beta} < 0. \tag{54}$$

Equations (49) and (50) imply that a technological improvement in labor productivity of tourism sector will reduce the labor input of the tourism sector and enhance the labor input of the manufacturing sector. As a result, the competitive wage rate and the level of environmental stock will increase and the urban unemployment ratio will decrease. Furthermore, under Assumption 2, the positive first term of RHS (53) dominates the negative second term leading to the conclusion that there is a positive effect on domestic welfare. Hence, we establish the following proposition.

Proposition 4. *(i) Under Assumption 1, an increase in labor productivity of tourism will enhance the labor input in the manufacturing sector while it will reduce the labor input in the tourism sector. In this circumstance, the price of the manufactured good, the competitive wage rate and the natural environmental stock will increase while the ratio of unemployed to employed workers in urban areas will decrease.*

(ii) Under Assumption 1 and 2, an increase in labor productivity of tourism will produce a positive effect on domestic welfare.

The above proposition asserts that a technological improvement which allows to save labor input in agritourism sector will cause positive effects on the economy of the developing country.

3.2.2 Shift to agricultural-good-intensive tourism

Next, let us consider a shift to more agricultural-good-intensive agritourism. For example, an additional experience like apple harvesting will contribute to enrich other agritourism services such as accommodation with local food. This reform will make it possible to consume more of the agricultural good in one unit of tourism good and in our model it translates in an increase in q. From (24), simple calculations yield

$$\frac{dL_M}{dq} = \frac{1}{\Delta}\beta^2 L_S F_L \alpha L \lambda_2 < 0, \tag{55}$$

$$\frac{dL_S}{dq} = \frac{1}{\Delta}\beta L_S\{2wp_M F_L^2 + \alpha L \lambda_1 F_L^2\} < 0, \tag{56}$$

$$\frac{dw}{dq} = \frac{1}{\Delta}\beta^2 \lambda_2 L_S p_M F_L^2 < 0, \tag{57}$$

$$\frac{dp_M}{dq} = -\frac{1}{\Delta}\beta^2 L_S p_M^2 F_{LL}(F_L - F_{LK}K^*) < 0, \tag{58}$$

$$\frac{\partial e}{\partial u} \cdot \frac{du}{dq} = \frac{dw}{dq} - m\frac{dp_M}{dq}, \tag{59}$$

$$\frac{d\eta}{dq} = -\frac{1+\eta}{w} \cdot \frac{dw}{dq} > 0. \tag{60}$$

Equations (55) and (56) imply that a shift to a more agricultural-good-intensive agritourism sector will reduce the labor input of both manufacturing and tourism industries. The com-

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petitive wage rate and the level of environmental stock will decrease and the urban unemployment ratio will increase. Furthermore, if Assumption 2 is satisfied, the negative first term of RHS (59) dominates the positive second term, leading to the conclusion that the effect on domestic welfare could be negative. Hence, we establish the following proposition.

Proposition 5. *(i) Under Assumption 1, shifting to a more agricultural-good-intensive agritourism industry will reduce the labor input to both manufacturing and agritourism industry. The price of the manufactured good, the competitive wage rate and the natural environmental stock will decrease while the urban unemployment ratio will increase.*
(ii) Under Assumption 1 and 2, shifting to a more agricultural good-intensive agritourism industry will have a negative effect on domestic welfare.

Therefore, under certain conditions, an increase in per capita consumption of agricultural good by foreign tourists in the agritourism industry might reduce the economic welfare as well as the level of natural environment and the urban unemployment ratio. This result comes from the direct effect of a reduction in domestic consumption of the agricultural good generated by an increase in the foreign tourists' consumption.

3.2.3 More environmentally friendly agritourism

Finally, let us consider the situation in which the agritourism industry becomes more environmentally friendly, for example introducing sustainable activities as planting trees. Such a reform will enhance the positive effect of agritourism on natural environment. In our model,

it means that λ_2 would increase. From (24), simple calculations yield

$$\frac{dL_M}{d\lambda_2} = -\frac{1}{\Delta}F_L\alpha L(w+\beta q)\beta L_S > 0, \tag{61}$$

$$\frac{dL_S}{d\lambda_2} = -\frac{1}{\Delta}\beta L_S F_L\{p_M(\alpha L - L_S)F_L + \bar{w}\alpha L F_L\} < 0, \tag{62}$$

$$\frac{dw}{d\lambda_2} = \frac{\beta L_S}{\Delta}\bar{w}(w+\beta q)F_L > 0, \tag{63}$$

$$\frac{dp_M}{d\lambda_2} = \frac{\beta L_S}{\Delta}(w+\beta q)\alpha L p_M F_{LL} > 0, \tag{64}$$

$$\frac{\partial e}{\partial u} \cdot \frac{du}{d\lambda_2} = \frac{dw}{d\lambda_2} - m\frac{dp_M}{d\lambda_2}, \tag{65}$$

$$\frac{d\eta}{d\lambda_2} = -\frac{1+\eta}{w} \cdot \frac{dw}{d\lambda_2} > 0. \tag{66}$$

Equations (61) and (62) imply that shifting to a more environmentally friendly agritourism will enhance the labor input of the manufacturing industry while reducing the labor input of the agricultural industry. The competitive wage rate and the level of environmental stock will increase and the urban unemployment ratio will decrease. Furthermore, if Assumption 2 is satisfied, the positive first term of RHS (65) dominates the negative second term and thus we can conclude the effect on domestic welfare could also be positive. Hence, we establish the following proposition.

Proposition 6. *(i) Under Assumption 1, shifting to a more environmentally friendly agritourism industry will reduce its labor input, while that of the manufacturing industry will increase. The price of manufactured good, the competitive wage rate and the natural environmental stock will grow while the urban unemployment ratio will decrease.*
(ii) Under Assumption 1 and 2, shifting to a more environmentally friendly agritourism industry will enhance the domestic welfare.

Therefore, under certain conditions, a more environmentally friendly agritourism causes positive effects on welfare as well as the level of natural environment. In equilibrium, labor reallocates from the tourism sector to manufacturing leading to a reduction of urban unemployment ratio.

In summary, considering the rapid wide spreading of the agritourism sector, we find that, under certain conditions, improving this industry in terms of technology may cause positive effects on domestic welfare.

4   Concluding Remarks

We have considered how policies in developing countries and improvements in the agritourism sector may affect the economy. We demonstrated that encouraging labor outflow is reasonable for a developing country since it has a positive effect on domestic welfare and the urban unemployment rate. In contrast, the effects of an additional inflow of foreign capital and the adjustment of the fixed minimum wage on welfare in urban areas are not clear. Increasing labor productivity in the agritourism sector by shifting to service-intensive agritourism or introducing more environmentally friendly activities will be beneficial to the economy under certain conditions (i.e., a sufficiently large labor supply and a relatively inflexible competitive wage rate).

There are still aspects that need to be considered since our study only focuses on the supply side of agritourism in a developing economy. In future studies, we should analyze the demand-side of the agritourism sector in greater detail, and consider the case of a developed country to compare the results with those obtained in this study.

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