Abstract: Utilizing a model of a small open economy with tourism, this paper examines the effects of the tourism expansion on prices and foreign reserve. Foreign tourists consume mainly the non-traded goods of the destination, converting formally non-traded goods into exports. This gives a tourism terms-of-trade effect. The expansion of tourism can initially cause an over- or under-adjustment in the non-tradable price, hinging on the tourism terms-of-trade effect. Nevertheless, in the long run, the expansion of tourism raises the price of the non-traded good but the effect on foreign reserve is ambiguous.

Keywords: tourism policy announcement, fixed exchange rate, overshooting

JEL classification: F41
1. Introduction

Tourism is a growing industry in many economies. According to the 2006 annual report of the World Tourism Organization (WTO), tourism is also a major source for earning foreign exchange. The number of international tourist arrivals was 69 million in 1960 and it reached 806 million in 2005, while tourism revenue was US$6 billion in 1960 and jumped to $682 billion in 2005. The recent “Tourism: 2020 Vision” issued by WTO forecasts that 1.6 billion tourists will visit foreign countries annually by the year of 2020, with revenue of US$2 trillion per year. In addition, a 2007 report from the World Travel & Tourism Council indicates that for almost half of 176 countries, tourism is expected to contribute more than 10.4% of GDP and 8.3% of total employment (or 1 for every 12 jobs).

Many countries have made efforts in attracting foreign tourists. For example, in 1995 Nepal planned the tourism policy by naming the year of 1998 as Visiting Nepal Year. The government then conducted a series of tourism measures, including encouragements of foreign investment in tourism fields. Another example is the case of Taiwan. In addition to efforts on negotiation of opening door for Chinese tourists, Taiwan drew up schemes in September, 2006 on the tourism policy of 2008. The schemes reorganize exiting tour itineraries, develop new tour packages and new destinations, establish a tourist service network, launch an international tourist promotion campaign, and develop the MICE (meeting, incentive, conventions and exhibitions) industry.

Foreign tourists visit the countries of destination and consume mainly the locally produced non-traded goods. This converts formally non-tradable goods into exports. A tourism boost change the non-tradable price and hence yields a tourism terms-of-trade effect. The purpose of this paper is to examine the short- and long-run impacts of the tourism expansion on the goods price and the consequent effects on

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1 According to high-ranking officials of Taiwan Affairs Office of the State Council, Taiwan is the top tourist destination where Chinese residents are eager to visit on the basis of investigation on relative aspects. Chinese Culture University Graduate Institute of Tourism Industry pointed that 25 million people in China wish to take a trip in Taiwan.
foreign exchange reserve in the economy.

It is worthwhile to mention the relation between numbers of visitor arrivals and foreign exchange reserve for a few countries. Figure 1 shows changes in growth rate in foreign exchange reserve and visitor arrivals in China from 1982 to 2006. In 1985, the number of visitor arrivals was 38.75% greater than that previous year while foreign exchange reserve was 17.07% lower than that in 1994. In addition, visitor arrivals rate in 1993 inclined 14.96% while foreign exchange reserve rate declined 47.64%. On the contrary, foreign exchange reserve sharply climbed 78.89% in 1995, while the number of visitor arrivals dropped 4.92%. The same phenomenon applies to 2003 while foreign exchange reserve steeply grew 43.26%, the number of visitor arrivals declined 10.41%. It appears if the number of visitor arrivals increases, foreign exchange reserves will decrease, vice versa.

Figure 1. Foreign exchange reserve and visitor arrivals in China

Figure 2 demonstrates the changes in growth rate in foreign exchange reserve and visitor arrivals in Singapore from 1999 to 2006. It is found from Figure 2 that a positive relationship exits between the number of visitor arrivals and foreign exchange reserves during this period except 2003. Accordingly, if the number of
visitor arrivals increases, it will help foreign exchange reserves.

![Figure 2. Singapore foreign exchange reserve and visitor arrivals](image)

**Table 2. Foreign exchange reserve and visitor arrivals (unit : %)**

<table>
<thead>
<tr>
<th></th>
<th>Taiwan (3.8)%</th>
<th>Hong Kong (8.2)%</th>
<th>Indonesia (7.8)%</th>
<th>Singapore (3.9)%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Managed float</td>
<td>Currency board</td>
<td>Independent float</td>
<td>Managed float</td>
</tr>
<tr>
<td>1999</td>
<td>17.55</td>
<td>4.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>0.51</td>
<td>8.82</td>
<td></td>
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<tr>
<td>2001</td>
<td>14.49</td>
<td>7.89</td>
<td></td>
<td>4.61</td>
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<tr>
<td>2002</td>
<td>32.28</td>
<td>5.18</td>
<td>-1.89</td>
<td>20.70</td>
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<tr>
<td>2003</td>
<td>27.82</td>
<td>-24.5</td>
<td>2.41</td>
<td>-6.21</td>
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<tr>
<td>2004</td>
<td>16.99</td>
<td>31.24</td>
<td>-1.89</td>
<td>20.70</td>
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<tr>
<td>2005</td>
<td>4.78</td>
<td>14.50</td>
<td>1.42</td>
<td>7.10</td>
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<tr>
<td>2006</td>
<td>5.08</td>
<td>4.19</td>
<td>4.73</td>
<td>8.10</td>
</tr>
</tbody>
</table>

* WTTC forecasted of total world exports, T & T is expected to generate percentage by the year 2007
* Exchange rate regimes
* Foreign exchange reserve grow rate
* Visitor arrivals grow rate

Source:
- Hong Kong Tourism Board.
- Ministry of Culture and Tourism, Republic of Indonesia.
- Ministry of Transportation and Communications R.O.C.
- Singapore Tourism Board.
Moreover, Table 2 illustrates the growth rate of foreign exchange reserves and the number of visitor arrivals in four countries - Taiwan, Hong Kong, Indonesia and Singapore. In 2003, because of the outbreak of SARS Crisis in Asia, visitors dropped while the foreign exchange reserves rate grew. Since 1999, the figure of foreign visitors to Taiwan has presented a positive growth in Taiwan except 2003. The growth rate of foreign exchange reserves also has shown in a positive way. In 2002, while the number of visitor arrivals declined, the foreign exchanges reserves diminished in Singapore. Apart from 2002, while the number of foreign tourists increased, foreign exchange reserves also increased in Singapore. In respect of Indonesia, the number of tourists decreased but foreign exchange reserves increased in 2002, 2003 and 2006. It indicated that foreign exchange reserves did not decline but a fall in the number of visitors. As for Hong Kong, the figure of visitors grew but foreign exchange reserves fell for all that in 2002. In spite of decrease in the number of visitors, foreign exchange reserves increased in 2003. However, the figure of visitors grew and foreign exchanges reserves increased between 2004 and 2006.

2. The Model

The dynamics of foreign exchange have been extensively examined in the literature. In the Dornbusch (1976) model, market agents form their expectations with regressive formation and policy implementations are unanticipated. Wilson (1979), Gray and Turnovsky (1979) extend the model by considering rational expectations and anticipated policy. In their model, the effects of policy announcements can be studied.

A number of empirical studies (Bordo, 1980) have observed that the price of manufactured products adjust sluggishly, while the agricultural price adjusts instantaneously. The effects of unanticipated monetary policy on the prices of agricultural and manufactured products are examined. Lai, Hu and Wang (1996) extends Frankel (1986) model to discuss policy announcements (anticipated monetary
shocks) on time paths of the agricultural commodity prices and price of manufactured products in the short and the long run. However, in Frankel (1986) and Lai, Hu and Wang (1996) model include agricultural commodities, manufactured, and money markets from a closed economy. As for tourism, we follow Chao et al. (2006) model to construct a dynamics theoretical framework, including tourism (non-traded) good, non-tourism (traded) good, domestic currency and foreign currency markets.

The assumptions of the model are as follows:

(i) The open economy is specified to be small in the sense that it cannot influence foreign interest rates and the foreign prices of its imports.

(ii) There are two types of goods, namely, tourism (non-traded) good and non-tourism (traded) good, in the domestic economy.

(iii) Perfect foresight is assumed in predictions regarding economic variables made by the public.

(iv) Domestic non-tourism (traded) good and foreign non-tourism (traded) good are assumed to be perfect substitutes.

Accordingly, the analytical framework can be described by the following functions:

\[
T^F \left( \frac{\hat{P}^T}{P^T}, \alpha \right) + T^D \left( \frac{P^T}{P^C}, \frac{D + R}{P^C} \right) = T^S \left( \frac{P^T}{P^C} \right); \\
T^F_1 > 0, \quad T^F_2 > 0, \quad T^D_1 < 0, \quad T^D_2 > 0, \quad T^S_1 > 0
\]

(1)

\[
P^C = EP^{C^*}
\]

(2)

\[
L(Y, i) = \frac{D + R}{P}; \quad L_1 > 0, \quad L_2 < 0
\]

(3)

\[
P = \rho P^C + (1 - \rho)P^T; \quad 0 < \rho < 1
\]

(4)

\[
\hat{R} = P^T T^F \left( \frac{\hat{P}^T}{P^T}, \alpha \right) - P^C C \left( \frac{P^T}{P^C}, \frac{D + R}{P^C} \right) + K(i - i^*); \quad C_1 > 0, \quad C_2 > 0, \quad K_1 > 0
\]

(5)

Where \( T^F \) = demand of foreign tourists for domestic’s non-traded good, \( T^D \) = demand of resident for domestic’s non-traded good, \( T^S \) = supply of non-traded
good, \( P_T \) = price of non-traded good, \( \alpha \) = tourist activity (or visitor expenditures), \( P_C \) = price of traded good, \( R \) = foreign reserve, \( D \) = domestic credit, \( E \) = exchange rate (defined as the price of foreign currency in terms of domestic currency), \( P_C^* \) = foreign price of traded good, \( P \) = domestic general price, \( L \) = real money demand, \( Y \) = total output, \( i \) = domestic nominal interest rate, \( C \) = demand of domestic resident for import of trade from foreign, \( i^* \) = foreign nominal interest rate, and an overdot denotes the rate of change with respect to time.

We assume that the price of the non-traded good adjusts instantaneously to clear the non-traded market. Equation (1) is the equilibrium condition for the non-traded good market. It specifies that the sum of consumption demand for resident \((T^D)\), and exports of non-traded good for foreign tourists \((T^F)\) is equal to the supply of non-traded good \((T^S)\). Some points concerning the specification of behavior functions in equation (1) should be addressed here. Firstly, the foreign tourists demand for non-traded good specified as an increasing function of the difference between the yield on non-traded good \(T^P\) and that on \(\alpha\) tourist activity (or visitor expenditures). Secondly, assume that the consumption demand for the non-traded good is homogeneous of degree zero in \(P_T, P_C\), and \((D+R)\), we thus can write that the consumption demand function for non-traded good depends upon the relative price \(\frac{P_T}{P_C}\) and real money balances \(\frac{D+R}{P_C}\). Finally, the supply of non-traded good is specified as an increasing function of the relative price between non-traded and traded goods \(\frac{p_T}{p^c}\).

Equation (2) describes the law of one price, as domestic traded good and foreign traded good are perfectly substitutable goods. Equation (3) is the equilibrium condition for the money market, where the demand for real money balances is specified as an increasing function of total output and a decreasing function of the interest rate. The nominal money supply is the sum of domestic credit and foreign exchange reserves. Equation (4) defines the general price level to be a weighted
average of non-traded good and traded good prices. Equation (5) specifies that under fixed exchange rates, the stock of foreign reserve will change over time with the status of balance of payments, which is the sum of the trade balance and the net capital inflow.

This section examines the evolution of non-traded good prices and the stock of foreign reserve when the economy experiences an anticipated expansion in domestic tourism. We assume that \( P^T = P^C = P = P^{C^*} = 1 \) initially. The foreign interest rate and for foreign price of traded good are exogenous variables and under the fixed exchange rate regime, we assume \( dE^* = dP^{C^*} = dE = 0 \) and set \( dY = 0 \). From equations (1) - (5) can be expressed by the following two differential equations:

\[
\dot{P}^T = F(P^T, R, D, \alpha) \tag{6}
\]

\[
\dot{R} = J(P^T, R, D, \alpha) \tag{7}
\]

where

\[
F_{pT} = \frac{\partial \dot{P}^T}{\partial P^T} = \frac{1}{T_1^F}(T_1^S - T_1^D) > 0 \tag{6a}
\]

\[
F_R = \frac{\partial \dot{P}^T}{\partial R} = -\frac{T_2^D}{T_1^F} < 0 \tag{6b}
\]

\[
F_D = \frac{\partial \dot{P}^T}{\partial D} = -\frac{T_2^D}{T_1^F} < 0 \tag{6c}
\]

\[
F_\alpha = \frac{\partial \dot{P}^T}{\partial \alpha} = -\frac{T_2^F}{T_1^F} < 0 \tag{6d}
\]

\[
J_{pT} = \frac{\partial \dot{R}}{\partial P^T} = T^F(\frac{\dot{P}^T}{P^T}, \alpha) - C_1 - \frac{(1 - \rho)(D + R)K_1}{L_2} + (T_1^S - T_1^D) > 0 \tag{7a}
\]

\[
\text{if } T^F(\frac{\dot{P}^T}{P^T}, \alpha) - \frac{(1 - \rho)(D + R)K_1}{L_2} + (T_1^S - T_1^D) < C_1
\]

\[
J_R = \frac{\partial \dot{R}}{\partial R} = -(C_2 - \frac{K_1}{L_2} + T_2^D) < 0 \tag{7b}
\]

\[
J_D = \frac{\partial \dot{R}}{\partial D} = -(C_2 - \frac{K_1}{L_2} + T_2^D) < 0 \tag{7c}
\]
\[ J_\alpha = \frac{\partial \hat{R}}{\partial \alpha} = 0 \]  

Equations (6) and (7) can be reduced to the following dynamic system:

\[
\begin{bmatrix}
\frac{d\hat{P}^T}{d\hat{R}} \\
\frac{d\hat{R}}{d\hat{R}}
\end{bmatrix} =
\begin{bmatrix}
F_{p^r} & F_R \\
J_{p^r} & J_R
\end{bmatrix}
\begin{bmatrix}
\frac{d\hat{P}^T}{d\hat{R}} \\
\frac{d\hat{R}}{d\hat{R}}
\end{bmatrix} +
\begin{bmatrix}
F_{p^r}dD + F_{\alpha}d\alpha \\
J_{p^r}dD + J_{\alpha}d\alpha
\end{bmatrix}
\]  

(8)

We now turn to discuss the dynamic nature of the system. Letting \( \lambda \) be the characteristic root of the dynamic system, from equation (8) we have the following characteristic equation:

\[ \lambda^2 - \lambda(J_R + F_{p^r}) + (F_{p^r}J_R - F_RJ_{p^r}) = 0 \]  

(9)

It is clear that the two characteristic roots which satisfy equation (9), \( \lambda_1 \) and \( \lambda_2 \), have the following relationship:

\[ \lambda_1 + \lambda_2 = F_{p^r} + J_R \]  

(10a)

\[ \lambda_1\lambda_2 = F_{p^r}J_R - F_RJ_{p^r} \]  

(10b)

As addressed in the literature of dynamic rational expectation models, including Burmeister (1980), Buiter (1984), and Turnovsky (2000), the dynamic system has a unique perfect-foresight equilibrium if the number of unstable roots equals the number of jump variables. Since the dynamic system reported in equations (9) and (10) has one jump variable \( P^T \), in what follows the restriction \( \lambda_1\lambda_2 < 0 \) should be imposed, and hence the dynamic system is assured to display a unique perfect-foresight equilibrium. For expository convenience, we assume that \( \lambda_1 < 0 < \lambda_2 \).

Therefore, we have two cases to discuss:

I. \( J_{p^r} < 0 \)

\[ \lambda_1\lambda_2 = F_{p^r}J_R - F_RJ_{p^r} < 0 \), and \( T^F\left( \frac{\hat{P}^T}{P^T}, \alpha \right) - \frac{(1-\rho)(D + R)K_1}{L_2} + (T_{1^S}^S - T_{1^D}^D) < C_1 \).

II. \( J_{p^r} > 0 \)
\[
\lambda_1 \lambda_2 = F_{p \rho} J_R - F_R J_{p \rho} < 0 . \quad \text{This gives: } \left| F_{p \rho} J_R \right| > \left| F_R J_{p \rho} \right| . \quad \text{That is, } F_{p \rho} J_R < F_R J_{p \rho} ,
\]
and
\[
T^T \left( \frac{\ddot{P}^T}{P^T} , \alpha \right) - \frac{(1 - \rho)(D + R)K_1}{L_2} + (T_1^S - T_1^D) > C_1 .
\]

It follows from equation (8) that the general solution for \( P^T \) and \( R \) can be expressed as:
\[
P^T = \hat{P}^T + A_1 e^{\lambda_1 t} + A_2 e^{\lambda_2 t} \quad (11)
\]
\[
R = \hat{R} + \frac{\lambda_1 - F_{p \rho}}{F_R} A_1 e^{\lambda_1 t} + \frac{\lambda_2 - F_{p \rho}}{F_R} A_2 e^{\lambda_2 t} \quad (12)
\]
where \( A_1 \) and \( A_2 \) are undetermined coefficients. From equations (11) and (12), we can derive the stable branch \( SS \) and the unstable branch \( UU \). The \( SS \) line is associated with the value \( A_2 = 0 \) in equations (11) and (12), and its slope is:
\[
\left. \frac{\partial P^T}{\partial R} \right|_{SS} = \frac{A_1 e^{\lambda_1 t}}{\lambda_1 - F_{p \rho}} A_1 e^{\lambda_1 t} = \frac{F_R}{\lambda_1 - F_{p \rho}} > 0 \quad (13)
\]

One the other hand, the unstable branch \( UU \) is associated with the value \( A_1 = 0 \) in equations (11) and (12), and hence its slope is:
\[
\left. \frac{\partial P^T}{\partial R} \right|_{UU} = \frac{A_2 e^{\lambda_2 t}}{\lambda_2 - F_{p \rho}} A_2 e^{\lambda_2 t} = \frac{F_R}{\lambda_2 - F_{p \rho}} > 0^2
\]

2 Equations (6) and (7) can be rewritten as:
\[
\begin{bmatrix}
\frac{d\hat{R}}{dt} \\
\frac{d\hat{P}^T}{dt}
\end{bmatrix} =
\begin{bmatrix}
J_R & J_{p \rho} \\
J_{p \rho} & F_R
\end{bmatrix}
\begin{bmatrix}
\frac{dR}{dt} \\
\frac{dP^T}{dt}
\end{bmatrix} +
\begin{bmatrix}
J_B dD + J_\alpha d\alpha \\
F_B dD + F_\alpha d\alpha
\end{bmatrix}
\]
\quad (i)
\[
R = \hat{R} + B_1 e^{\lambda_1 t} + B_2 e^{\lambda_2 t} \quad (ii)
\]
\[
P^T = \hat{P}^T + \frac{\lambda_1 - J_R}{J_{p \rho}} B_1 e^{\lambda_1 t} + \frac{\lambda_2 - J_R}{J_{p \rho}} B_2 e^{\lambda_2 t} \quad (iii)
\]
It is clear from equations (ii) and (iii) that the slope of the \( UU \) line is
\[ \text{if } T^F \left( \frac{\dot{p}^T}{p^T}, \alpha \right) - \frac{(1-\rho)(D+R)K_1}{L_2} + (T^I_t - T^D_t) > C_1 \]

It is clear from equation (13) that the slope of the unstable branch \( UU \) may be positive or negative depending upon the tourism terms-of-trade effect to consume import (or the extent of capital mobility). Obviously, the \( UU \) line is upward sloping if the tourism terms-of-trade effect to consume import \( (C_t) \) is relatively high, and the \( UU \) line is downward sloping if the tourism terms-of-trade effect to consume import \( (C_t) \) is relatively low.

The evolution of \( p^T \) and \( R \) can be illustrated by means of a phase diagram. It is clear from equations (8) that the slopes of loci \( \dot{p}^T = 0 \) and \( \dot{R} = 0 \) are:

\[ \frac{\partial p^T}{\partial R} \bigg|_{p^T = 0} = -\frac{F_R}{F_{p^T}} > 0 \]

\[ \frac{\partial p^T}{\partial R} \bigg|_{R = 0} = -\frac{J_R}{J_{p^T}} > 0 ; \quad \text{if } T^F \left( \frac{\dot{p}^T}{p^T}, \alpha \right) - \frac{(1-\rho)(D+R)K_1}{L_2} + (T^I_t - T^D_t) > C_1 \]

Equations (15) and (16) states that the \( \dot{p}^T = 0 \) locus is always upward sloping, while the slope of the \( \dot{R} = 0 \) locus may be positive or negative depending upon the price effect of consuming import good \( (C_t) \) or depending upon the relative size of capital mobility \( K_1 \). The \( \dot{R} = 0 \) schedule is positively sloped if the price effect of \( C_t \) is relatively high, while a negatively-sloped \( \dot{R} = 0 \) locus occurs if the price effect of \( C_t \) is relatively low. The economy logic is: The \( \dot{p}^T = 0 \) locus is always upward sloping. Its reason is domestic demands for the non-traded good, where the demand for non-traded good is specified as an increasing function of real income (include real domestic credit and real foreign exchange reserve). Therefore, increasing foreign exchange reserve will make domestic resident increasing their demand for the

\[ \frac{\partial p^T}{\partial R} \bigg|_{UU} = \frac{\lambda_2 - J_R}{J_{p^T}} > 0 ; \quad \text{if } T^F \left( \frac{\dot{p}^T}{p^T}, \alpha \right) - \frac{(1-\rho)(D+R)K_1}{L_2} + (T^I_t - T^D_t) > C_1 \]
non-traded good. For keeping the equilibrium of the non-traded good, the price \( P^T \) should rise. For the \( \dot{R} = 0 \) locus may be positive or negative: As the rise of foreign exchange reserve will cause the domestic currency supply to increase, equation (3) shows, for keeping the money market balanced, the corresponding domestic interest rate \( i \) must fall. The fall in the domestic interest rate will cause the capital account to reduce on the foreign exchange market (effect i). In addition, the non-traded good price change will be positively related to the international income by the non-traded good (effect ii) and inversely related to the international expenditure from traded good (effect iii).

In other words, for \( (P^T T^F - P^C C) + K(i - i^*) = 0 \), the foreign exchange reserve increases. Effect (i) reduces the capital account, effect (ii) will cause the balance of current account to decrease, but effect (iii) will cause it to increase by the fall in \( P^T \). When the effect of price \( C_i \) is relatively high, effect (iii) is greater than effect (ii), causing the balance of current account to rise. When the effect of price \( C_i \) is relatively higher, the non-trade good price \( P^T \) is inversely related to the balance of current account. The fall in \( P^T \) will make the balance of current account to increase. If the effect of price \( C_i \) is relatively low, the non-traded good price \( P^T \) is positive related to the balance of current account. The decrease in \( P^T \) makes the balance of current account to rise.

Hence, the tourism terms-of-trade effect to consume import \( C_i \) is relatively high, increases in the foreign exchange reserve will cause the capital account to reduce. For maintaining the foreign exchange mark balanced, the balance of current account increases. \( \dot{R} = 0 \) line is negative sloped. On the contrary, if the tourism terms-of-trade effect to consume import \( C_i \) is relatively low, \( R \) increase will cause the capital account to reduce. For maintaining the foreign exchange mark balanced, the balance of current account increases. This causes \( P^T \) to rise and then the \( \dot{R} = 0 \) line is positive sloped.

Figures 3 and 4 depict respectively the phase diagrams associated with a high
price effect \( T^F \left( \frac{\dot{P}^T}{P^T}, \alpha \right) - \frac{(1-\rho)(D+R)K_1}{L_2} + (T_1^s - T_1^d) < C_1 \) and a low price effect \( T^F \left( \frac{\dot{P}^T}{P^T}, \alpha \right) - \frac{(1-\rho)(D+R)K_1}{L_2} + (T_1^s - T_1^d) > C_1 \). As indicated by the arrow direction, we can sketch all possible trajectories. In the phase space plane, the lines \( SS \) and \( UU \) represent the stable and unstable branches, respectively. As exhibited in both figures, the convergent saddle path \( SS \) is always upward sloped, while the divergent branch \( UU \) may be either upward or downward sloped depending upon the effect of price.

Due to the fact that different degrees of the price effect will generate distinct adjustment patterns of non-traded good when the economy experiences an expansion of tourism policy, in what follows we will proceed with two situations: the high and low price effects.

I. High effect of price \( (J_{\rho'} < 0) \)

From equation (13) and (14), the \( \dot{P}^T = 0 \) and \( SS \) loci are both positive. By comparing the slopes of the two further, we can obtain

\[
\left. \frac{\partial P^T}{\partial R} \right|_{\rho' = 0} - \left. \frac{\partial P^T}{\partial R} \right|_{SS} = \frac{F_R}{F_{\rho'}} - \frac{F_R}{\lambda_1 - F_{\rho'}} - \frac{-F_R(\lambda_1 - F_{\rho'}) - F_{\rho'}F_R}{F_{\rho'}(\lambda_1 - F_{\rho'})} = -\frac{F_R}{F_{\rho'}(\lambda_1 - F_{\rho'})} > 0 \quad (17)
\]

Equation (17) indicates that the \( SS \) line locus is flatter than that of the \( \dot{P}^T = 0 \) line. Moreover, the \( \dot{R} = 0 \) and \( UU \) loci are both negative, also comparing the slopes of the two further, we can obtain

\[
\left. \frac{\partial P^T}{\partial R} \right|_{\rho' = 0} - \left. \frac{\partial P^T}{\partial R} \right|_{UU} = -\frac{J_{\rho'}}{J_{\rho'}} - \frac{\dot{\lambda}_2 - J_{\rho'}}{J_{\rho'}} = -\frac{\dot{\lambda}_2}{J_{\rho'}} > 0 \quad (18)
\]

The \( \dot{R} = 0 \) line locus is flatter than that of the \( UU \) line. In the phase space plane, the lines \( SS \) and \( UU \) represent the stable and unstable branches, respectively. As is evident, the trajectories will start from the \( SS \) path, and will asymptotically diverge from the \( UU \) path.
II. Low effect of price \((J_{p^r} > 0)\)

Equations (13), (14), (15), (16), and (17) state that\(^3\)

\[
\frac{\partial P^T}{\partial R}_{U^U} > \frac{\partial P^T}{\partial R}_{R=0} > \frac{\partial P^T}{\partial R}_{P^r=0} > \frac{\partial P^T}{\partial R}_{S^S} > 0
\]  \hspace{1cm} (19)

\(^3\) From equations (13), (14), (15), and (16)

\[
\frac{\partial P^T}{\partial R}_{P^r=0} = -\frac{F_R}{F_{p^r}} + \frac{J_R}{J_{p^r}} = -\frac{F_R J_{p^r} + F_{p^r} J_R}{F_{p^r} J_{p^r}} < 0
\]

\[
\frac{\partial P^T}{\partial R}_{J^J} = -\frac{J_R}{J_{p^r}} - \frac{\dot{\lambda}_2 - J_R}{J_{p^r}} = -\frac{\dot{\lambda}_2}{J_{p^r}} < 0
\]
3. Dynamic Adjustments

This section examines the evolution of non-traded good price and the stock of foreign exchange reserves when the economy experiences an anticipated expansion in domestic tourism policy.

We now analyze the dynamic behavior of the economy, in which at time \( t = 0 \) the government announces that domestic tourism policy will experience a permanent rise from \( \alpha_0 \) to \( \alpha_1 \) at a specific date \( t = T \) in the future. In what follows \( 0^+ \) denotes the instant after the government makes the announcement, while \( T^- \) and \( T^+ \) denote the instant before and after domestic credit expansion.

From equation (8), we have

\[
\frac{\partial P^T}{\partial \alpha} \bigg|_{\dot{P}^T=0} = -\frac{F_{\alpha}}{F_{P^T}} > 0 \tag{20}
\]

\[
\frac{\partial R}{\partial \alpha} \bigg|_{\dot{R}=0} = -\frac{J_{\alpha}}{J_R} = 0 \tag{21}
\]
The above equations indicate that, following an increase in the tourism activity or visitor expenditure, the \( \hat{P}^T = 0(\alpha_0) \) line will shift upwards to \( \hat{P}^T = 0(\alpha) \) and the \( \hat{R} = 0 \) line will not be influenced.

At the long-run equilibrium, \( \hat{P}^T = \hat{R} = 0 \), whereas \( P^T \) and \( R \) are at their stationary levels, namely \( \hat{P}^T \) and \( \hat{R} \). It follows from equation (8) that:

\[
\begin{bmatrix}
F_{\alpha} & F_R \\
J_{\alpha} & J_R
\end{bmatrix}
\begin{bmatrix}
dP^T \\
dR
\end{bmatrix}
= 
\begin{bmatrix}
-F_\alpha dD - F_\alpha d\alpha \\
-J_\alpha dD - J_\alpha d\alpha
\end{bmatrix}
\tag{22}
\]

By using the Cramer’s rule, we have the following long-run relationships:

\[
\frac{\partial \hat{P}^T}{\partial \alpha} = \frac{-F_\alpha J_R + F_R J_\alpha}{F_{\alpha}J_R - F_R J_{\alpha}} > 0 \tag{23}
\]

\[
\frac{\partial \hat{R}}{\partial \alpha} = \frac{-F_{\alpha}J_R + F_R J_{\alpha}}{F_{\alpha}J_R - F_R J_{\alpha}} < 0 \tag{24}
\]

\[
\text{if } T^T\left(\frac{\hat{P}^T}{P^T}, \alpha\right) - \frac{(1-\rho)(D+R)K}{L_2} + (T^S_i - T^D_i) > C_i
\]

From equations (23) and (24), the expansion of tourism unambiguously raises the prices of the non-traded goods, but the effect on foreign exchange reserve is uncertain. The foreign exchange reserves may be increased or decreased, depending upon the size of the tourism terms-of-trade effect to consume import (\( C_i \)).

I. High price effect (\( J_{\alpha} < 0 \))

Figure 5 illustrates the situation where the tourism terms-of-trade effect to consume import (\( C_i \)) is relatively high. Assume that the initial equilibrium, where \( \hat{p}^T = 0(\alpha_0) \) intersects \( \hat{R} = 0 \), is at \( E_0 \). Here, the initial non-traded good price and foreign exchange reserves are \( p_0^T \) and \( R_0 \), respectively. Upon a permanent shock of tourism, \( \hat{p}^T = 0(\alpha_0) \) shifts upwards to \( \hat{p}^T = 0(\alpha) \), and intersects \( \hat{R} = 0 \) at point \( E_i \), with \( p_i^T \) and \( R_i \), respectively. The new long-run equilibrium is established at point \( E_i \), where the \( p_i^T = 0(\alpha) \) curve intersects \( \hat{R} = 0 \). As exhibited in the figure, the new
stationary foreign exchange reserves $R_i$ are less than their initial level $R_0$, while the new stationary non-traded good price moves up to $p^T_1$.

Before we proceed to study the dynamic adjustment of the economy, two points should be addressed. Firstly, during the time interval between $0^-$ and $T^-$, domestic tourism policy does not yet change and thus point $E_0$ should be treated as the reference point to govern the dynamic adjustment of $P^T$ and $R$. Secondly, as domestic credit increases from $\alpha_0$ to $\alpha_1$ at the moment of $T^+$, the economy should move to a point on the stable branch $SS(\alpha_1)$ at that instant of time to ensure that the system will be convergent. Based on these considerations, in Figure 3, at time $0^+$, non-traded good price will rise instantly from $P^T_0$ to $P^T_1$, while foreign exchange reserves remain intact at their initial level $R_0$, and the economy will correspondingly jump from point $E_0$ to $E_1$. Since point $E_1$ lies vertically above $E_0$, from $0^+$ to $T^-$, as the arrows indicate, $P^T$ continues to rise and $R$ continues to decline, and the economy moves from $E_0$ to $E_1$. At time $T^+$, as an expansion in domestic tourism is enacted, the economy exactly reaches the point $E_1$ on the convergent saddle path $SS(\alpha_1)$. Subsequently, from $T^+$ onwards, $P^T$ begins to fall and $R$ continues to decline as the economy moves along the $SS(\alpha_1)$ locus towards its new stationary equilibrium $E_1$. A conclusion can be drawn in Figure 5 that rising non-trade good price accompany an accumulation of foreign exchange reserves during the dates prior to domestic tourism expansion, while rising non-trade good price are matched by a decrease in foreign exchange reserves after policy implementation.
The announcement of a policy related to the rage of beating involves looking closely to the time lag to do with the execution time \( T \). Then foreign exchange reserves monotonically continue to go down, and the non-traded good price rises after falling, in the short run, if \( T \) is small, the phenomenon of overshooting may occur. As to Figure 5, \( \dot{P}(\alpha_i) \) is \( P_t^r \), if \( P_t^r - P_t^r > 0 \), at express time \( 0^+ \), the beating of the exchange rate will lie between a certain point between path (i), such as \( E_{0^+} \), the overshooting phenomenon is that there is a short-run at this moment.

II. Low price effect \( (J_{p^r} > 0) \)

Figure 6 illustrates the situation where the terms-of-trade effect for consuming import good \( (C_1) \) is relatively low. Following the similar description as that in Figure 5, at the instant \( 0^+ \), the economy will jump from point \( E_{0^-} \) to \( E_{0^+} \).
Since point $E_{0e}$ lies vertically above point $E_{0e}$, from $0^+$ to $T^-$, as the arrows indicate, both $P^T$ and $R$ continues to rise, and the economy moves from $E_{0e}$ to $E_T$. At time $T^+$, when an expansion in domestic tourism comes into force, the economy exactly reaches point $E_T$ on the convergent saddle path $SS(\alpha_i)$. At time $T^+$, when an expansion in domestic tourism comes into force, the economy exactly reaches point $E_T$ on the convergent saddle path $SS(\alpha_i)$. From $T^+$ onwards, both $P^T$ and $R$ continues to rise as the economy moves along the $SS(\alpha_i)$ locus towards its new stationary equilibrium $E_1$. A conclusion drawn in Figure 6 is that the non-traded good price rises with an increase in foreign exchange reserves during the dates prior to domestic tourism expansion, while both the non-traded good price and foreign exchange reserves are monotonically continues to go up after policy implementation.

Figure 6. The dynamic behavior of the economy under low effect of price
A sharp distinction displayed in both Figure 5 and Figure 6 is that, during the dates prior to domestic tourism expansion (i.e., from \(0^+\) to \(T^-\)), the non-traded good price rises with either a de-accumulation of foreign reserves under the high price effect or an accumulation of foreign reserves under the low price effect. The economic reasoning for this difference is not hard to understand. Given that perfect foresight has a forward-looking feature, as indicated in Figures 5 and 6, an announcement of tourism expansion will cause non-traded good price to rise at the instant of receiving new information \(0^+\). Given that domestic tourism does not as yet increase at the instant \(0^+\), the discrete rise in \(P^T\) unambiguously will lead to a rise in the interest rate to clear the money market. The increased interest rate tends to improve the capital account (effect i). On the other hand, the increased non-traded good price causes a rise in \(\frac{P^T}{P^C}\). The rise in \(P^T\) has a positive effect on the production of the non-traded product \(P^T T^F\) (effect ii) and has a negative effect on the demand for the traded good \(C_1\) (effect iii), and a negative effect on the demand for the traded good \(C_2\) (effect iv).

For maintaining the foreign exchange mark balanced, the increase in the capital account causes the current account to decline. When the tourism terms-of-trade effect to consume import \((C_1)\) is relatively high (international capital mobility \((K_1)\) is relatively low), effect ii make the international income to rise, effect iii will cause current account to fall, the effect iv will increases the current account (foreign exchange reserve reduce), then the foreign exchange will maintain balanced. In Figure 5, it describes that the price effect is relatively high, the expansion of tourism can cause the price of the non-traded good to rise and the foreign exchange reserve to fall. Otherwise, if the price effect on \(C_1\) is relatively low (international capital mobility \((K_1)\) is relatively high), effect iii will cause the current account to fall, the effect iv will reduce the current account (foreign reserve increase). The foreign exchange will maintain balanced. In Figure 6, it describes that the price effect is relatively high, the expansion of tourism can cause the price of the non-traded good and foreign exchange reserve to rise.
4. Concluding Remarks

Utilizing a dynamic model, this paper has examined the short- and the long-run effects of an expansion of tourism on the prices and foreign exchange reserve for a small open economy. In the paper, we find:

1. The prices of the non-traded good will jump and may appear overshooting. Foreign exchange reserves will reduce at the instant of the policy announcement when the tourism terms-of-trade effect is relatively large. In the long run, the expansion of tourism unambiguously raises the price of the non-traded good, but the effect is opposite on foreign reserve.

2. The expansion of tourism raises the price of the non-traded good and foreign reserve when the tourism terms-of-trade effect is relatively small. In addition, the price of the non-traded good will jump but overshooting will not occur at the moment of the policy announcement.

3. The price adjustments of the non-traded good exhibit various dynamic patterns, including undershooting and overshooting, depending on time lags between the policy announcement and its implementation when the degree of capital mobility is relatively small. However, undershooting may occur when the degree of capital mobility is relatively large.

References


Modeling,” *Journal of Money, credit, and Banking* 12: 800-812.


World Travel & Tourism Council, 2007, “Executive Summary 2007”.

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