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## Tourism, Trade and Domestic Welfare

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# **Tourism, Trade and Domestic Welfare**

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# Tourism, Trade and Domestic Welfare

## Summary

Tourism has been regarded as a major source of economic growth and a good source of foreign exchange earnings. Tourism has also been considered as an activity that imposes costs on the host country. Such costs include increased pollution, congestion and despoliation of fragile environments and intra-generational inequity aggravation. One aspect that has been ignored is the general equilibrium effects of tourism on the other sectors in the economy. These effects can be quite substantial and should be taken into account when assessing the net benefits of a tourism boom on an economy. This paper presents a model which captures the interdependence between tourism and the rest of the economy, in particular agriculture and manufacturing. We examine the effect of a tourist boom on structural adjustment, commodity and factor prices and more importantly resident welfare. An important result obtained is that the tourist boom may “immiserize” the residents. This occurs because of two effects. The first, a favourable effect due to an increase in the relative price of the non-traded good which is termed the secondary terms of trade effect. The second, a negative effect due to an efficiency loss that occurs in the presence of increasing returns to scale in manufacturing. If this second effect outweighs the first effect, resident immiserization occurs.

**Keywords:** Tourism, Trade welfare

**JEL Classification:** F10, F22

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## **1. Introduction**

Tourism has often been regarded as a major source of economic growth. Various governments often invest in infrastructure to promote tourism and growth<sup>1</sup>. Tourism supplements the foreign exchange earnings already derived from trade in commodities and sometimes finances the imports of the capital goods necessary for the growth of the manufacturing sector<sup>2</sup>. Tourism has also been regarded as a mechanism for generating increased income and employment both in the formal and informal sectors<sup>3</sup>. Hazari and Ng (1993) have also highlighted important differences between trade in commodities and tourism<sup>4</sup>. However, international tourism has also at times been considered an activity that imposes costs on the host country. Much attention in this context has been paid to inflationary and low multiplier effects of tourism expansion<sup>5</sup>, increased pollution, congestion and despoilation of fragile environments<sup>6</sup>, intra-generational inequity aggravation<sup>7</sup> and even to adverse sociocultural impacts<sup>8</sup>. Less obvious but more important costs of tourism have often been neglected such as the adverse impacts of a tourism boom on other sectors resulting from general equilibrium effects. However, theoretical and empirical studies tell us that these effects can be quite substantial and have to be taken into account when assessing the net benefit of a tourism boom on an economy<sup>9</sup>.

The model used in this paper captures the interdependence and interaction between tourism and the rest of the economy; in particular, agriculture and manufacturing. This is important in view of the public debate on the effects of tourism as it highlights the problem of competition for

resources between two export-earning activities, agriculture and tourism. Furthermore, there is a concern as to whether tourism promotes or hinders the development of the manufacturing sector. Moreover, it is important to examine the welfare effects of tourism.

Specifically a tourist boom and its consequences are examined in a three-sector model of trade consisting of two internationally traded and one non-traded good. An important feature of the model is that the manufacturing good is produced with increasing returns to scale while the other goods are produced under constant returns to scale. A large proportion of a tourist's consumption is generally of non-traded goods and services and this consumption interacts with other sectors in a general equilibrium setting. Using this model, we analyse the effect of a tourism boom on structural adjustment, commodity and factor and product prices and most importantly resident welfare. An important result obtained is that the tourist boom may "immiserize" the residents. This occurs because of two effects. The first, a favourable effect due to an increase in the relative price of the non-traded good which is termed the secondary terms of trade effect. The second, a negative effect due to an efficiency loss that occurs in the presence of increasing returns to scale in manufacturing. If this second effect outweighs the first effect, resident immiserization occurs<sup>10</sup>.

## **2. The Model**

Our analysis uses a hybrid of the Ricardo-Viner-Jones (RVJ) and Heckscher-Ohlin (H-O) models under the assumption of full employment. The economy consists of three sectors; one a non-traded goods sector producing  $X_N$ , an agricultural sector producing an

exportable  $X_A$ , and a manufacturing sector producing an importable  $X_M$ . Assuming a small open economy, the terms of trade are given exogenously. It is assumed that commodities  $X_j$  ( $j=N,A$ ) are produced under constant returns to scale and  $X_M$  with increasing returns to scale. The production functions for the agriculture and non-traded goods sectors can be written as follows:

$$X_j = F_j(L_j, T_j) \quad j = A, N \quad (1)$$

where  $L_j$  and  $T_j$  represent allocations of labour and land respectively utilized in the  $j^{\text{th}}$  sector<sup>11</sup>.

These production functions exhibit positive and diminishing marginal products.

In the manufacturing sector, the production functions for a typical firm and the industry as a whole are as follows<sup>12</sup>:

$$x_M^i = g_M^i(X_M) F_M^i(l_M^i, k_M^i) \quad i = 1, 2, \dots, N \quad (2a)$$

and

$$X_M = G_M(L_M, K_M) = g_M(X_M) F_M(L_M, K_M) \quad (2b)$$

where  $x_M^i$  is a typical firm's output of the manufactured good,  $X_M$  is the total output in the manufacturing sector;  $l_M^i$  and  $k_M^i$  are labour and capital respectively employed by a typical firm in this sector;  $L_M$  and  $K_M$  are the total labour and specific capital employed in this sector. The increasing returns to scale in our model are output-generated and are external to the firm and internal to the industry. These assumptions ensure that perfect competition prevails at the

firm level and that the economy will produce along its social transformation curve. Also note that the production function for the manufacturing sector,  $X_M$ , is multiplicatively separable

The production function  $F_M$  in equation (2b) is linearly homogenous in inputs. The increasing returns to scale are captured by the term  $g_M(X_M)$  which is a positive function defined on the open interval  $]0, +\infty[$  and is twice differentiable. This type of increasing returns to scale is “neutral” in the sense that the capital intensity used in production is independent of the scale of production. It is assumed that  $X_M$  is homothetic in  $L_M$  and  $K_M$ .

Using the production function  $X_M$  defined in equation (2b), the rate of returns to scale,  $e_M$ , is specified below:

$$e_M = (dg_M/dX_M) \cdot (X_M/g_M) = F_M(L_M, K_M)g'_M(X_M) \quad (3)$$

where  $e_M$  is defined over the open interval  $]0, 1[$  in the case of increasing returns.

The full employment conditions can be specified as follows:

$$a_{LA} X_A + a_{LN} X_N = L_{AN} = \bar{L} - L_M \quad (4)$$

$$a_{TA} X_A + a_{TN} X_N = \bar{T} \quad (5)$$

$$a_{LM} X_M = L_M \quad (6)$$

$$a_{KM} X_M = K_M = \bar{K} \quad (7)$$

where the  $a_{ij}$ 's denote the variable input coefficients.  $L_{AN}$  the amounts of labour in the agriculture and non-traded goods sectors and  $L_M$  is the amount of labour used in the manufacturing sectors,  $\bar{L}$ ,  $\bar{T}$  and  $\bar{K}$  are the inelastically supplied factors labour, land and capital respectively. Note that the subset of sectors A and N forms a Heckscher-Ohlin structure with an endogenous labour supply [equations (4) and (5)]. The endogenous labour supply  $(\bar{L} - L_M)$  is determined by the amount of labour used in the manufacturing sector<sup>13</sup>. There is an RVJ structure between this subset and the manufacturing sector.

Under the assumption of profit maximization, interior solution and competitive markets, the price side of our model is as follows:

$$a_{LA} w + a_{TA} t = 1 \quad (8)$$

$$a_{LN} w + a_{TN} t = P_N \quad (9)$$

$$a_{LM} w + a_{KM} r = P \quad (10)$$

where  $P_N$  and  $P$  are the relative price of the non-traded and manufactured good respectively;  $w$ ,  $t$  and  $r$  are the wage rate, rental on land and the rental on capital. The agriculture good has been chosen as the numeraire. Assuming a small open economy, the terms of trade,  $P$ , is given. The relative price of the non-traded good,  $P_N$ , is determined domestically by the forces of demand and supply.

The quasi-concave aggregate utility function for the residents is as follows:



$$U = U(D_A, D_M, D_N) \quad (11)$$

where  $D_j$ , ( $j = A, M, N$ ) denotes the demand for the agriculture, manufactured and non-traded goods respectively by the residents.

Given utility maximization, it follows (from the equilibrium conditions) that:

$$\frac{\partial U}{\partial D_A} = \frac{1}{P_M} \frac{\partial U}{\partial D_M} = \frac{1}{P_N} \frac{\partial U}{\partial D_N} \quad (12)$$

where  $\frac{\partial U}{\partial D_j}$  ( $j = A, M, N$ ) denotes marginal utility.

The demand for the non-traded good consists of resident demand ( $D_N$ ) and tourist demand ( $D_{NT}$ ) which can be written as follows:

$$D_N = D_N(P, P_N, Y) \quad (13)$$

$$D_{NT} = D_{NT}(P, P_N, \Delta) \quad (14)$$

where  $Y$  is resident income and  $\Delta$  is a variable that captures foreign income and other exogenous domestic amenities such as indigenous culture, fashion, special events and so on that distinguish tourist attractions in one country from another. All goods in consumption are substitutes and normal. We assume that  $\frac{\partial D_{NT}}{\partial \Delta} > 0$  so that a tourist boom in our model is captured by an exogenous increase in  $\Delta$ .

The market clearing conditions for the non-traded good and the resident budget constraint are as follows:

$$D_N + D_{NT} = X_N \quad (15)$$

$$Y = P X_M + P_N X_N + X_A = P_N D_N + P D_M + D_A \quad (16)$$

It is useful to represent the above model by using two diagrams, which highlight the interaction among the sectors and the factors of production. We represent the initial equilibrium of the model in Figure 1 where in quadrant II, the unit cost function for the agricultural sector is drawn as a  $P_A$  in the space  $(w, t)$ . Also shown are the iso-cost curves for the agriculture (given  $P_A = 1$ ) and non-traded goods sector  $P_N^0$ . These curves are drawn under the assumption that the non-traded goods sector is labour intensive.

Given a solution for  $P_N$  from the non-traded good market (see Figure 2, quadrant II), we can determine the equilibrium values of  $w$  and  $t$  as shown by  $w^0$  and  $t^0$ . In quadrant I, we have the isocost curve for the manufacturing sector  $P$  whose price is internationally given for the small country case. The equilibrium solution for  $w^0$  also determines the equilibrium value of  $r$  as shown by  $r^0$ .

In quadrant III, the curve  $aa'$  is the marginal product of labour curve in the manufacturing sector. The mathematical conditions necessary for this case are derived in the section III. Generally the marginal product curve for an increasing returns to scale technology can have any

shape [Panagariya (1986)]. From quadrant III, the equilibrium value  $w^o$  enables us to determine the employment level  $L_M^0$  in the manufacturing sector. Since  $OL_M^0$  of total labour supply is used in the manufacturing sector, the residual  $\bar{L} - OL_M^0$  determines the supply of labour for the other two sectors,  $L_{AN}^0$ .

Given this residual supply  $L_{AN}^0$  and the quantity of land,  $\bar{T}$ , we can draw the Edgeworth-Bowley box in quadrant IV of Figure 1. Also illustrated is the contract curve  $O_A O_N^o$  drawn under the assumption that the non-traded good sector is labour intensive. Given the equilibrium wage/rental ratio on land determined in quadrant II, we can identify the point  $D^0(X_A^0, X_N^0)$  on the contract curve which determines the allocation of labour and land between the two sectors, agriculture and non-traded goods. From the factor allocation in quadrant IV of Figure 1, we can derive the production possibility curve  $Z^0 Z^0{}^1$  for goods  $X_A$  and  $X_N$  in quadrant I of Figure 2, given the quantity of labour  $L_{AN}^0$ .<sup>7</sup> In quadrant II of Figure 2, we have drawn the tourist demand curve  $D_{NT}$  and the non-traded good supply curve  $X_N$ . Note that for illustrative purposes only, we have made the simplifying assumption that residents do not consume the non-traded good. The actual results in the model presented in the following section are derived for the general case of both resident and tourist demand for the non-traded good. The equilibrium price and quantity are shown as  $P_N^0$  and  $X_N^0$ . In quadrant I, given  $P_N^0$ , we can determine the production point  $F^0(X_A^0, X_N^0)$  while in quadrant III, we have the demand ( $D_M^0$ ) and private ( $pmc_M$ ) and social ( $smc_M$ ) marginal cost curves for the manufacturing sector. Note that the axes

are labelled  $X_M, D_M$  and  $P$ . Given the international price  $P$ , to satisfy the demand  $D_M^0$ , we import  $D_M^0 - X_M^0$  of the manufacturing good. Due to the increasing returns to scale technology in this sector, the social marginal cost curve is below the private marginal cost curve, giving rise to a welfare loss represented by the shaded area. While in quadrant IV, we determine resident welfare. The national income budget line is represented by the line  $Y^0Y^{01}$  while its slope is determined by the relative price ratio  $P$ . The vertical intercept of this budget line  $OY^0$  is made up of the sum of  $X_A^0 + P_N^0 X_N^0 + P X_M^0$ , the values of which can be read from quadrant I and III. Also illustrated in quadrant I of Figure 2 is  $OY_{AN}^0$  which represents the income generated in the Heckscher-Ohlin subset of the economy. Given the resident utility function  $U$  defined in equation (11), with the restriction that resident consumption of the non-traded good is zero, we can determine the social indifference curve  $U_0$  with equilibrium at  $G^0$ . Note that the  $G^0$  includes the imports  $D_M^0 - X_M^0$  of the manufactured good derived in quadrant III.

### 3. Results

In this section, we present the implications of a tourist boom on relative prices, outputs, factor incomes and resident welfare. The tourism boom is captured by change in  $\Delta$  in equation (14).

By totally differentiating the cost equations (8) and (9) which make up the Heckscher-Ohlin bloc, we obtain the standard Stolper-Samuelson result:

$$\hat{w} = \frac{\mathbf{q}_{TA}}{|\mathbf{q}|} \hat{P}_N \quad (17)$$

Figure 1

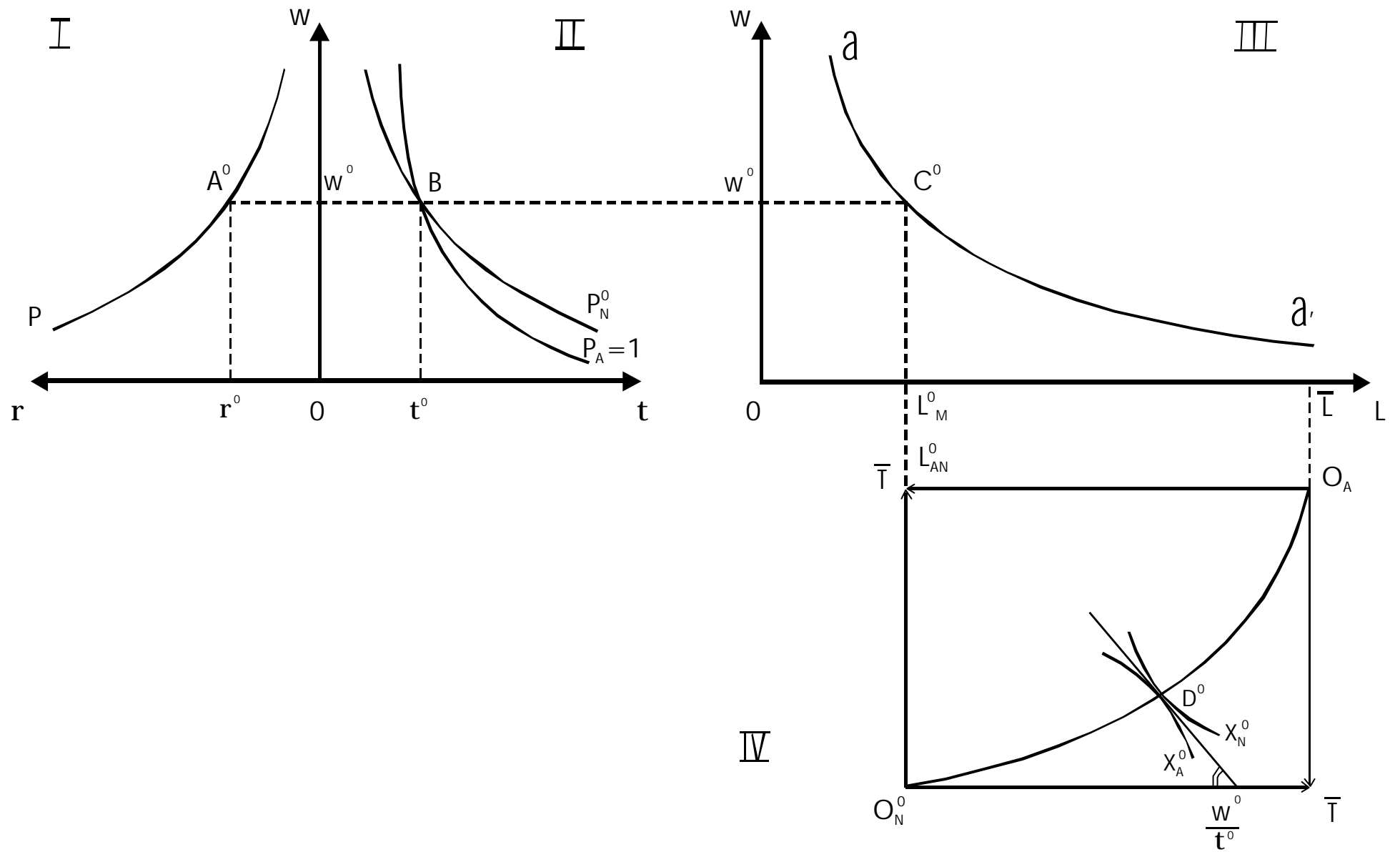
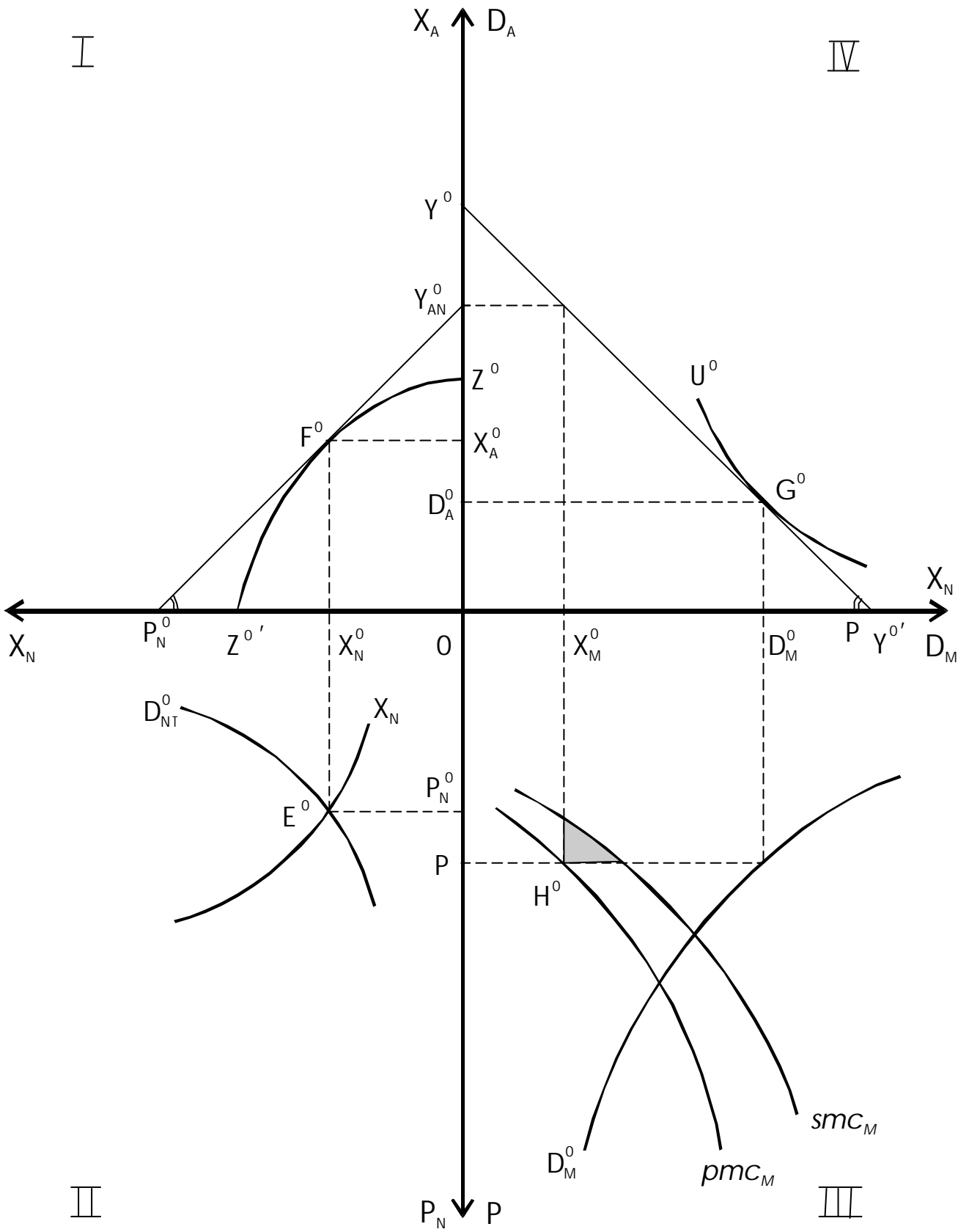


Figure 2



$$\hat{t} = -\frac{\mathbf{q}_{LA}}{|\mathbf{q}|} \hat{P}_N \quad (18)$$

where the  $\mathbf{q}_{ij}$ 's are the cost shares, the  $(\wedge)$  notation denotes relative changes and  $|\mathbf{q}| = \mathbf{q}_{LN} - \mathbf{q}_{LA} = \mathbf{q}_{TA} - \mathbf{q}_{TN}$  describes the labour/land factor intensity which is positive for the case where the non-traded good is labour intensive vis-à-vis the agriculture good. Thus if the price of  $\hat{P}_N$ , the non-traded good, rises,  $w$ , the price of the factor used intensely in its production, rises and  $t$  falls.

Totally differentiating (2b), (10), using (3) and after some manipulation, we obtain

$$e_M \hat{X}_M = \mathbf{q}_{LM} \hat{w} + \mathbf{q}_{KM} \hat{r} \quad (19)$$

From equation (7), and (17) – (19) above, we obtain the following expression for  $\hat{X}_M$  :

$$\hat{X}_M = -\mathbf{f}_M \hat{P}_N \quad (20)$$

where  $\mathbf{f}_M = \frac{\mathbf{q}_{LM} \mathbf{q}_{TA}}{(1 - e_M) \mathbf{x}_M |\mathbf{q}|}$ ,  $\mathbf{x}_M = \left( \frac{e_M}{1 - e_M} \right) \mathbf{q}_{LM} - \frac{\mathbf{q}_{KM}}{\mathbf{s}^M}$  and  $\mathbf{s}^j$  is the elasticity of substitution between the primary factors in sector  $j$ . The term  $\mathbf{x}_M$  is the elasticity of the marginal physical product of labour with respect to a change in labour in  $X_M$  and is assumed to be negative for stability<sup>14</sup>.

From equation (6) and (20), we obtain the following expression for change in the labour demand in the manufacturing sector:

$$\hat{L}_M = -\frac{\mathbf{q}_{TA}}{|\mathbf{q}|(\mathbf{x}_M)} \hat{P}_N \quad (21)$$

By using equation (21), we have the change in the labour supply for the agriculture and non-traded goods sectors:

$$\hat{L}_{AN} = -\frac{\mathbf{m}_M}{\mathbf{m}_{AN}} \frac{\mathbf{q}_{TA}}{|\mathbf{q}|(\mathbf{x}_M)} \hat{P}_N \quad (22)$$

where  $\mathbf{m}_j$ , ( $j = M, AN$ ) is the labour share in  $j$ , e.g.  $\mathbf{m}_{AN} = \frac{L_{AN}}{L}$ .

From the full employment conditions in the Heckscher-Ohlin subset [equations (4), (5)] and (22), we obtain the following output changes for sectors  $X_A$  and  $X_N$ .

$$\hat{X}_A = -\mathbf{f}_A \hat{P}_N \quad (23)$$

$$\hat{X}_N = \mathbf{f}_N \hat{P}_N \quad (24)$$

where  $\mathbf{f}_j = \left[ (\mathbf{I}_{Li} \wp_T + \mathbf{I}_{Ti} \wp_L) - \mathbf{I}_{Ti} \frac{\mathbf{m}_M}{\mathbf{m}_{AN}} \frac{\mathbf{q}_{TA}}{\mathbf{x}_M} \right] \frac{1}{|\mathbf{q}||\mathbf{I}|}$ ,  $i, j = A, N$ ,  $i \neq j$ . The term

$\mathbf{f}_j$  is the price elasticity of supply in sector  $j$ ;  $\mathbf{I}_{Li}$  and  $\mathbf{I}_{Ti}$  are factor shares defined in



sectors  $X_A$  and  $X_N$ . For example,  $I_{LA} = \frac{L_A}{L_{AN}}$ ,  $I_{TN} = \frac{T_N}{T}$ .

Note that  $|I| = I_{LN} - I_{TN} = I_{TA} - I_{LA}$  has the same sign as  $|q|$  since there are no distortions in the labour market.  $\varphi_i, i = T, L$  is the elasticity of factor  $i$  in sector A and N with respect to  $(t/w)$  at constant outputs and factor endowments.

From the full employment condition (4), (6), (7), the production function (2b), and using the definition of  $e_M$ , we obtain the following relationship between the slope of the production possibility surface and relative prices:

$$dX_A + P_N dX_N + P_M dX_M = e_M dX_M \quad (25)$$

Note that due to the presence of a distortion (here as increasing returns to scale), there is a non-tangency between the production possibility surface and relative prices.

Using equations (11), (12), (16) and (25) we obtain the following expression for the change in resident welfare:

$$\hat{y} = g_N \hat{D}_N + g_M \hat{D}_M + g_A \hat{D}_A = y \hat{P}_N \quad (26)$$

where  $y = \left[ d_{NT} + \left( \frac{e_M}{1-e_M} \right) \frac{q_{TA}}{|q|} \frac{d_M q_{LM}}{x_M} \right] \begin{matrix} < \\ > \end{matrix} 0$ ,

$\mathbf{d}_{NT}$  is the share of international tourist demand in national income, and  $\mathbf{d}_M$ , is the share of manufacturing output in national income.

By differentiating (13) – (15), we obtain:

$$\hat{X}_N = \hat{D}_{NT} \mathbf{a}_{NT} + \hat{D}_N \mathbf{a}_N \quad (27)$$

where  $\mathbf{a}_N = \frac{D_N}{X_N}$ ,  $\mathbf{a}_{NT} = \frac{D_{NT}}{X_N}$

$$\hat{D}_{NT} = -\mathbf{e}_{NT} \hat{P}_N + \mathbf{b}_{NT} \hat{\Delta} \quad (28)$$

$$\hat{D}_N = -\mathbf{e}_N \hat{P}_N + \mathbf{h}_N \hat{y} \quad (29)$$

where  $\mathbf{e}_i > 0, (i = N, NT)$  is the compensated price elasticity of demand,  $\mathbf{h}_N$  is the resident income elasticity of the non-traded goods and  $\mathbf{b}_{NT}$  measures the sensitivity of the tourist demand to the tourist shock.

Using (24), (26)-(29) we obtain:

$$\hat{P}_N = (\mathbf{a}_{NT} \mathbf{b}_{NT} / \Omega) \hat{\Delta} \quad (30)$$

where  $\Omega = f_N + a_{NT} e_{NT} + a_N e_N - a_N e_N \Psi$  is the excess supply elasticity of the non-traded good in general equilibrium and is positive for stability in this market.

From the above equations, we are now able to describe the consequences of an increase in tourism on the key variables.

Irrespective of the labour intensity of the non-traded goods sector, its price and output always increase and the output of the agricultural sector falls. In our model,  $P_N$  can be interpreted as the relative price of an export and hence its increase is, in fact, an improvement in the terms of trade.

The response of the other key variables depends on the labour intensity of the non-traded goods sector. If this sector is labour intensive ( $q > 0$ ), the wage rate increases and both the rental on land and capital fall. Due to the wage increase (and resultant increase in costs), the output of the manufacturing sector falls. Note that the tourist expansion comes at a cost to the manufacturing sector. Moreover as the manufacturing output was already sub-optimal at the initial market equilibrium (due to the increasing returns to scale), this decrease in output worsens the welfare loss (second term in square brackets of  $\Psi$  in (26)). This welfare loss can outweigh the welfare gain [captured by  $d_{NT}$  in  $\Psi$  in (26)] due to the terms of trade effect [ $\hat{P}_N > 0$ ]. Hence resident welfare (income) may fall as a result of the increase in tourism.

If the non-traded goods is land intensive ( $|q| < 0$ ), the wage rate falls, the rental on capital and land rise and the outputs of both  $X_M$  and  $X_N$  rise. Hence, the expansion in tourism helps the development of the manufacturing sector. Resident welfare (income) rises as both the effects referred to above are positive. That is, the terms of trade effect is still favourable while the expansion of the manufacturing sector reduces the welfare loss at the market equilibrium<sup>15</sup>.

Figure 3

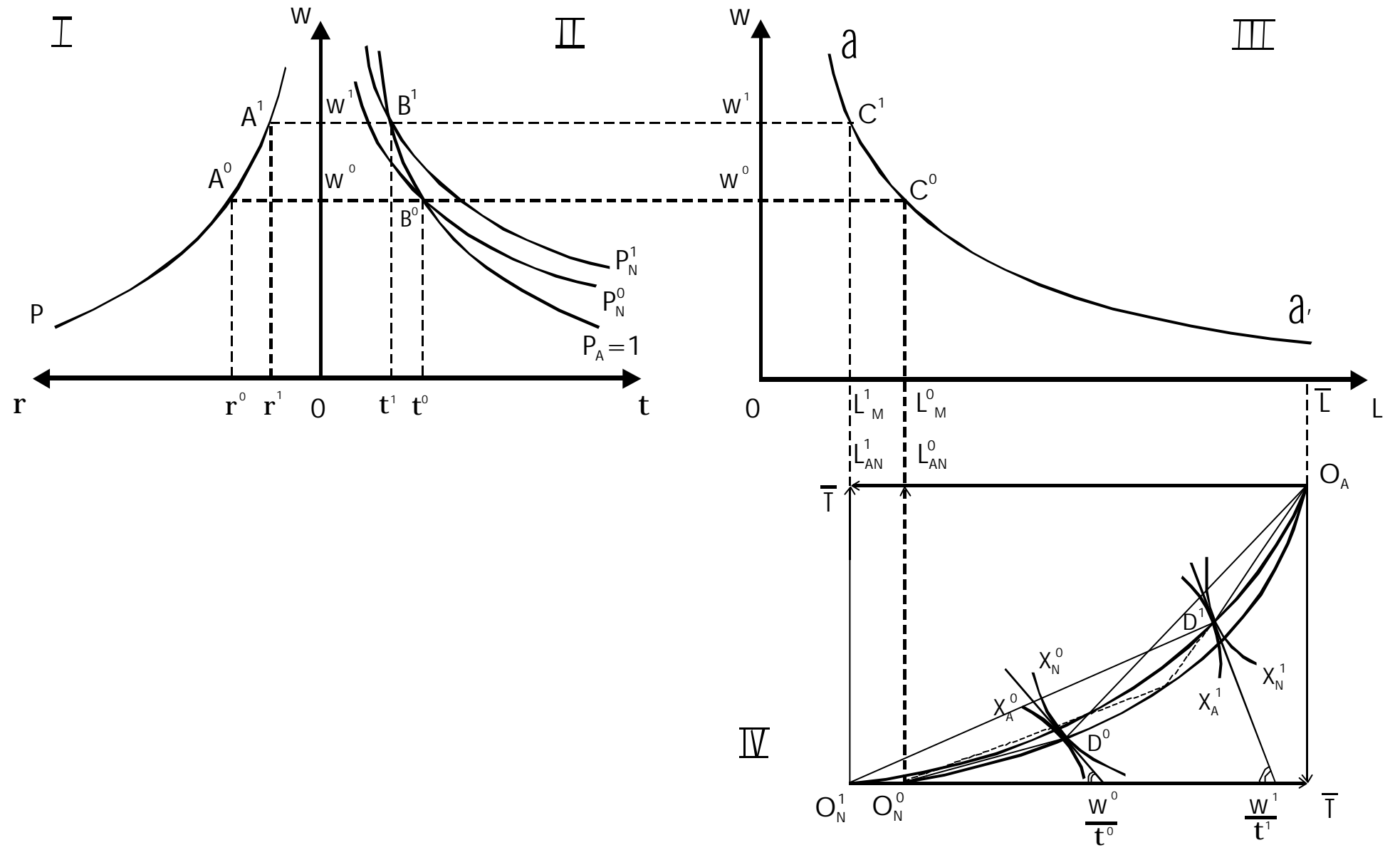
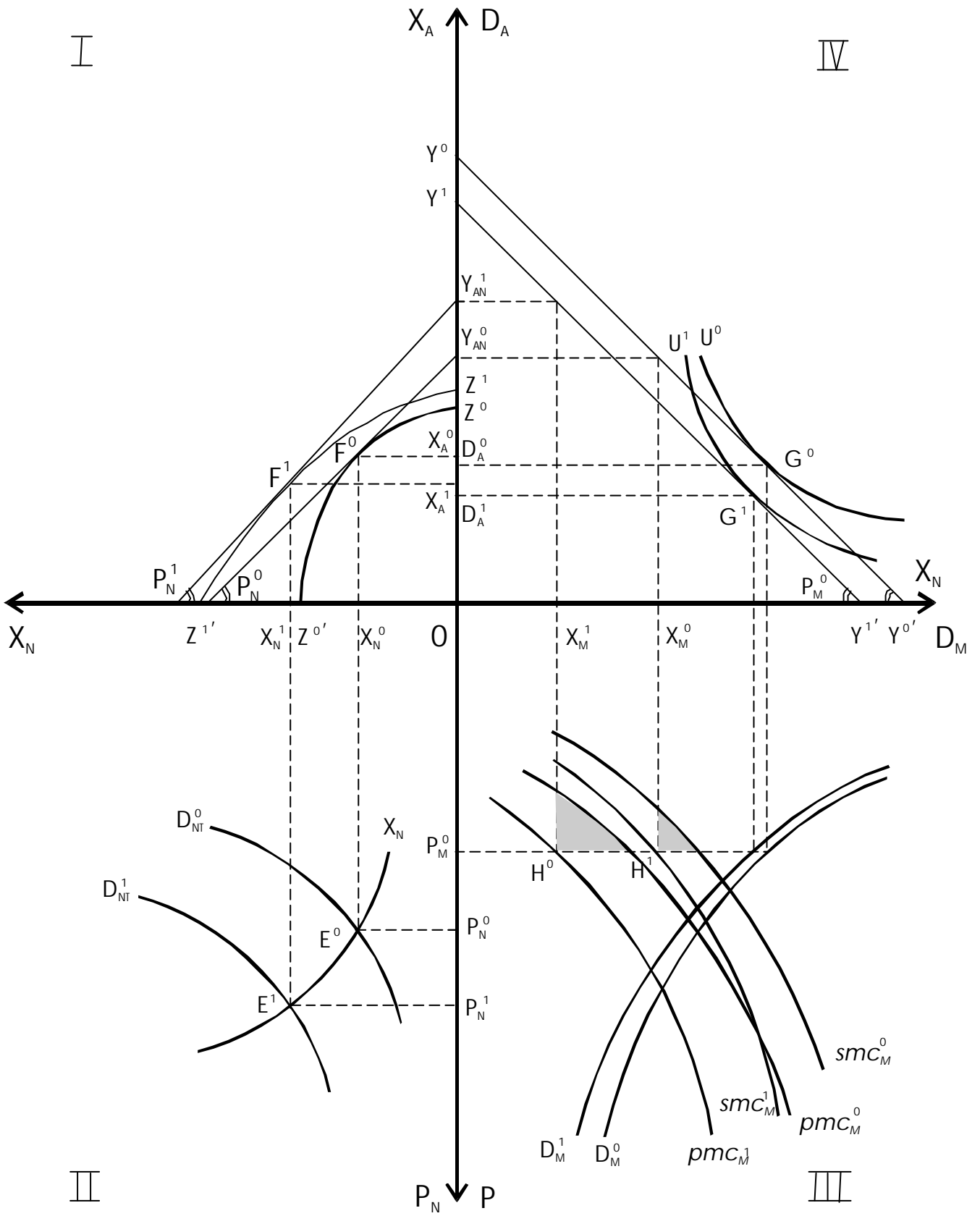


Figure 4



It will be useful to use our Figures 1 and 2 to illustrate some of the results. We will illustrate the case of immiserizing growth. In quadrant II of Figure 4, the increase in tourism induces an increase in  $P_N$ . Recall that, for illustrative purposes only, we assume that residents do not consume  $X_N$ . By the Stolper-Samuelson effect the wage rate,  $w$ , increases at the expense of the rental rates on land as described in quadrant II of Figure 3. The manufacturing sector reduces its demand for labour as shown in quadrant III of Figure 3, which results in an increased labour supply for the HOS subset of the economy ( $X_A$  and  $X_N$ ). In quadrant IV of Figure 3, we have represented both the factor prices and the labour supply effects on outputs  $X_A$  and  $X_N$ . The expansion of  $X_N$  and contraction of  $X_A$  production are illustrated in quadrant I of Figure 4 by the shift in the production point from  $F^o$  to  $F'$ . We can identify the terms of trade and increased labour supply effects on resident income in quadrant I of Figure 4 by the distance  $Y_{AN}^o, Y_{AN}^1$ .

As a result of the increases in  $P_N$ , both the  $(pmc_M)$  and  $(smc_M)$  curves shift to the left with the  $pmc_M$  curve shifting more than the  $(smc_M)$  curve because the private firm in  $X_M$  do not internalise the effects of the increasing returns to scale. As a result the welfare loss (represented by the shaded area) becomes largest. This increase in the welfare loss outweighs the increase in income from the terms of trade effect as illustrated by the movement from the social indifference curve  $U^o$  to  $U^1$  in quadrant IV of Figure 4.

#### **4. Conclusion**

It is frequently asserted that international tourism may be costly to the host country. A great deal of attention has been paid to the most obvious costs due to externalities associated with tourism activity (pollution, congestion and sociocultural impacts). However a general equilibrium analysis of the effects of tourism on structural adjustment and welfare in the presence of externalities is lacking. This paper addresses this problem.

Under certain conditions, welfare and manufacturing output may fall as a result of increased tourism. This can occur when the non-traded tourism sector is more labour intensive than the agricultural traded sector. The empirical evidence on factor intensities suggest that this case is more likely to prevail and this theoretical possibility should therefore be taken seriously<sup>16</sup>.

The distortion literature establishes that a tax-cum-subsidy policy is required to correct the distortion. Note that due to the monopoly power in trade in tourism, the taxing opportunities are broader, for example, tourism tax receipts could be used to subsidize the manufacturing sector.



## Footnotes

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1. Various governments have pursued aggressive policies for promoting tourism. Singapore, Hong Kong, Thailand, Tunisia and Egypt are prime examples of such policies. See also the papers by Copeland (1991), and Nowak and Sahli (1999) who highlight the differences between conventional trade and tourism.
2. See for example Sinclair and Bote Gomez (1996) for Spain and Pye and Lin (1983) for Asian NIC.
3. See de Kadt, (1979), WTO (1998), while on the issue of tax revenue for the government, Bird, (1992), and to promote growth, Hazari and Sgro, (1995).
4. Domestic residents pay for some of these amenities via taxes. For further elaboration on the differences between tourism trade and commodities trade, see Copeland (1991), Hazari and Sgro (1995), Hazari and Nowak (2000).
5. See for example Cazes (1992) and Sheldon (1990).
6. See for example Cater and Goodall (1992), Eber (1992).
7. See for example Long (1991).
8. See for example Krippendorf (1991).
9. Empirical evidence shows that in some cases tourism development is detrimental to agriculture, as on the Spanish Mediterranean coast (Tyrakowski (1986)), in Caribbean

countries (Bryden (1973), Weaver (1988)), in Bali or in many parts of Mexico (Latimer (1985)). Computable general equilibrium modeling experiments on Australia (Adams and Parmenter (1995)) and Hawaii (Zhou et al. (1997)) also suggest that an increase in the demand for tourism may seriously crowd out agriculture and manufacturing activities, with no change in overall output.

10. In the “Dutch Disease” literature, Corden and Neary (1982), and Neary and van Wijnbergen (1986) have emphasized the detrimental consequences of a booming traded good sector and other traded good sectors, especially on manufacturing industry. In our model, since the foreign tourists consume the local non-traded good, the booming sector is the non-traded sector, which makes our analysis different to the “Dutch Disease” model, although structural effects may still exist.
11. Several studies stress competition for the using of land and labor between agriculture and tourism, see Bryden (1973), Latimer (1985), Telfer and Wall (1996).
12. This particular formulation is used, for example, by Panagariya (1980) (1986), Herberg and Kemp (1969) and Choi and Yu (1984).
13. In general with endogenous labour supply the price-output response maybe perverse and the production possibility curve may not be concave [Kemp and Jones (1962), Martin and Neary (1980)]. To avoid this problem in the H-O subset we impose restrictions on the price elasticities.
14. Panagariya (1986) proved that a necessary and sufficient condition for stability in the RVJ model is that the weighted sum of the sectoral marginal physical product of labour be negative. In this case the price-output response is normal and the production

possibility curve is concave. Given that there are no production or factor market distortions from the H-O subset (sectors  $X_A$  and  $X_N$ ), and given the footnote 13 above, it is easy to show that the corresponding elasticity is always negative for this subset. Therefore it is sufficient to assume  $\alpha_M < 0$  for stability in our model.

15. Also note that both the Heckscher-Ohlin-Komiya (HOK) and the RVJ models can be derived from our more general model by making specific simplifying assumptions. In the HOK model, by allowing capital mobility between all the sectors, we obtain the price and output results of Komiya (1967) and the welfare result does not have a terms of trade effect. Welfare will rise or fall depending on the labour intensity of  $X_N$  vis-à-vis the other two sectors. To obtain the RVJ model, we add land immobility between  $X_A$  and  $X_N$ . In this case the rise in  $P_N$  always increases the wage rate and the results are qualitatively identical to the case above where ( $|q| > 0$ ), i.e. the non-traded good sector is labour intensive. Also note that the return to the specific factor in the non-traded good sector in the RVJ model rises but in our model decreases. Our model is also based on the assumption of competitive markets, full employment and interior solutions.
16. See for example Krueger A.O. et al., (1983).

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- (lix) This paper was presented at the ENGIME Workshop on “Mapping Diversity”, Leuven, May 16-17, 2002
- (lx) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications”, organised by the Fondazione Eni Enrico Mattei, Milan, September 26-28, 2002
- (lxi) This paper was presented at the Eighth Meeting of the Coalition Theory Network organised by the GREQAM, Aix-en-Provence, France, January 24-25, 2003
- (lxii) This paper was presented at the ENGIME Workshop on “Communication across Cultures in Multicultural Cities”, The Hague, November 7-8, 2002
- (lxiii) This paper was presented at the ENGIME Workshop on “Social dynamics and conflicts in multicultural cities”, Milan, March 20-21, 2003
- (lxiv) This paper was presented at the International Conference on “Theoretical Topics in Ecological Economics”, organised by the Abdus Salam International Centre for Theoretical Physics - ICTP, the Beijer International Institute of Ecological Economics, and Fondazione Eni Enrico Mattei – FEEM Trieste, February 10-21, 2003
- (lxv) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications” organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003
- (lxvi) This paper has been presented at the 4th BioEcon Workshop on “Economic Analysis of Policies for Biodiversity Conservation” organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL), Venice, August 28-29, 2003
- (lxvii) This paper has been presented at the international conference on “Tourism and Sustainable Economic Development – Macro and Micro Economic Issues” jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003

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