Tourism Immiserization:
Fact or Fiction?

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NOTA DI LAVORO 143.2005

NOVEMBER 2005

NRM – Natural Resources Management

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Summary

Tourism plays a major part in the development strategies of both developing and developed countries because of the alleged potential of generating foreign exchange, economic growth and welfare enhancement (Sinclair and Stabler, 1997; Sinclair, 1988). Consequently, in several countries a considerable amount of resources is allocated to further promote the tourism sector in a hope of reaping more economic benefits. However, it is still debatable whether tourism is beneficial for the tourist-receiving country or not. While empirical studies (Adams and Parmenter, 1994; Zhou et al., 1996, Baaijens et al., 1998; Blake, 2000; Blake et. al., 2003; Dwyer et al., 2003), argue that tourism expansion is beneficial to the economy, theoretical studies (Copeland, 1991; Chen and Devereux, 1999; Hazari and Nowak, 2003; Hazari et al., 2003; Nowak et al., 2003) posit that tourism expansion can be immiserizing. This paper critically reviews the theoretical and empirical literature to identify the sources via which tourism expansion can benefit or harm the economy. The issues are then empirically investigated using a CGE model for Mauritius to identify the conditions under which tourism expansion can be immiserizing.

Keywords: Tourism, Immiserization, Welfare, Economic growth

JEL Classification: L83, Q26

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1. INTRODUCTION

Tourism plays a major part in the development strategies of both developing and developed countries because of the alleged potential of generating foreign exchange, economic growth and welfare enhancement.[1] Consequently, in several countries considerable amount of resources are allocated to further promote the tourism sector in a hope of reaping more economic benefits. However, it is still debatable whether tourism is beneficial for the tourist-receiving country or not. While empirical studies (Adams and Parmenter, 1994; Zhou *et al.*, 1996, Baaijens *et al.*, 1998; Blake, 2000; Blake *et. al.*, 2003; Dwyer *et al.*, 2003), argue that tourism expansion is beneficial to the economy, theoretical studies (Copeland, 1991; Chen and Devereux, 1999; Hazari and Nowak, 2003; Hazari *et al.*, 2003; Nowak *et al.*, 2003) posit that tourism expansion can be immiserizing. This paper critically reviews the theoretical and empirical literature to identify the sources via which tourism expansion can benefit or harm the economy. The issues are then empirically investigated using a CGE model for Mauritius to identify the conditions under which tourism expansion can be immiserizing.

The analysis of tourism expansion is similar to the analysis of an export boom and follows closely the 'Dutch disease' literature (Corden and Neary, 1982; Corden, 1984). 'Dutch disease' refers to the negative effects of the export boom, due to new discoveries of natural gas of the 1960's, on the Dutch economy arising from the subsequent appreciation of the Dutch real exchange rate. However, as noted by Copeland (1991), there are crucial

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[1] See Sinclair and Stabler (1997) and Sinclair (1988) for a review of the economic and non-economic benefits of tourism growth.

differences between tourism exports and traditional exports that require additional insight to the 'Dutch disease' literature in order to analyse tourism expansion. Copeland identifies three major differences. First, consumers (tourists) move across the boundaries to consume the commodity rather than sending goods across the boundaries as in traditional exports. Consequently, non-tradables such as accommodation services become tradable in the sense that they generate foreign exchange. Therefore following the 'Dutch disease' literature, a tourism boom will not only affect the non-traded sector indirectly via the spending effect, but there will also be a major direct effect since tourists consume non-traded goods at domestic prices. Moreover, tourism taxes will have direct effects on domestic consumption, and similarly domestic taxes will also affect tourism exports.

Secondly, the tourism product consists of a bundle of goods and services for which tourists assess the cost as a whole before deciding to visit the destination. Therefore, the tourism consumption decision can be regarded as consisting of two stages: one is whether to visit the country or not and the second is how much of each commodity they should consume once they are at the destination. We refer to the former as the macro tourism demand choice and the latter the micro tourism demand choice. This is discussed further in the description of the CGE model.

Thirdly, the tourism product is also consumed jointly with other unpriced natural amenities such as climate and scenery, and public goods such as defence and street lighting. The natural amenities form part of a destination's tourism assets, and differentiate tourism products across countries. The Grand Canyon, Niagara Falls, the beaches of Mauritius and of the Caribbean are the assets that make tourism destinations at these places distinctive. A very important implication is that tourism exports can no longer be modelled under the small country assumption, even for small countries. The demand for a given country's tourism exports is less than perfectly elastic because tourism products are differentiated across countries.

The next section of the paper reviews the 'Dutch disease' literature and a critical evaluation of the existing empirical and theoretical literature on tourism booms in order to identify the potential effects of a tourism boom on the economy. Section 3 describes the features of the CGE model for Mauritius including the treatment of tourism and the associated assumptions. Section 4 provides an empirical evaluation of a tourism boom in Mauritius highlighting the

conditions under which tourism immiserization is possible. Finally, section 5 offers some concluding comments.

2. THE EFFECTS OF A TOURISM BOOM

There are several studies providing a theoretical analysis of the possible channels through which a tourism boom can affect the economy both positively and negatively (e.g. Copeland 1991, Chen and Devereux 1999, Hazari and Nowak 2003, Hazari and Ng 1993, Nowak *et al.* 2003). Most of these studies follow the 'Dutch disease' literature in some way and are investigated using general equilibrium trade models. The main channel through which a tourism boom effects the economy is through a terms of trade effect. Tourists consume products that are otherwise non-tradeable, and demand for these products will increase following the tourism boom[2]. Thus the relative price of non-tradeables will increase causing an appreciation in the real exchange rate and an improvement in welfare. Copeland (1991) argues that the price increase will be reinforced in the second round effect from additional domestic spending induced by the increase in real income. It should be noted that unlike a traditional export boom, there are both a direct and indirect effect on the non-tradeable market. The increase in the terms of trade will have similar spending and resource movement effects as in the 'Dutch disease' literature, welfare will increase overall since without distortions immiserization is not possible in the 'Dutch disease' framework.

The core model of the 'Dutch disease' economics is presented by Corden and Neary (1982) and Corden (1984), and the effects of an export boom are separated into two parts: the *spending effect* and the *resource movement effect*. An export boom increases domestic income causing an increase in the demand of both tradeables and non-tradeables. This will result in an increase in the price of non-tradeables, but with the small country assumption, the price of tradeables will not change. The relative price of non-tradeables to tradeables rises (i.e. an appreciation of the real exchange rate), making the production of non-tradeables more attractive than tradeables. With resources drawn away from the tradeable sector to the non-tradeables sector and with the increase in demand for importables being mostly met by higher imports financed by higher exports, the output of tradeables must contract. This is the spending effect. The resource movement effect is initiated by an increase in the marginal product of labour in the booming sector causing an influx of labour from the non-tradeable

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[2] As Corden (1984) has noted, the export boom could also happen from the supply side such as an exogenous improvement in technology or a windfall discovery of resources as in the original 'Dutch disease' case. An increase in supply will initially reduce the price of non-tradeables, causing a real depreciation.

and tradeable sectors. This is referred to as direct de-industrialisation. The reduction in labour in those sectors causes a reduction in output and an excess demand emerges in addition to the spending effect. The price of non-tradeables increases causing a further movement of labour away from the tradeable sector but this time towards the non-tradeable sector. This is referred to as indirect de-industrialisation arising from an appreciation in the real exchange rate. The above effects are based on a set of restrictive assumptions.

Krueger and Sonnenschein (1967) proved that in the absence of distortions, an improvement in the terms of trade is always welfare improving. This relationship breaks down in the presence of distortions. In the presence of monopoly in the non-traded sector (Lahiri and Ono, 1989), international imperfect competition (Markusen, 1981), foreign ownership of factors (Bhagwati and Tironi, 1980; Micheal, 1992), wage differentials (Batra and Scully, 1971), trade taxes (Woodland, 1982, chap. 9; Lahiri and Ono, 1989), it is seen that an improvement in terms of trade may not always be welfare improving. These conditions may also lead to a reduction in welfare following a tourism boom. A tourism boom has been investigated under the some of the above conditions and the outcome is sometimes debatable.

The terms of trade effects when the non-traded sector has domestic monopoly power is discussed in Lahiri and Ono (1989) and Cassing (1977). Lahiri and Ono found that increases in TOT for a competitive tradeable can reduce welfare if the output of non-tradeable falls causing a reduction in monopoly profits (assuming constant return to scale) which outweighs the increase in exports, especially when the export sector is small enough. A tourism boom will expand the non-tradeable sector that provides tourism goods and services and contracts the other non-tradeable sectors. If the latter sectors have monopoly power and the tourism sector and the tourism sector is small enough, the tourism boom can be immiserizing. However, if the tourism non-traded sector itself has monopoly power, the situation is different. The tourism non-traded sector can often have domestic monopoly power especially in developing countries having only a few large hotel chains controlling the market. The tourism boom will increase demand which will lead to higher abnormal profits and higher welfare. Such analysis is conducted analytically by Hazari and Kaur (1995), who could not conclusively determine the direction of change of the price of non-traded tourism goods after the tourism boom. In any market structure, with well behaved demand and supply functions, an exogenous increase in demand should increase price, leading to an increase in welfare.

Under an increasing returns to scale assumption, efficiency gains (losses) will add to (subtract from) the welfare effect, depending on which sectors the increasing returns to scale are present in. Efficiency of expanding (contracting) sectors will improve (worsen), contributing positively (negatively) to welfare. Nowak *et al.* (2003) show that if the exportable sector is the only sector facing increasing returns to scale, a tourism boom can be immiserizing because the reduction in output of the exportable can lead to further efficiency losses.

Tourists consume non-traded goods that are also consumed by domestic residents, and a tourism boom can lead to a crowding-out effect on domestic consumption causing a welfare loss. On the other hand, the tourism boom will increase the terms of trade implying that the domestic residents have more consumption possibilities in terms of imports. Hazari and Ng (1993) analyse the change in domestic consumption locus following the introduction of tourism in the economy, assuming that tourists do not consume imported goods. Part of the new consumption locus lies below the pre-boom locus and if consumption takes place on this part, welfare will be lower.[3] Similarly, one can make a case for a welfare-improving equilibrium. The position of the new equilibrium depends on the preference of local residents towards non-traded and imported goods such that a preference for non-traded goods can lead to an immiserizing tourism boom. The new equilibrium will also depend on the price ratio. The higher the price of the imported good relative to the non-traded goods, the higher is the possibility that tourism boom will be immiserizing.

Kemp (1968) found that in the presence of import tariffs, an improvement in the terms of trade can never be immiserizing. In contrast, Lahiri and Ono (1989) found that improvement in the terms of trade may reduce welfare in the presence of export subsidies especially with high subsidy rate, high price elasticity of demand and small amount of export. Chen and Devereux (1999) investigated tourism under different trade regimes and decomposed the welfare effects into terms of trade and volume of trade effects. The terms of trade effect is welfare improving while the volume of trade effect can be welfare improving or worsening. Assuming that all goods are normal and are net substitutes from each other in the goods and factor markets, the volume of trade effect will be welfare enhancing (reducing) under an import tariff (subsidy) and export subsidy (tax) regime. The intuition behind the immiserizing case is that a tourism boom expands imports and reduces exports. Import subsidies are distortions that reduce welfare, so their distortionary effect is enhanced. Export taxes will, if

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[3] Proof for the derivation of the curve is given in Hazari and Ng (1993).

exports face a downward-sloping demand curve and the tax is less than or equal to the optimal export tax, increase welfare; hence the reduction in exports reduces the positive welfare effects of these taxes.

Most studies of the effects of internationally mobile factors concentrate on import tariffs. For example, Jones (1984), Bhagwati and Tironi (1980) and Micheal (1992) found that import tariffs are more welfare reducing when some factors are internationally mobile than when they are not.

The presence of international capital in the tourism sector can lead to a reduction in welfare following a tourism boom. Following the Stolper-Samuelson argument, a tourism boom will decrease (increase) the relative price of capital to labour, if the tourism sector is labour (capital) intensive. This will result to a decrease (increase) in factor income repatriated to foreigners and an increase (decrease) in factor income attributed to domestic residents. The direct benefits of the tourism boom will hence be larger (smaller) in the presence of international capital. As argued by Copeland (1991), if the amount of factor income repatriated to foreigners is larger than the tourist spending, a tourism boom can be immiserizing. In the case where capital is internationally mobile and the world rental rate is given, a tourism boom is still welfare improving. However, the real appreciation is lower because international mobility of factors makes supply more elastic.

Most tourism analyses assume that tourism demand is not perfectly elastic. Several studies (Fish, 1982; Copeland, 1991; Bird, 1992; Hazari and Ng, 1993; Forsyth and Dwyer 2002; Hazari and Nowak, 2003; Gooroochurn and Sinclair, 2003) have indicated that most countries have some monopoly power over international tourism. Such market power arises because of the differentiated nature of tourism products which occur in terms of types and quality of attractions, goods and services sold in the country. Some studies including Chen and Devereux (1987) distinguish between 'wanderlust' tourism, involving seeing or doing something that is unique to the destination, and 'sunlust' tourism which refers to sun, sea and sand destinations. 'Wanderlust' tourism tends to exhibit a higher degree of product differentiation and hence higher market power than 'sunlust' tourism.

In principle, free trade is Pareto improving, but the Stolper-Samuelson theorem shows that owners of some factors win while owners of others lose. Krugman (1979) argues that income

redistribution effects under the Hecksher-Ohlin trade model are higher than under the intraindusry trade model, but nevertheless distributional effects are significant. Aggregate welfare can increase despite deterioration in income distribution if the increase in welfare of the richer households is more than the reduction in welfare of the poorer households. For developing countries, especially where poverty is eminent, welfare of the poorer households are more important and pro-poor tourism strategies are being implemented. In such situations, it is important to give a higher weight to poorer households while evaluating the aggregate welfare effects, and if the tourism boom does not increase welfare of the poor adequately, it can be immiserizing. The tourism sector is generally labour-intensive, and the tourism boom will increase relative price of labour to capital which will tend to benefit the poorer households. Moreover, the subsequent increase in the price of tourism-related commodities and the crowding-out effects on domestic consumption caused by higher tourism consumption will tend to affect the richer households more since they consume tourism-related goods more than poorer households. Income distribution can also be affected by tax distortions. A tourism boom will increase trade tax revenue under the import tariff/export subsidy regime. Since generally a higher proportion of tax revenues are redistributed as lump-sum transfers to the poorer households, the equity adjusted welfare may increase.

3. THE COMPUTABLE GENERAL EQUILIBRIUM MODEL

We use a single country CGE model, where Mauritius is taken as a small open economy and tourism is the only export sector for which the world price is not fixed. The model is static with the conventional neo-classical assumptions, and belongs to same family of models as those described by Dervis *et al*. (1982) and Robinson *et al*. (1999). The model explicitly captures ten types of taxes, and government balances the budget through adjustment to transfer income.

3.1 Model Overview

This sub-section provides an overview of the nested equation structure of the model (Table A.1 in the appendix provides a list of the equations on the model).[4] On the supply side, the model includes seventeen sectors each consisting of profit maximizing firms with production functions in the form of a Leontief function of value added and intermediate inputs. The value-added component is a constant elasticity of substitution (CES) aggregate of labor and capital, each of which is homogeneous, mobile among sectors, internationally immobile and

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[4] The GAMS/MPSGE code of the model is available upon request.

fixed in supply. Labor is further decomposed into the unskilled, semi-skilled and skilled categories, which are aggregated in a Cobb-Douglas (CD) fashion. Intermediate inputs, which are a CES composite of domestically produced and imported inputs following the Armington assumption, are aggregated in a Leontief function. Output of each sector is split between domestic sales and exports using a constant elasticity of transformation (CET) specification.

The demand side consists of the household sector, the government, tourism demand and investment demand. There are eight household groups in the model classified according to income level, and each household group maximizes utility in a multi-stage budget process. In the first CD nest, consumers decide on how to allocate expenditure across different sectors, while in the second Armington CES nest they decide on the mix between domestically produced and imported commodities. Investment demand is formulated in a similar fashion.

Tourism demand is formulated at two levels: micro tourism demand and macro tourism demand. Micro tourism demand is the demand for goods and services of tourists within the destination country, while macro tourism demand captures tourist demand as represented by tourist arrivals. The micro tourism demand is modeled like household demand, with each tourist maximizing his/her utility given a budget constraint. This generates demand of a representative tourist already at the destination. Total tourism demand is then the micro demand multiply by the number of tourists in the country. The latter is captured by the macro tourism demand, which incorporates the effect of changes in the relative international price of tourism on tourist arrivals on the assumption that other destinations prices are fixed. The price of tourism is a weighted average of the price of tourism commodities in Mauritius divided by the exchange rate. Changes in the price of tourism change tourist arrivals and consequently aggregate tourism demand.

The model treats government consumption as a standard demand rather than as public goods.[5] Normally, an increase in taxation causing an increase in government revenue will increase government consumption which in turn will crowd out effect private consumption, resulting to a reduction in welfare of the household sectors in addition to the one caused by higher

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[5] Government consumption is predominantly from the government services sector itself and consists mainly of public goods. However, since we do not have enough data on the valuation of public goods, we treat government consumption as a standard demand rather than as public good.

taxes. To avoid this effect, government consumption is fixed in the model and the budget is balanced using adjustment to transfer income. The dead weight loss of taxation is measured as the difference between the reduction in consumer surplus and the increase in government tax revenue. If the increase in government revenue is transferred to the household sector (via transfer income), change in household welfare will then measure the dead weight loss of a given tax simulation. However, one limitation of using transfer income is that the distributional effect of taxation is sensitive to the proportions in which transfer income is allocated to different household groups.

With the small country assumption, the world prices of imports and exports are assumed to be fixed, but import prices will change when tariffs and the exchange rate change. With exogenously fixed foreign savings (balance of payment deficit fixed at zero), the equilibrating mechanism at work is the exchange rate. Changes in the exchange rate will alter the relative price of imports and exports, and consequently imports and exports will adjust to restore equilibrium. The model is also 'savings-driven', with total investment adjusting to be equal to savings. The exchange rate is used as the numéraire, and is measured such that a rise in the exchange rate represents a depreciation of the domestic currency.

3.2 Data Description

The data for the Mauritian CGE model consists of a social accounting matrix (SAM) for the year 1997. The production activities are further decomposed into 17 sectors, and no distinction is made between commodities and sectors. Tourism is not identified as a distinct sector in the input-output table of Mauritius, and hence several adjustments are required to capture tourism in the model. It is worth noting that tourism is treated as a demand phenomenon and is identified only on the demand side. It is assumed that there is an additional group of final demand, the tourists, whom consume goods and services produced by the traditional sectors, and that there is no specific sector producing only for the tourists. In the I-O table of Mauritius, tourism demand lies partly in household consumption and partly in exports. After extracting tourism demand from the latter two components, we also need to differentiate between tourism demand that is met from domestic production and that by imported goods. Specific details on the above can be found in Gooroochurn (2002).

From table 1, it can be seen that sugar milling, EPZ textiles and EPZ non-textiles are the main export sectors (excluding tourism exports) with 89%, 90% and 90% of output exported,

Table 1: Summary of Production Sectors

	K/L Ratio[a]	Export Ratio[b]	Tourism Ratio[c]	Import Ratio[d]
Sugarcane	0.54	0	0	0.04
Foodcrops and Fruits	7.52	0.18	0	0.05
Livestock, Poultry and Fishing	3.07	0.02	0	0.11
Other Agriculture	2.39	0.19	0	0.08
Mining and Quarrying	2.71	0	0	0.05
Sugar Milling	0.91	0.89	0	0.05
EPZ Textiles	0.93	0.90	0	0.45
EPZ Non-textiles	0.93	0.90	0	0.60
Other Manufacturing	1.67	0.07	12.1	0.19
Electricity, Gas and Water	1.62	0	0	0.28
Construction	0.97	0	0	0.28
Wholesale and Retail Trade	1.98	0.01	2.7	0.02
Restaurants and Hotels	1.20	0	95.4	0.06
Transport and Communication	1.71	0.15	61.4	0.39
Financial Services	2.83	0.15	0	0.09
Government Services	0	0	0	0.09
Other Services	1.11	0	12.3	0.05

[a]: Capital income divided by labour income
[b]: Exports (exclude tourism) divided by total demand
[c]: Tourism demand divided by total demand
[d]: Imports divided by domestic output

respectively. There are five sectors that are related to tourism: hotel and restaurant (95.4%), transport and communication (61.4%), retail and wholesale trade (2.7%), other manufacturing (12.1%) and other services (12.3%). The tourism ratio, measured as the proportion of tourism demand out of total demand, is given in brackets. The main importables are EPZ textiles, EPZ non-textiles and transport and communication sectors with an import ratio of 40% and above. Other less intensive importables include the construction and electricity, gas and water sectors. Non-tradeables include the sugarcane, livestock, poultry and fishing, mining and quarrying, wholesale and retail trade, restaurants and hotels, financial services, government services and other services sectors.

The calibration process is based on the Harberger's convention, which assumes that all prices in the model equal to one. All share and shift parameters are calibrated from the SAM. Some elasticity values are taken from the GTAP database (Hertel, 1997), and others are taken from previous studies or guessitimated judiciously. Sensitivity analyses (reported in Gooroochurn, 2004) are carried out on the elasticity values and the results are found to be robust.

4. EMPIRICAL EVIDENCE

The welfare effects of different magnitudes of tourism boom in Mauritius are given in figure 1. It should be noted that in there are no distortions in the benchmark. All taxes and subsidies have been removed prior to the tourism boom simulations such that the 'real' effects of the tourism boom can be estimated. It can be seen that for expansion less than 10%, tourism boom is immiserizing. With a less than perfectly elastic export demand for the tourism sector, there is a lower appreciation of the real exchange rate resulting in a lower terms of trade gains. On the other hand, competing export sectors contract and tourist consumption crowds-out domestic consumption causing a reduction in welfare. Larger export boom causes relatively higher terms of trade gains than contraction on other sectors, causing an improvement in welfare. In our initial model with no distortions, tourism expansions above 10% are welfare improving. The following sub-sections investigate the effects of tourism expansion under different assumptions to investigate the possibilities of tourism immiseration.

Figure 1: EV and Tourism Boom with no Distortions
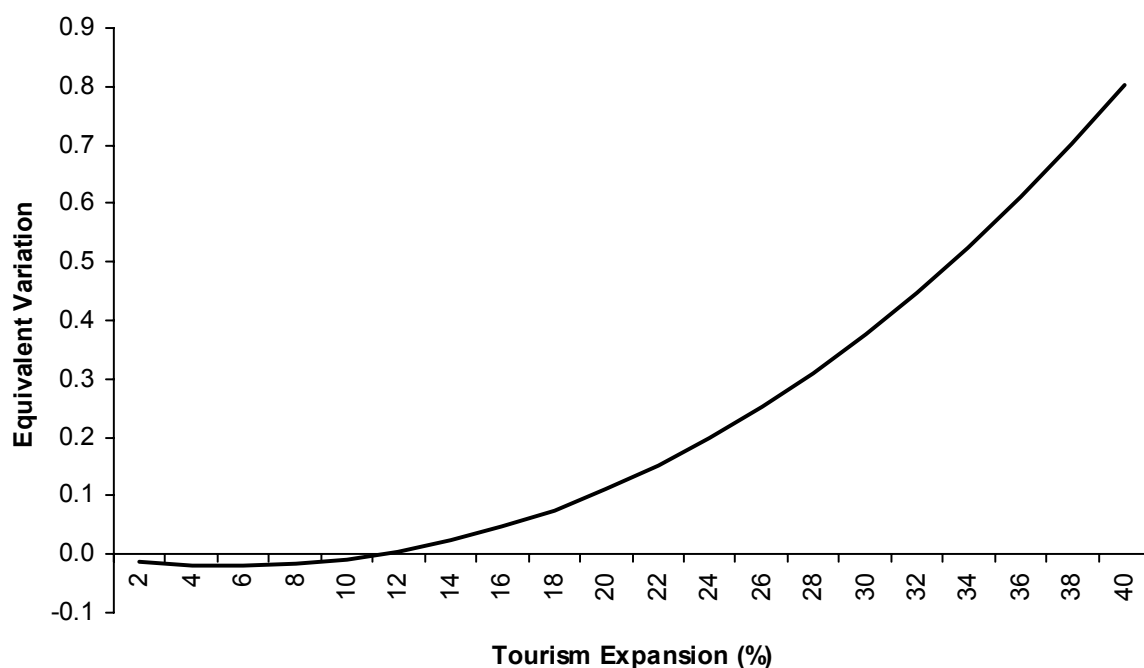
4.1 Tourism Boom and Increasing Return to Scale

Increasing return to scale in the expanding (contracting) sector is expected to increase (decrease) welfare due to higher (lower) efficiency. We introduce increasing return to scale, with a fixed 'Cost Reduction Ratio' (CDR) of 0.1 to each sector at a time, and evaluate the welfare effects of a tourism boom of 15%. The results are given in table 2 alongside the export ratio. It can be seen that welfare effects are lower with increasing return to scale in the export-orientated sectors than with constant return to scale following the tourism boom. The equivalent variations are also negative showing immiseration of domestic residents. However, tourism boom the presence of increasing returns to scale in the other sectors,

Table 2: Movement of Welfare Effects of Tourism Boom of with EOS in Each Sector

	Export Ratio	Change	Immiserise
Sugarcane	0	↓	Yes
Foodcrops and Fruits	0.2	↑	No
Livestock, Poultry and Fishing	0	↑	No
Other Agriculture	0.2	↓	Yes
Mining and Quarrying	0	↑	No
Sugar Milling	0.9	↓	Yes
EPZ Textiles	0.9	↓	Yes
EPZ Non-textiles	0.9	↓	Yes
Other Manufacturing	0.1	↑	No
Electricity, Gas and Water	0	↑	No
Construction	0	↑	No
Wholesale and Retail Trade	0	↑	No
Restaurants and Hotels	0	↑	No
Transport and Communication	0.1	↑	No
Financial Services	0.2	↑	No
Government Services	0	↑	No
Other Services	0	↑	No

↓: Lower welfare effects

↑: Higher welfare effects

including the tourism-related sectors, generate a higher welfare gains arising from improving technical efficiency in the expanding sectors.

4.2 Tourism Boom and Trade Regime

In the presence of trade distortions, we estimate the terms of trade, volume of trade and total welfare effects of a tourism boom. Simulations are undertaken for a 15% tourism boom (welfare should improve without trade distortions). The simulations are undertaken for import tariffs/subsidies, export taxes/subsidies and for a combination of both. Following Chen and Devereux (1999), welfare is expected to be lower with higher import subsidy and export tax. We run a set of dual counterfactual simulations, and found that tourism expansion with lower import tariffs and lead to lower welfare, and tourism expansion with higher import leads to higher immiserization. This is depicted in figure 2.

Figure 2: EV of 15% Tourism Boom with Different Tariff Level on Final Demand
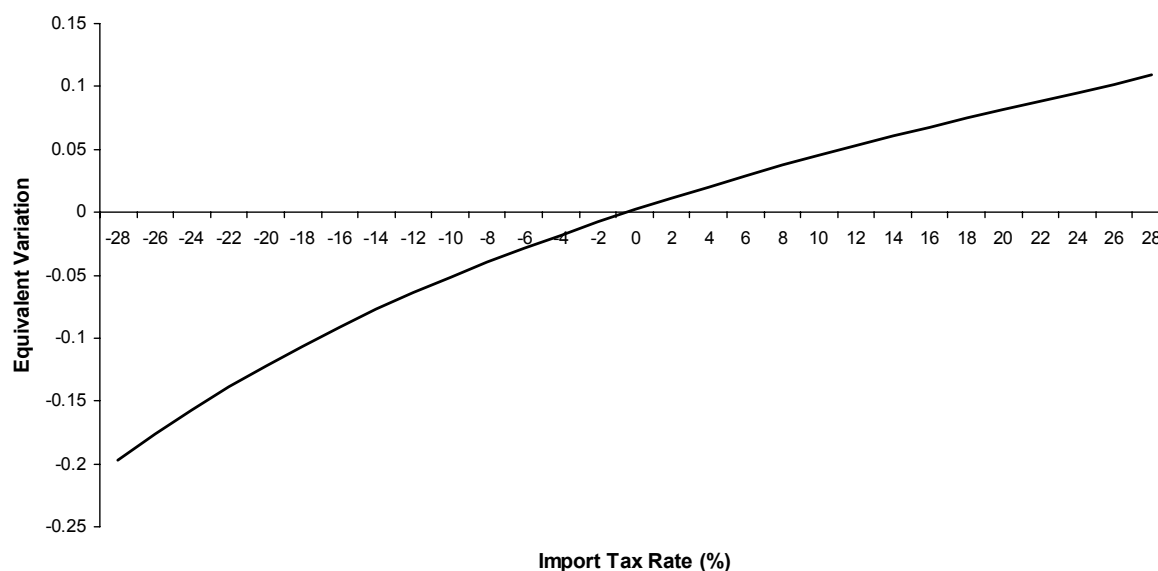
It should be noted that in the above simulation, import tax is levied only on final demand. Hence with higher imports demand following the favourable terms of trade effect, import tax revenue will increase (decrease) for positive (negative) tax rates. If import tax is levied on both final and intermediate demand, the welfare effects can be ambiguous. Following the 'Dutch disease' literature, the tourism boom will cause other export sectors to contract. Export sectors are generally large sectors using significant amount of imported intermediate inputs. For example in Mauritius, intermediate imports of the two main export sectors, textile EPZ and non-textile EPZ, consist more than 22% of total imports. Contraction of these sectors can lead to lower import tax revenue if tax is positive or higher tax revenue savings if import tax is negative. Therefore, with taxes on intermediate inputs, Chen and Devereux's

argument may not hold. In fact, in our simulations, we found increasing and positive equivalent variations for higher import subsidies on both intermediate and final demand. This

Figure 3: Figure 2: EV Tourism Boom with Different Tariff Level on all Demand
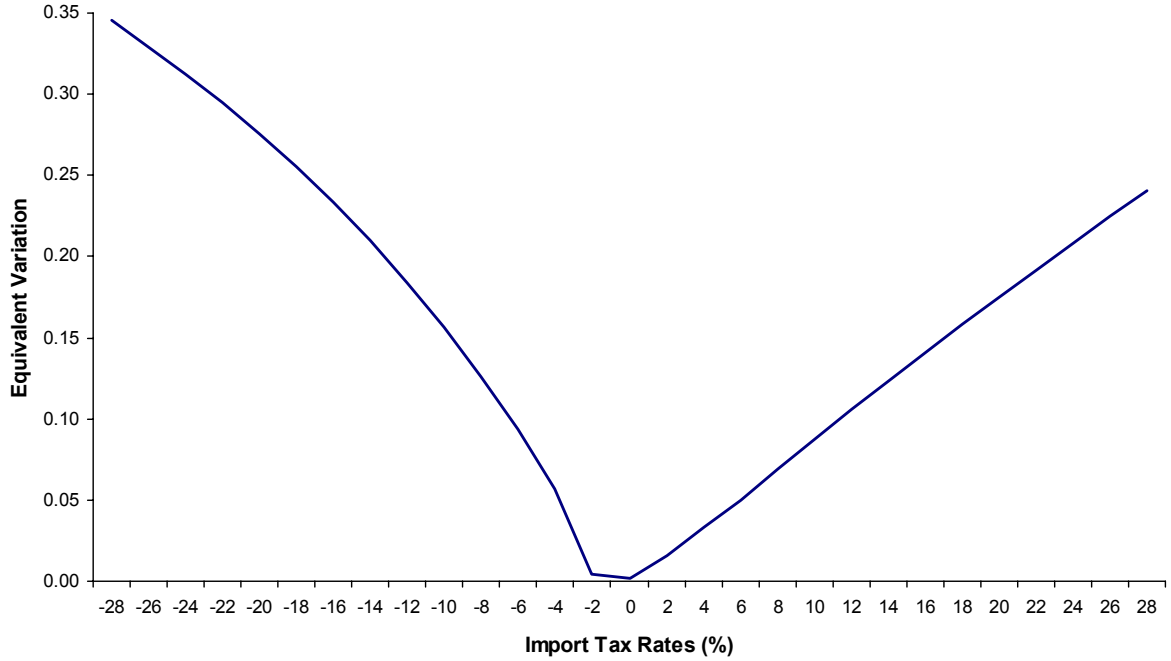
is depicted in figure 3.

Figure 4 shows the relationship between the equivalent variation following a tourism boom and different level of export tax/subsidy. It can be seen that a tourism boom is more welfare improving in the presence of higher export subsidy and more immiserizing with higher export tax rate.

4.3 Tourism Boom and Income Distribution

Income distribution is closely related to poverty analysis in developing countries. Economies that are highly concerned about inequality aversion will give more weight to welfare of poorer households whilst evaluating total domestic welfare. The equity adjusted social welfare (*SW*) thus takes the following form:

$$SW = \sum_{h}^{8} \beta_h . W_h \qquad\qquad (1)$$

where the β_h are the welfare weights and are given by[6]

Figure 4: EV Tourism Boom with Different Export Tax
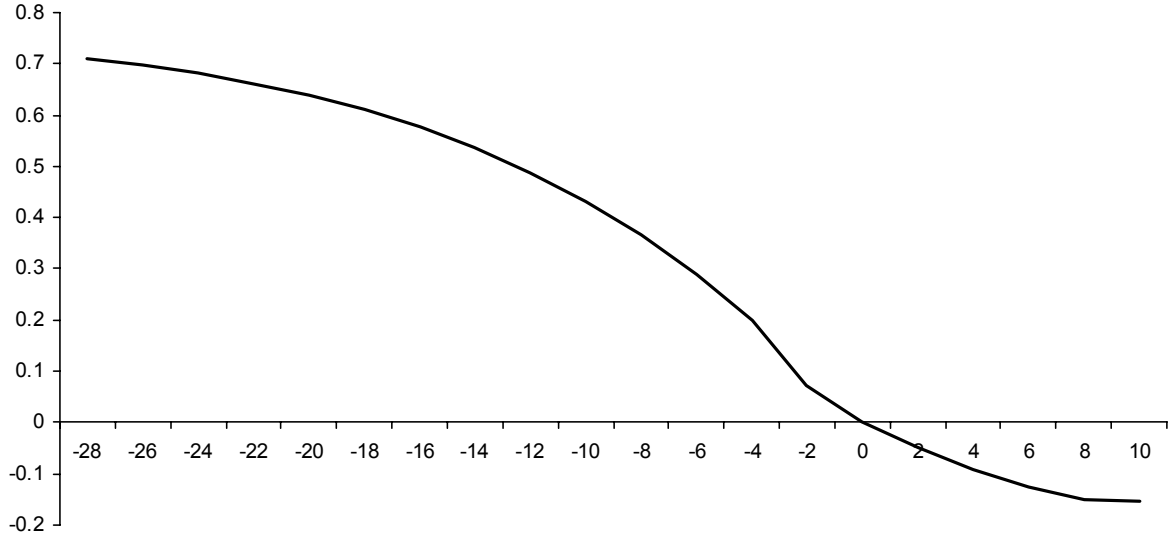
$$\beta_h = \frac{\left(M_1 \big/ M_h\right)^{\varepsilon}}{N} \tag{2}$$

N is simply a normalisation coefficient and is equal to $\sum_h^8 \left(M_1 \big/ M_h\right)^{\varepsilon}$ so that $\sum_h^8 \beta_h = 1$. M_1 and M_h are the average income level of the poorest household group and household group h, respectively. Thus β_h can be regarded as representing the marginal social benefit of one unit of income to household group h relative to a unit to the poorest household group. ε is a positive number and can interpreted as the degree of inequality aversion. If we are not concerned about inequality at all, then $\varepsilon = 0$ such that $\beta_h = 1$ for all h and we are back to the unadjusted welfare function. If the modeller has an aversion to inequality then ε will be greater than zero such that $\beta_h < 1$ for $h \neq 1$ and becomes smaller for richer household groups. We are thus giving higher weight to poorer household groups. For a value of $\varepsilon = 1$ for example, the weight of the poorest household will be twice the weight of the household group

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[6] This formulation of the weights is commonly used in empirical studies in taxation. See Ahmad and Stern (1991), Leung et al. (1999) and Madden (1989, 1995) for such applications.

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with twice the income of the poorest household group. As ε becomes larger, the condition approaches the Rawlsian 'maxi-min' criterion where the aim is to maximise the welfare of the poorest household group; with the weight on richer household groups approaching zero and that on the poorest household tending to one.

Table 3: Equivalent Variation for Different Inequality Aversion (ε)

	$\varepsilon = 1$	$\varepsilon = 2$	$\varepsilon = 5$
Tourism Boom: 10%	0.027	0.099	0.124
Tourism Boom: 15%	0.041	0.149	0.185
Tourism Boom: 20%	0.055	0.198	0.246
Tourism Boom: 25%	0.068	0.247	0.308

The adjusted equivalent variation is calculated using the adjusted social welfare for different values of ε ($\varepsilon = 1$, $\varepsilon = 2$, $\varepsilon = 5$) for tourism booms of 10%, 15%, 20% and 25%, and the results are given in table 3. As expected welfare effects are higher for higher magnitude of tourism boom. It can also be seen that for each tourism boom experiment, the equivalent variations are higher the greater the degree of inequality aversion (ε) where welfare of poorer households are given more weights. Thus, it can be concluded that tourism boom benefits the poorer household groups more than the richer groups.

This conclusion is motivated by the source and use of imcome effects. From table 1, it can be seen that the tourism-related sectors, especially the hotel and restaurant sector, are relatively more labour intensive. Moreover, more than 55% of the labour are unskilled. Therefore, expansion in the tourism-related sectors will tend to benefit the poorer household groups. This is the source of income effect. The use of income effect is related to the proportion of consumption of tourism products by different household groups which is summarised in table 4. It can be seen that a relatively higher proportion of consumption of the hotel and restautant and transport and communication sectors are from higher income groups. The tourism boom will tend to increase the consumption price of the above sectors. Moreover, higher tourism consumption generate higher crowding-out effects on cumsumption. Both effects will tend to lower welfare and with a higher proportion of consumption, the richer households will bear more of the burden. The pattern of the sources and uses of income effects are similar in many

countries, and hence if income distribution effects are taken into consideration, there is a lower likelihood that a tourism boom will be immiserizing.

Table 4: Domestic Consumption of Tourism-Related Commodities Across Households (%)

Household Groups	Tourism-related Sectors				
	Other Services	Retail and Wholesale Trade	Hotel and Restaurant	Transport and Communication	Other Services
H1	1.4	2.4	0.9	0.5	1.0
H2	10.1	19.6	7.6	4.0	5.7
H3	18.3	38.1	14.7	9.6	11.5
H4	18.5	42.4	16.4	13.0	14.2
H5	20.9	54.2	21.0	20.8	21.3
H6	11.7	32.7	12.6	12.9	13.1
H7	8.5	25.7	9.9	10.0	11.5
H8	10.7	43.6	16.9	29.2	21.8

5. CONCLUSIONS

This paper provides describes the economy-wide effects of a tourism boom following the 'Dutch disease' literature. It is found that a straightforward application of the 'Dutch disease' literature to a tourism boom is not appropriate because there are important differences between tourism and traditional exports. For instance, a tourism boom will affect the non-traded sector both directly via higher tourists spending and indirectly via higher domestic spending arising from higher income. The conditions under which a tourism boom can be immiserizing are also identified from both the trade and tourism literature They are mainly under the assumptions of monopoly power in the non-traded sector, foreign ownership of factors, crowding-out effects, increasing returns to scale, trade taxes distortions and income distribution.

Using Mauritius as a case study, the latter three conditions are investigated empirically. It is found that a tourism boom with increasing returns to scale in the export-oriented sectors leads to lower welfare gain and can be immiserizing. On the other hand, increasing returns in the

tourism-related sectors and non-tradeables leads to higher welfare increase following the tourism boom.

The outcomes of the tourism boom simulation under different trade regimes are more complicated. Tourism boom under the assumption of pre-existing import taxes/subsidies on final demand, leads to higher welfare gain with higher import tariffs. On the other hand, the presence of import subsidies leads to immiserizing growth. However, if import subsidies are levied on both final and intermediate demand, a tourism boom can increase welfare. It is also found that a tourism boom tend to improve income distribution.

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APPENDIX

Table A.1: List of Equations Used in the Model

Price Equations

World Price of Imports
$$\overline{PWM}_i = \frac{PM_i}{\left(1+t_i^M\right)ER}$$

World Price of Exports
$$\overline{PWE}_i = \frac{PE_i}{\left(1+t_i^E\right)ER}$$

Composite Commodity Price
$$PX_i = \frac{PM_iM_i + PD_iD_i}{X_i}$$

Marketed Output Price
$$PQ_i = \frac{PE_iE_i + PD_iD_i}{Q_i}$$

Intermediate Input Price
$$PN_i = \sum_j \psi_{ij} PX_i$$

Value Added Price
$$PVA_i = PQ_i\left(1-t_i^S\right) - PN_i$$

Aggregate Price Index
$$PINDEX = \sum_i windex_i^Q . PX_i$$

Quantity Equations

Value Added
$$VA_i = \phi_i^{va}\left[\alpha_i^{va} L_i^{\sigma_i^{ya}-1/\sigma_i^{ya}} + \left(1-\alpha_i^{va}\right) K_i^{\sigma_i^{ya}-1/\sigma_i^{ya}}\right]^{\sigma_i^{ya}/\sigma_i^{ya}-1}$$

Composite Demand
$$X_i = \phi_i^m\left[\alpha_i^m M_i^{\sigma_i^m-1/\sigma_i^m} + \left(1-\alpha_i^m\right) D_i^{\sigma_i^m-1/\sigma_i^m}\right]^{\sigma_i^m/\sigma_i^m-1}$$

Domestic Output
$$Q_i = \phi_i^e\left[\alpha_i^e E_i^{\sigma_i^e-1/\sigma_i^e} + \left(1-\alpha_i^e\right) D_i^{\sigma_i^e-1/\sigma_i^e}\right]^{\sigma_i^e/\sigma_i^e-1}$$

Demand for Labor
$$DD_i^L = \left(\phi_i^{va}\right)^{\sigma_i^{ya}-1} VA_i\left(\frac{\alpha_i^{va} P_i^{VA}}{P^L}\right)^{\sigma_i^{ya}}$$

Demand for Capital
$$DD_i^K = \left(\phi_i^{va}\right)^{\sigma_i^{ya}-1} VA_i\left(\frac{\left(1-\alpha_i^{va}\right) P_i^{VA}}{P^K}\right)^{\sigma_i^{ya}}$$

Export Demand
$$\frac{E_i}{D_i} = \left(\frac{PE_i}{PD_i}\right)^{\sigma_i^e}\left(\frac{1-\alpha_i^e}{\alpha_i^e}\right)^{\sigma_i^e}$$

Import Demand
$$\frac{M_i}{D_i} = \left(\frac{PM_i}{PD_i}\right)^{\sigma_i^m}\left(\frac{1-\alpha_i^m}{\alpha_i^m}\right)^{\sigma_i^m}$$

Tourist Arrivals
$$TA = \Theta.TA_0.\left(\frac{PINDEX}{ER}\right)^{\varepsilon_T^{price}}$$

Income Equations

Household Income
$$Y_h^H = [wdist_h TL] + [kdist_h TKU] + tdist_h\left[TGH + TCH + \overline{TWH}.(ER) + TOH\right] + iddist_h IDRH$$

Government Income
$$E^G = CG + IDEG + SUB + TGH + \overline{TGW}.ER + TGO + SAV^G$$

Labor Income
$$TL = \sum_i P^L L_i$$

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Unincorporated Capital Income	$TKU = \sum_i \kappa_i P^K K_i$
Incorporated Capital Income	$TKI = \kappa^C \sum_i (1 - \kappa_i) P^K K_i$

Expenditure Equations

Household Total Expenditure	$E_h^H = CH_h + \overline{THW}_h . ER + THO_h + THG_h + IDEH_h$ $\quad + INCTAX_h + PROPTAX_h + SAV_h^H$
Government Expenditure	$E^G = CG + IDEG + SUB + TGH + \overline{TGW} . ER + TGO + \;$
Household Consumption	$CH_h = \sum_i \dfrac{\lambda_{ih}^H Y_h^{HDIS}}{PX_i}$
Intermediate Consumption	$CN_i = \sum_i^n a_{ij} Q_j$
Tourism Total Consumption	$CT_i = TA \times CTU_i$
Representative Tourist Consumption	$CTU_i = \dfrac{\lambda_i . \overline{Y_1^T} . ER}{PQ_i}$

Equilibrium Equations

Aggregate Demand	$Q_i = CN_i + CH_i + CG_i + CT_i + CI_i + CS_i + E_i$
Labor Market Equilibrium	$\sum_i DD_i^L = \overline{L}$
Capital Market Equilibrium	$\sum_i DD_i^K = \overline{K}$
Government Savings	$SAV^G = Y^G - E^G$
Household Savings	$SAV_h^H = \left[\left(\left(1 - t_h^{IT}\right) Y_h^H \right) - PROPTAX_h^H \right] . mps_h^H$
Total Savings	$SAV = SAV^H + SAV^C + SAV^G + \overline{SAV}^W . ER$
Investment-Saving Equilibrium	$TINV = SAV$

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(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

(lxviii) This paper was presented at the ENGIME Workshop on "Governance and Policies in Multicultural Cities", Rome, June 5-6, 2003

(lxix) This paper was presented at the Fourth EEP Plenary Workshop and EEP Conference "The Future of Climate Policy", Cagliari, Italy, 27-28 March 2003

(lxx) This paper was presented at the 9th Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004

(lxxi) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications", organised by Fondazione Eni Enrico Mattei and Consip and sponsored by the EU, Rome, September 23-25, 2004

(lxxii) This paper was presented at the 10th Coalition Theory Network Workshop held in Paris, France on 28-29 January 2005 and organised by EUREQua.

(lxxiii) This paper was presented at the 2nd Workshop on "Inclusive Wealth and Accounting Prices" held in Trieste, Italy on 13-15 April 2005 and organised by the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics

(lxxiv) This paper was presented at the ENGIME Workshop on "Trust and social capital in multicultural cities" Athens, January 19-20, 2004

(lxxv) This paper was presented at the ENGIME Workshop on "Diversity as a source of growth" Rome November 18-19, 2004

(lxxvi) This paper was presented at the 3rd Workshop on Spatial-Dynamic Models of Economics and Ecosystems held in Trieste on 11-13 April 2005 and organised by the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics

(lxxvii) This paper was presented at the Workshop on Infectious Diseases: Ecological and Economic Approaches held in Trieste on 13-15 April 2005 and organised by the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics.

(lxxviii) This paper was presented at the Second International Conference on "Tourism and Sustainable Economic Development - Macro and Micro Economic Issues" jointly organised by CRENoS (Università di Cagliari and Sassari, Italy) and Fondazione Eni Enrico Mattei, Italy, and supported by the World Bank, Chia, Italy, 16-17 September 2005.