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The impact of relative prices on tourism demand for Mauritius: An empirical analysis

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The present study assesses the impact of relative prices on tourism flows in Mauritius. To account for dynamism in tourism flows modelling, a dynamic time series analysis – namely the vector autoregressive model – is employed. The results show that relative price measures have a long-run impact on international tourism flows, indicating that tourists are sensitive to price levels. The relative average cost in the different competing destinations is also reported to be positive and significant, indicating that the impact of relative price changes in foreign destinations competing with Mauritius tourism matters; thus indicating a certain degree of substitutability between Mauritian and its regional competitors' tourism. Tourism infrastructure, income in country of origin and the island's level of development are confirmed to be key factors in the tourist selection decision. Finally, overall, short-run estimates confirm the above results.

Keywords: relative prices; tourism demand; vector autoregressive model; demand elasticity

1. Introduction

The contribution of the tourism sector towards the development of the host economy was been widely discussed and acknowledged in the literature. Lea (1988) and Sinclair (1998), for instance, have in their studies highlighted the positive impact of the tourism sector in fostering jobs and in generating much-needed revenue for the government. In addition, non-negligible linkages and spillover benefits may also accrue through sub-contracting provisions to local firms that supply the tourism industry, through the economic and technological development of nations by stimulating the development of basic infrastructure and also via foreign investment (especially in hotels) and transfer of technology provisions. This is particularly true for the case of island economies, which are most of the time very dependent on such trade. In this regard, such a positive and significant impact of the tourism sector on a destination's economy, especially on island states, has been well documented by Sinclair (1998) and Durbarry (2002, 2004) and more recently Seetanah (2010), amongst others.

Although an overwhelming part of the tourism literature has focused on the tourism–growth link, a second strand of the literature has dealt with the determinants of international tourism demand (see Uysal & Crompton, 1984; Crouch, 1994a, 1994b, 1995; Lim & McAleer, 2001; Eilat & Einav, 2004; Naudee & Saayman, 2004; Li

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et al., 2005; Lim, 2006; Kareem, 2009; Gomezelj, 2011; Ibrahim, 2011; among others). In this regard, there is consensus amongst these writers that the most important determinants of tourism demand are income in country of origin, the cost of travel, relative prices and tourism infrastructure (for a review of the empirical literature refer to Witt & Witt, 1995; Lim, 1997).

Given the above, the focus of the present study centres on the impact of relative prices or price competitiveness on tourism demand for the small island economy of Mauritius, where the tourism sector is one of the major pillars of the economy. Interestingly, this study investigates both the impact of the island's own price levels and also its competitors' (substitute) prices. Indeed, there is the widely held view that 'relative prices' is a crucial element when deriving a destination's tourism industry competitiveness (Forsyth & Dwyer, 2009). In their destination choice decision, tourists consider the price (cost of living) at the destination relative to the costs of living in the origin and substitute destinations. Thus, it is imperative that two types of prices be considered when estimating the price competitiveness of a destination. The first pertains to the relative price between the destinations and country of origin, whilst the second relates to the relative price between different competing destinations, which generates the so-called substitution price effect. Tourism demand, it may be argued, is relatively responsive to price factors, as measured by the price elasticity, which in turn may vary in relation to the country of origin and the country of destination. The residents of large countries, offering a wider diversity of travel experiences within their own borders, are likely to be more price sensitive in their international travel behaviour than those tourists from geographically smaller countries whose choices are rather more limited.

Additionally, destinations at the higher end of the market tend to be less price elastic. Similarly, a lower price elasticity is also expected for more differentiated destinations. However, one could argue that over the last few years there has been the emergence of a new trend where increased emphasis on destination differentiation strategies has resulted into tourists becoming less price sensitive.

Empirically, the relative price variable that is normally used in the demand for tourism function is the ratio of the consumer price indexes between the countries of destination and the countries of origin, adjusted by the bilateral exchange rate. A higher exchange rate in favour of the origin country's currency can result in an increasing number of tourists visiting the destination country from the country of origin. When the exchange rate-adjusted consumer price index ratio is used to measure the changes in relative prices of goods and services in the destination country, the impacts of inflation and exchange rate movements are measured through one 'relative price' variable. In this regard, the existing literature tends to confirm the negative link between relative prices and tourist arrivals; however, the magnitude of the effects is also reported to differ and is at times insignificant (refer to Lim, 1997).

Prices in competing destinations may also influence the demand for tourists in other destinations. For example, a rise in prices in one destination will boost visitors in the substitute destinations. Increasingly, with the emergence of new competing tourists' destinations, tourists are considering a range of competing destinations before making a final choice and, in this regard, they may compare the cost of living in the chosen destination against the costs of living in the competing destinations. On the other hand, some destinations may be complementary in nature rather than being substitutes

and as such they may instead witness an increasing number of visitors although the cost of living in the other destination is low.

Similarly, Lee et al. (1996) have contended that income and prices are considered among the most important determinants of tourism demand that very much rejoin the proposition of the classical economic theory, which propounds that tourism demand can be explained by the income of tourists, constituting the income effect, and the relative prices of goods and services with respect to their direct substitutes – the substitution effect. However, other ingredients such as marketing and promotional efforts, political situation, air access liberalisation exchange rates, and the occurrence of special events were also found to explain demand conditions.

Given the above, the aim of the present paper is to model the effect of relative prices, both between the countries of destination and of origin and also in relation to a few competing destinations in the region (substitution price effect), on tourism development for the island of Mauritius over the period 1983–2012. Such a dual relative prices analysis has been relatively ignored in the literature and our study is believed to supplement the literature on island states. Furthermore, the present study also methodologically departs from most existing work (few studies have used similar methodology, e.g. Mello & Nell, 2005; Saayman & Saayman, 2008; Bonham et al., 2009) in that it adopts a dynamic time series analysis to cater for the proposition that tourism demand is a dynamic phenomenon. Additionally, it also integrates the element of persistence in tourism and other endogenous and indirect links that may exist among the tourism determinants. Finally, the present research also investigates the impact of both the Mauritian own price elasticity and those of the competing islands on tourism flows.

The rest of the paper is structured as follows: Section 2 provides a background of tourism flows in Mauritius; Section 3 discusses the methodology and provides an analysis of the results; and Section 4 concludes.

2. The tourism industry in Mauritius: Facts and figures

There is unequivocal agreement that, over the last three decades, Mauritius has successfully undergone noticeable structural transformation which has helped the island move from a least developed country status to an upper-middle-income economy. Such an evolution is characterised by a development path from a single-crop economy – completely dependent on sugar – to diversification into manufacturing and, finally, into the services sector; and this has proved to be an ideal trajectory for the economic success of the country.

The main motivations behind the urge to diversify the economy have been the threat to agriculture, mainly sugar, ensuing from Europe's common agricultural (moving into services at the onset and only recently into real estate) policy and the potential detrimental effects of the Agreement on Textile and Clothing on the textiles and clothing sector. A stable political system, along with a strong commitment to industrialisation and structural change by deliberately using industrial policies across various administrations, effective governance institutions and less corruption than the developing country average, further contributed to make the difference and resulted in the Mauritian miracle of successful industrialisation and diversification (UNIDO, 2004). In addition, various measures and policies were devised that fostered

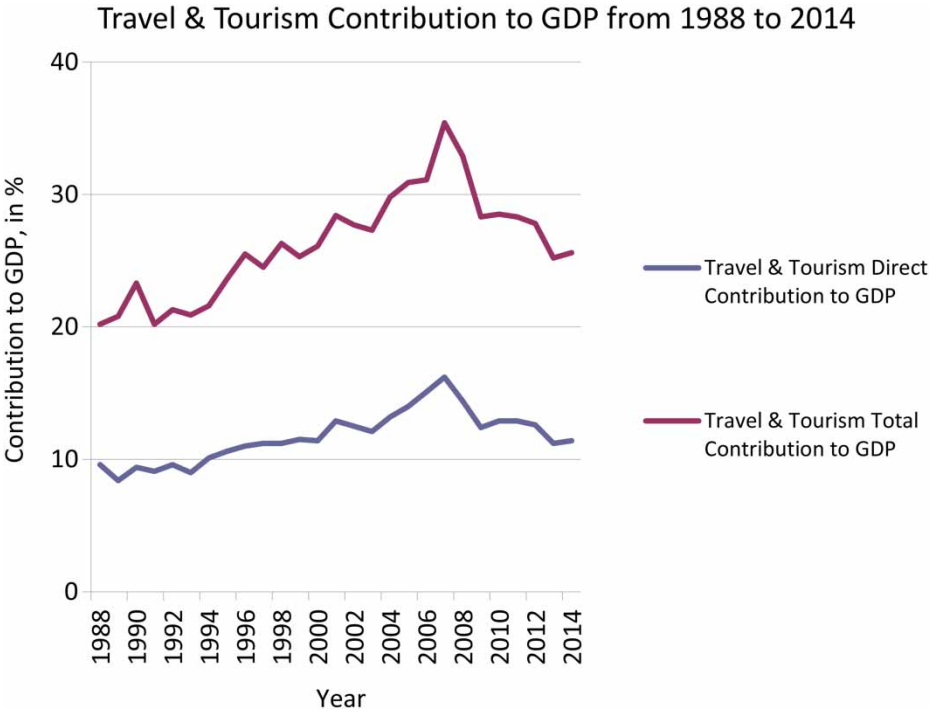


Figure 1: Percent share of tourism in GDP, 1988–2014.
Source: Bank of Mauritius Annual Reports (www.bom.mu).

investment expansion, both at a local level and an international level into alternate sectors such as the tourism sector and the financial services sector. Today, it can safely be argued that the tourism industry is one of the most important sectors contributing significantly to the gross domestic product (GDP) of the country (refer to Figure 1). In this regard, one can argue that the government has successfully been able to take advantage of the tropical island appeal, beautiful beaches, security and absence of tropical disease to promote Mauritius as an attractive destination.

In addition, the number of tourist arrivals since 1974 has increased more than 10-fold with numbers rising well in excess of 850 000 as at present. Similarly, tourism has substantially increased from a low of R11 million in 1974 to figures well in excess of R40 billion. However, the bulk of the tourist arrival in Mauritius is still highly concentrated towards the European countries. More than 50% of our tourism market originates from France, the United Kingdom, Italy and Germany, with France alone representing approximately 25% of the market share. Likewise, the Asian market is still at its embryonic stage with a share of 2.5 to 5% accounting for India alone. (Figure 2)

3. Methodology and analysis

3.1 Model specification and data source

This study is based on the small island state of Mauritius for the period 1983–2012. The economic model pertains to the estimation of a demand function for international tourism

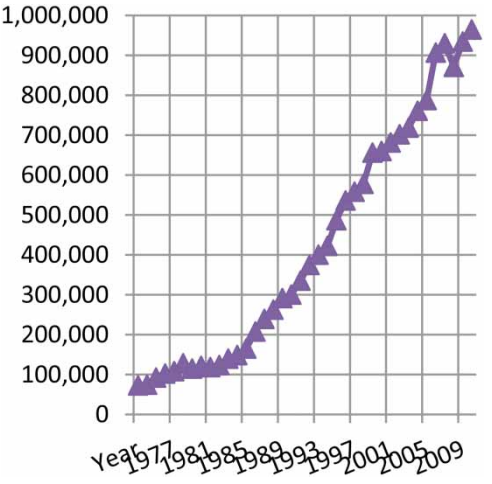


Figure 2: Tourist arrivals, 1974–2012.
Source: Central Statistics Office (www.statsmauritius.gov.mu).

including relative tourism prices (both with respect to the destination and to its competitors). Our preferred model is consistent with the general literature (refer to Witt & Witt, 1995; Lim, 1997; Nordstrom, 2002; Eilat & Einav, 2004; Naudee & Saayman, 2004:121,156) and more particularly with Seetanah (2010) for the case of island economies. The function specified is thus as follows:

$$\mathrm{TR}_t = f(\mathrm{GDPH}_t, \mathrm{GDPF}_t, \mathrm{ROOM}_t, \mathrm{RELATIVE}_t, \mathrm{PRICECOMP}_t, \mathrm{CRISIS}_t) \quad (1)$$

The dependent variable, measured as the total number of tourist arrivals per annum (TR),[4] proxies the demand for tourism to Mauritius. The data were extracted from the Central Statistical Office of the country and the subscript reflects the time dimension. (Figure 3)

Urbanisation and the development level of a destination country are an important ingredient for the attraction of tourists, especially those from developed countries. Indeed, it is believed that visitors who are already using and enjoying a decent level of infrastructure and development in their home country may require some minimum of the same when choosing their destination. This is proxied by the income of the destination country (GDPH) and the data are obtained from the Central Statistical Office. (Figure 4)

Income of origin (GDPF) is included in the model as a major determinant of leisure travel. Indeed, recreational overseas travel remains relatively expensive and is often considered a luxury good. As such, the higher the income potential of prospective tourists, the more the likelihood to undertake overseas vacations. This is measured as the weighted average real GDP per capita of the origin country in each year of study. Such a variable reflects a measure the responsiveness of the travelling habits of people

[4]This study has also made use of 'tourism receipts' as an alternative dependent variable to proxy tourism development and the results obtained are, on the whole, similar to those reported in this research.

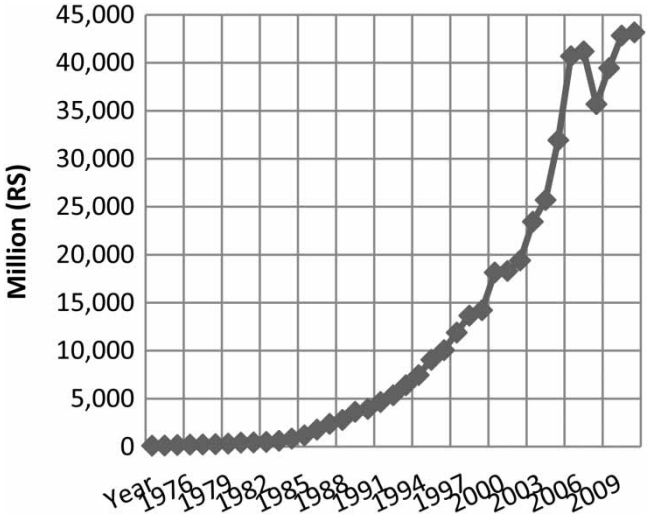
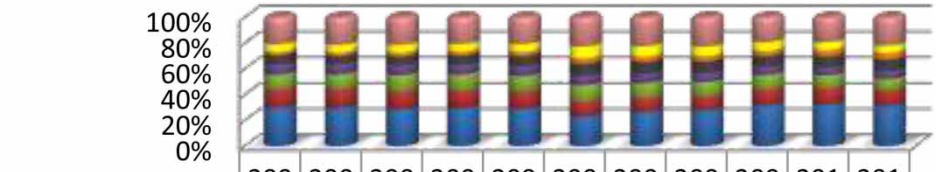


Figure 3: Tourism receipts, 1974–2012.
Source: Central Statistics Office (www.statsmauritius.gov.mu).



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Others	20.9	21.4	21.4	20.7	20.8	22.7	22.5	22.7	19.3	19.3	22.0
Italy	5.7	5.6	5.7	5.7	5.7	8.8	7.7	7.1	6.5	6	5.5
India	2.9	3.1	3.6	3.4	3.9	4.8	4.7	4.7	4.5	5.3	5.6
South Africa	7.3	6.3	6.5	7.3	7.7	9	9	9.1	8.5	8.7	8.9
Germany	7.7	7.9	7.7	7.3	7.4	7.3	7.2	6.6	5.9	5.7	5.8
United Kingdom	11.8	11.8	13	12.9	12.5	13	11.8	11.6	11.7	10.4	9.1
Reunion Island	13.8	14.1	13.6	13.4	13	11.3	10.6	10.3	12	12.3	11.7
France	29.9	29.8	28.5	29.3	29	23.1	26.5	27.9	31.6	32.3	31.3

Figure 4: Percent distribution of tourist arrivals by country of residence, 2001–12.

in the origin country following a change in their income and wealth. GDPF was generated constructed from the Penn World Table 7.1 (Heston et al. 2012). World Development Indicators (World Bank 2013) and International Financial Statistics (International Monetary Fund 2014). We used the GDP per capita of our major markets and computed an average GDP per capita, weighted by the number of tourism arrivals from each of these origin countries.

To measure tourism infrastructure, this study used hotel rooms (ROOM) available in the country, as this is a reflection of the capacity of the tourism sector. Indeed, higher room numbers implies greater capacity and is likely to enhance the competitive level of a country's tourism sector (particularly in terms of pricing and service quality). Naudee & Saayman (2004) also posited that a critical number of hotels and rooms are required for airlines to operate regular flights to a destination. The time series on the on the number of rooms was accessed from the Central Statistical Office of the country.

'CRISIS' is included in the model to account for the world economic recession that started in 2008 (Mauritius being heavily dependent on tourism export). A dummy variable, taking the value of one for the years of economic crisis (2008–11) and zero otherwise, was thus used to extract the effect of such adverse effects.

One central focus of this study relates to the fact that tourists consider the price and cost of living in the destination country, relative to the costs of living in the country of origin and in relation to substitute destinations, in the choice decision of their destination country. As such, two types of prices have been considered in this study: namely the relative price between the country of destination and the country of origin; and also the relative price between different competing destinations, which generates the substitution price effect. Tourists usually would incur costs related to accommodation, food, shopping and tours among others and they are likely to compare prices in the destination country relative to their home country or region. This may impact on their decision to travel, which will depend on the relative prices between the two areas. To proxy for relative tourism prices (cost of living) in the destination country relative to the costs of living in the country of origin, this study follows the work from Eilat & Einav (2004) and Naudee & Saayman (2004) and employs the consumer price index of a destination country adjusted for by the US$ exchange rate. As Naudee & Saayman (2004:121,156) put it: 'the inverse inference of the above depicts how many baskets of goods a tourist has to give up in his home country in order to buy a basket of goods in the destination country'. The above proposed measure related to relative prices also importantly takes into account possible changes in the real exchange rate over time as well as the cross-sectional variations in the cost of travel.

Competing destinations' relative price is also predicted to have an influence on the demand for international tourism for its competitor. More precisely, an increase in general price level in one destination may 'push' visitor numbers to substitute destinations Tourists are likely to take into account potential competing destinations before making their final choice and will often compare the cost of living in the chosen destination relative to the costs of living in competing destinations.

We include the average relative prices of our competitors (PRICECOMP), measured as the ratio of the average consumer price indices between the competing destinations offering similar tourism products in the region, essentially beach tourism (Seychelles/ Maldives) and their major tourist countries of origin. Such a ratio proxies the average cost of visits in competing destinations and permits the measuring of the impact of price changes in competing foreign destinations for Mauritius. Such relative prices proxies (average of both competing islands) were constructed from the Penn World Table, selected countries' Central Statistical Office, World Development Indicators and International Financial Statistics. It should be noted that this measure is not without its limitations and that the ideal measure should be including other islands in the region offering similar products, but this was not possible due to

unavailability of data. Other proposed measures in the literature are related to the costs of package tours (to proxy tourism prices) and also the 'Bic Mac Index', which is an index of price competitiveness of different countries. However, such alternative indices are not available for the case of Mauritius and its direct competitors under study.

3.2 Econometric modelling

The regression model of Equation (1) can be subsequently written as:

$$\begin{aligned} \mathrm{tr}_t = {} & \beta_0 + \beta_1 \mathrm{gdph}_t + \beta_2 \mathrm{gdpf}_t + \beta_3 \mathrm{room}_t + \beta_4 \mathrm{relative}_t + \beta_5 \mathrm{pricecomp}_t \\ & + \beta_6 \mathrm{crisis}_t + \varepsilon_t \end{aligned} \tag{2}$$

It is noteworthy that Equation (2) is of a log-linear nature (for ease of interpretation, i.e. in percentage changes) and the lowercase letters denote the natural logarithm of the respective variables.

3.3 Tests of stationary and co-integration

The augmented Dickey & Fuller (1979) and Phillips & Perron (1988) unit-roots tests confirmed that the data series under investigation are non-stationary in levels but stationary in the first difference (refer to Tables A1 and A2 in Appendix A). As Stock (1987) posited, variables may still be co-integrated even if they are non-stationary in level form but stationary in first difference. Subsequently we performed a test for co-integration, using the Johansen procedure with an optimal lag length of one. Both the trace value and the maximum eigenvalue tests validated the fact that that there is one co-integrating vector at the 5% level within the variables equation (see Table A3 in Appendix A).

Engle & Granger (1987) argued that regression using variables in their first difference (and co-integrated) would result in a misspecification error and they showed, using the error-representation theorem, that presence of co-integration implies an error correction model. Consequently, to analyse potential dynamism within our hypothesised relationship, the vector autoregressive model was formulated in a vector error correction model (VECM) whereby the lagged errors of the co-integrating regression were included in the regression equation as explanatory variables. With the presence of co-integration in the international tourism demand equation, the normalised co-integration relationship is given by Equation (3) and this is used to analyse the short-run dynamics:

$$\Delta Z_t = \Gamma_1 Z_{t-1} + \Gamma_2 \Delta Z_{t-2} \ldots\ldots + \Gamma_{k-1} \Delta Z_{t-k-1} + \Pi Z_{t-k} + \mu + \eta_t \quad t = 1 \ldots .t \tag{3}$$

where $Z_t = [\mathrm{tr}, \mathrm{gdph}, \mathrm{gdpf}, \mathrm{room}, \mathrm{relative}, \mathrm{pricecomp}, \mathrm{crisis}]$,

ΔZ_t represents the vector of growth percentages of the seven variables, the Γ values are parameters to be estimated, Δ is a difference operator, η_t is a vector of unanticipated impulses, k refers to the dimension of the vector autoregressive model ($k = 2$), μ is a constant and t is time. Π represents the long-run parameter matrix with rank r (the number of co-integrating vectors). Since co-integration is present among the variables, the matrix Π can be segregated into$\alpha\beta^{/}$, with β representing a matrix of long-run

parameters and α representing a matrix of short-run adjustment parameters. The optimum lag (k = 2) was chosen using Schwarz Bayesian Criteria.

Ericsson et al. (1998:377) analysed the concepts of possible weak and strong exogeneity in the context of conditioning variables for VECMs and argued that 'weak exogeneity is a sufficient condition for the efficient inference on the parameters of interest in the conditional model'. We performed weak exogeneity tests on each of the equations (this is equivalent to the testing if $\alpha_1 = 0$, $\alpha_2 = 0$, $\alpha_3 = 0$, $\alpha_4 = 0$, $\alpha_5 = 0$ and $\alpha_6 = 0$). The resulting Wald test reported chi-square values of 113.63, 10.43, 3.467, 2.43, 5.54 and 6.34 respectively, and such results imply the rejection of the null hypothesis of weak exogeneity at the 5% significance level in all cases (suggesting an unchanged system of equation).

3.4 Analysis

The long-run estimates are presented in Table 1.

The coefficients β of the respective explanatory variables represent estimates of the co-integrating vector, normalised on output. They yield the long-run impact of the various determinants of international tourism. More importantly in this case, it is observed that both measures of price competitiveness are significant. As far as the price elasticity in relation to the tourists' home country is concerned, the negative and significant value of the proxy 'relative' entails that tourists are sensitive to the price level in Mauritius (tourists will be negatively influenced as the cost of living goes up in Mauritius relative to their country). In comparison with recent works, the reported estimate appears to be on the lower side (see Lim, 1997; Eilat & Einav, 2004; Naude & Saayman, 2004 – to include those more recent among others). Indeed, the fact that the relative price level in Mauritius is generally lower as compared with the countries of origin of the tourists (mostly from Europe) may provide some explanations for such a low elasticity level. Moreover, the generally depreciating nature of the island's exchange rate vis-à-vis its main markets may also be another contributory element.

Interestingly, the variable 'pricecomp', a measure of the relative average cost in the different competing destinations, is also positive and significant. This indicates that relative price changes in competing foreign destinations matters to a certain extent. This can also be interpreted as the cross-elasticity of demand for tourism and the low value

Table 1: Long-run estimates

Variable	β (average pricecomp)	β (pricecomp, Seychelles)	β (pricecomp, Maldives)
tr	1	1	1
gdph	0.45**	0.54**	0.51*
gdpf	1.16**	1.03**	1.19**
room	0.64*	0.55*	0.63*
relative	−0.316**	−0.42*	−0.37*
pricecomp	0.28*	0.38*	0.22**
crisis	−0.11**	−0.15***	−0.13*

*Significant at 10%.

**Significant at 5%.

***Significant at 1%.

of the coefficient may imply a low level of substitutability of the Mauritian tourism market vis-à-vis the region's competing markets, at least based on relative price variables.

The variable 'rooms', representing a proxy for tourism infrastructure and supply side elements, is observed to have a positive and significant sign validating the fact that increased hotel capacity is associated with more arrivals in Mauritius. The magnitude and significance of the coefficient 'gdpf', a measure of income in the country of origin and thus income elasticity, reveals that tourism to the island is indeed a luxury product. As in most empirical studies, income appears to be the most relevant determinant of tourism revenues (see Lim, 1997). The coefficient 'gdph', a measure of the destination's level of development, is also influential in the tourist selection decision. This mainly relates to the fact that tourists demand (as compared with their countries) a minimum level of development and facilities to enhance their tourism experience (see Cohen, 1978). The world economic crisis ('crisis'), as expected, had a significant negative impact on tourism development in the country.

We also extended the analysis to investigate two additional specifications with the average competitors' relative price proxy (average of Seychelles and Maldives) being replaced by a relative price proxy of Seychelles and subsequently in the third specification by the relative or substitute price proxy of Maldives. Such an analysis is believed to shed some more light as to which of these two competitors' relative prices may have a relatively bigger impact on Mauritian tourism. Referring to the third and fourth columns, it can be observed that indeed Seychelles' relative price appears to have a relatively bigger influence on Mauritian tourism (implying that Seychelles poses the greatest threat in terms of price competitiveness) as witnessed by the respective coefficients.

3.4.1 Estimates of the error correction model

In this section, we proceed with the VECM formulated and subsequently estimated. The estimated results are presented in Table 2 (the results passed the residual autocorrelation at the 5% significance level). From the tourism equation (i.e. Equation (2)), all of the variables are significant and have the required signs in explaining the short-run variation in tourist arrivals. Interestingly changes in both 'relative' and 'pricecomp'

Table 2: Estimates of the error correction model

Variable	Δtr	Δgdph	Δgdpf	Δrooms	Δrelative	Δpricecomp
Δtr_{t-1}	0.313*	0.34*	0.16	0.17*	0.11*	0.24
$\Delta gdph_{t-1}$	0.26**	0.446**	0.143	0.13*	0.06*	0.07
$\Delta gdpf_{t-1}$	0.375*	0.24**	0.37***	0.21*	0.12	0.21
$\Delta rooms_{t-1}$	0.24**	0.24*	−0.16	0.57**	0.08	0.11
$\Delta relative_{t-1}$	−0.24*	−0.165*	−0.25	−0.18**	0.25*	0.12
$\Delta pricecomp_{t-1}$	0.11	0.12*	−0.31	0.13*	−0.17	0.37**
v_{t-1}	−0.65***	−0.125	−0.26**	−0.57*	−0.61*	−0.57***
R^2	0.72	0.72	0.52	0.61	0.74	0.43

*Significant at 10%.

**Significant at 5%.

***Significant at 1%.

are associated with changes in the tourist arrival respectively after one year and they are observed to have the expected theoretical signs. Such a finding also points to the fact that relative prices also matter in the short run (in our case, a one-year period), albeit to a lesser extent, since the time frame between the choice of a destination and the time of travel is relatively short. In this regard, empirical studies from Li et al. (2005) also found that long-run values of both income and own-price elasticity are relatively greater than their short-run parameters, implying that tourists may be more sensitive to income and price changes over the long run. It is noteworthy that we also replicated the analysis whereby the separate competitors' relative prices (namely for Seychelles and Maldives) were included in alternative specifications. Overall, similar results as for the case of the long run were obtained in our respective VECMs.[5]

The lagged arrivals variable is positive and significant, suggesting the presence of persistence in arrival from certain countries, following the positive experience of tourists. Referring to column 2, it is also interesting to note that the adjustment parameter is -0.35 $(1 - 0.65)$, which indicates a relatively average adjustment speed of the system to its long-run equilibrium (thus suggesting dynamism in the system). Error correction model-based causality and impulse response analysis confirmed the above results to an overwhelming extent.

Moreover, as regards the 'relative' equation (sixth column), it can be observed that tourism arrival appears to affect the relative prices of the country (although not to a great extent), suggesting the presence for bi-causality between these two variables. However, no such relationship could be discerned for the 'pricecomp' (last column) equation. Interestingly, the present framework also permits the investigation of other possible indirect relationships. For instance, referring to the 'rooms' equation, one may argue that relative prices ('relative') may have a bearing on tourism infrastructure, since a fall in our price competiveness (higher relative prices) may negatively impact on tourist arrivals and thus on tourism infrastructure and hotels, which may in turn further negatively impact on the number of tourists visiting the island. Finally, the positive coefficient of the 'pricecomp' variable would tend to indicate that increasing tourism prices in competing destinations may lead to an increase in tourist arrivals in Mauritius.

It is noteworthy that that the system of equation clears the diagnosis tests related to the Lagrange multiplier test of serial correlation and that of heteroscedasticity, which was drawn on the regression of squared residuals on squared fitted values. Moreover, there is evidence that the residuals are normally distributed based on the Jarque–Bera statistic, with the reported kurtosis and skewness values confirming that residuals are normally distributed.

4. Summary and policy implications

The aim of the present study was to assess the effect of relative prices, in relation to both the relative price between the country of destination and country of origin and also the relative price between a couple of competing destinations in the region, on tourism flows development for the island state of Mauritius over the period 1983–2012. The study methodologically departed from most existing work in that it adopts a dynamic

[5]Detailed results can be obtained from the authors upon request.

time series analysis, namely a vector autoregressive model, to account for the fact that tourism flows is a dynamic phenomenon.

Results from the analysis showed that both relative prices measures have a long-run impact on international tourism flows. Thus, the negative and significant own price elasticity (a measure of price elasticity) implied that tourists were somewhat sensitive to the price level of the destination country; albeit the estimate being on the lower side as compared with existing literature. This could be explained by the fact that the relative price level of the island remained generally lower than in most countries from which the tourists emanated and this was accentuated by the generally depreciating nature of the island currency exchange rate vis–à–vis our main market currencies.

Our measure of the relative average costs in the different competing destinations was also reported to be positive and significant, indicating that the relative price changes in foreign destinations competing with Mauritian tourism matters to a certain extent. Interpreted as the cross-elasticity of the demand for tourism, the low value of the relevant coefficient implied a rather low level of substitutability of Mauritian tourism and the region's tourism competitors. Finally, tourism infrastructure, income in country of origin and the island's level of development were also validated to be important ingredients in the tourist selection decision.

References

Bonham, C, Gangnes, B & Zhou, T, 2009. Modeling tourism: A fully identified VECM approach. International Journal of Forecasting Elsevier 25(3), 531–49.

Cohen, E, 1978. Impact of tourism on the physical environment. Annals of Tourism Research 5(2), 215–37.

Crouch, GI, 1994a. The study of international tourism demand: A review of findings. Journal of Travel Research 33(1), 12–23.

Crouch, GI, 1994b. The study of international tourism: A survey of practice. Journal of Travel Research 32(4), 41–55.

Crouch, GI, 1995. A meta-analysis of tourism demand. Annals of Tourism Research 22(1), 103–18.

De Mello, MM & Nell, KS, 2005. The forecasting ability of a cointegrated VAR system of the UK tourism demand for France, Spain and Portugal. Empirical Economics 30(2), 277–308.

Dickey, DA & Fuller, WA, 1979. Distributions of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association 74(366), 427–31.

Durbarry, R, 2002. The economic contribution of tourism in Mauritius. Annals of Tourism Research 29(3), 862–5.

Durbarry, R, 2004. Tourism and economic growth: The case of Mauritius. Tourism Economics 10(4), 389–401.

Eilat, Y & Einav, L, 2004. Determinants of international tourism: A three-dimensional panel data analysis. Applied Economics 36(12), 1315–27.

Engle, R & Granger, C, 1987. Co-integration and error correction: Representation, estimation and testing. Econometrica 55(2), 251–76.

Ericsson, NR, Hendry, DF & Mizon, GE 1998. Exogeneity, cointegration and economic policy analysis: An overview. Journal of Business and Economic Statistics, 6(4), 370–87.

Forsyth, P & Dwyer, L, 2009. Tourism price competitiveness. In Jennifer, Blanke & Thea, Chiesa (Eds.), The travel and tourism competitiveness report 2009: Managing in a time of turbulence, Chapter 1.6, World Economic Forum, Geneva, Switzerland.

Gomezelj Omerzel, D, 2011. Stakeholders' understanding of factors influencing tourism demand conditions: The case of Slovenia. Tourism and Hospitality Management 17(1), 1–17.

Heston, A, Summers, R & Aten, B, 2012. Penn World Table Version 7.1. Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, Philadelphia.

Ibrahim, M, 2011. The determinants of international tourism demand for Egypt: Panel data evidence. European Journal of Economics, Finance and Administrative Sciences 30, 1450–2275.

International Monetary Fund, 2014. International Financial Statistics. IMF, Washington, DC.

Kareem, OI, 2009. A dynamic panel analysis of the effects of international tourism exports on African Economic Growth. Paper presented at the 14th African Econometrics Society (AES) conference, Abuja, Nigeria.

Lea, J, 1988. Tourism and development in the third world. Routledge, London.

Lee, C-K, Var, T & Blaine, TW, 1996. Determinants of inbound tourist expenditures. Annals of Tourism Research 23(3), 527–42.

Li, G, Song, H & Witt, SF, 2005. Recent developments in econometric modelling and forecasting. Journal of Travel Research 44, 82–99.

Lim, C, 1997. Review of international tourism demand models. Annals of Tourism Research 24(4), 835–49.

Lim, C, 2006. A survey of tourism demand modelling practice: Issues and implications. In Dwyer, L & Forsyth, P (Eds.), International handbook on the economics of tourism. Edward Elgar Publishing, Gloucester, England, pp. 45–72.

Lim, C & McAleer, M, 2001. Cointegration analysis of quarterly tourism demand by Hong Kong and Singapore for Australia. Applied Economics 33(12), 1599–619.

Naudee, WA & Saayman, A, 2004. The determinants of tourist arrivals in Africa: A panel data regression analysis, Paper presented at the international conference, Centre for the Study of African Economies, University of Oxford.

Nordstrom, J, 2002. Dynamic and stochastic structures in tourism demand modeling. Umea Economic Studies No 596, Umea University, Sweden.

Phillips, PCB & Perron, P, 1988. Testing for a unit root in time series regression. Biometrica 75(2), 335–46.

Saayman, M & Saayman, A, 2008. The determinants of inbound tourism to South Africa. Tourism Economics 14(1), 81–96.

Seetanah, B, 2010. Assessing the role of marketing promotion in tourism development in a dynamic time series framework. International research symposium in service management. Balaclava, Mauritius.

Sinclair, T, 1998. Tourism and economic development: A survey. Journal of Development Studies 34(5), 1–51.

Stock, JH, 1987. Asymptotic properties of least squares estimators of cointegrating vectors. Econometrica 55, 1035–56.

UNIDO, 2004. Industrial development report 2004: Industrialization, environment and the millennium development goals in Sub-Saharan Africa. UNIDO, Vienna.

Uysal, M & Crompton, JL, 1984. Determinants of demand for international tourist flows to Turkey. Tourism Management 5(4), 288–97.

Witt, S & Witt, C, 1995. Forecasting tourism demand: A review of empirical research. International Journal of Forecasting 11(3), 447–75.

World Bank, 2013. World Development Indicators 2013. World Bank, Washington, DC. doi:10.1596/978-0-8213-9824-1

Appendix A

Table A1: Summary results of unit root tests in level form: augmented Dickey & Fuller (ADF) and Phillips & Perron (PP) tests

Variable (log)	Lag selection	ADF	PP	Variable type	ADF (time trend (t))	Variable type
tr	0	+0.24	+0.62	I(1)	−1.87	I(1)
gdph	1	−0.15	−0.94	I(1)	−1.68	I(1)
gdpf	0	−0.27	−0.79	I(1)	−1.39	I(1)
room	1	1.334	1.68	I(1)	1.95	I(1)
relative	1	−1.43	−1.67	I(1)	−1.97	I(1)
pricecomp	1	+1.62	+1.44	I(1)	−1.42	I(1)

Table A2: Summary results of unit root tests in first difference: augmented Dickey & Fuller (ADF) and Phillips & Perron (PP) tests

Variable (log)	Lag selection	ADF	PP	Variable type	ADF (with time trend (t))	Variable type
Δtr	0	−5.22	−6.72	I(0)	−4.55	I(0)
Δgdph	0	−4.76	−5.23	I(0)	−4.64	I(0)
Δgdpf	0	−4.87	−6.55	I(0)	−5.33	I(0)
Δroom	0	−3.45	−5.45	I(0)	−434	I(0)
Δrelative	0	−3.44	−4.86	I(0)	−3.43	I(0)
Δpricecomp	0	−4.87	−6.43	I(0)	−4.44	I(0)

Table A3: Co-integration test result from Johansen procedure

	Null hypothesis	Alternative hypothesis	Test statistic	Critical value 5%	Critical value 10%
Maximal eigenvalue of the stochastic matrix	$r = 0$	$r = 1$	45.14	40.65	37.34
	$r \leq 1$	$r = 2$	29.38	34.34	31.84
	$r \leq 2$	$r = 3$	24.69	28.34	25.86
	$r \leq 3$	$r = 4$	17.34	22.76	19.32
	$r \leq 4$	$r = 5$	11.43	15.34	13.12
	$r \leq 5$	$r = 6$	6.87	9.18	7.43
Trace of the stochastic matrix	$r = 0$	$r \geq 1$	104.87	102.34	97.43
	$r \leq 1$	$r \geq 2$	69.14	75.66	71.43
	$r \leq 2$	$r \geq 3$	44.97	53.23	49.43
	$r \leq 3$	$r \geq 4$	28.34	34.43	31.87
	$r \leq 4$	$r \geq 5$	16.76	20.75	17.97
	$r \leq 5$	$r = 6$	5.34	9.65	7.59

Notes: Johansen maximum likelihood procedure of co-integrating regression. tr = (gdph,gdpf,room,relative,pricecomp): number of co-integrating vectors(s) using the co−integration likelihood ratio.