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An ARDL bounds test approach to modelling tourist expenditure in South Africa

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This research follows micro-economic theory, according to which demand for a product is influenced by price, substitute prices and income, to determine the sensitivity of inbound tourist expenditure in South Africa to changes in these variables. Tourist expenditure per person per day from different origins forms the dependent variable. Using quarterly time-series data from 2003 to 2010, this article models inbound tourist expenditure from key source markets for the country. Previous research based on arrivals finds that South Africa is a relatively price-insensitive destination. However, this research shows that this is not the case for all markets. It mostly confirms the income elasticity of South Africa as a destination.

Keywords: tourism demand; price elasticity; income elasticity; competitiveness; bounds test; South Africa

It is generally accepted that tourism is one of the largest industries in the world, and despite volatile economic conditions, travel remains on the increase. International tourism gained momentum in the late 1980s and has increased significantly since then. Like many other developing nations, the South African government realized in the early 1990s that the country has huge potential to become a top tourism destination and is a useful tool for promoting the socio-economic development of a country (Saayman and Saayman, 2001; Phakdisoth

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and Kim, 2007; Sahli and Nowak, 2007). Some of the positive aspects associated with tourism development include job creation, poverty reduction, infrastructure improvements and skills development, to name but a few.

Since the democratic elections in 1994, the South African government has introduced several policy documents to address development and growth in the country, namely GEAR (Growth, Employment and Redistribution: A Macroeconomic Strategy), ASGISA (Accelerated and Shared Growth Initiative of South Africa) and, most recently, the New Growth Path. In each of these documents, tourism is identified as a key area in order to promote growth and development in the country. These policies have prioritized tourism as one of the key pillars of the economy. In line with these developments, South African Tourism (SAT), the official tourism marketing authority, has also developed strategies to increase tourist arrivals and one of those strategies is attracting major events – be it sporting events, such as the FIFA Soccer World Cup 2010, or conferences, such as COP17 (Conference on Climate Change) 2011.

As a result of these and other initiatives, as well as the country's natural assets, tourist arrivals in South Africa have shown a steady growth since 1994 (see Figure 1). In 1994, South Africa held the 52nd position on the list of most visited destinations, but over the past 16 years, the country has improved by 20 positions to take the 32nd position in 2010 (UNWTO, 2011). On the African continent, however, South Africa is the most visited destination.

Even though the number of tourist arrivals in a country are regularly used in debates for budgets as well as an indicator of successful destination marketing campaigns, from a sustainability point of view it is not the number of tourists or visitors that are important, but rather the amount that they spend. Given the stiff competition between destinations, as well as dealing with several external factors that inhibit travel, such as high fuel prices and political unrest in several corners of the world, sustainability is becoming a greater challenge than ever before (Shaw, 2010). Uys (2005) and Kastenholz (2005) add that the most important aspect is to achieve sustainable growth in tourism revenue. Increasing visitor statistics does not always translate into an equal increase in revenue from tourism and tourism to South Africa illustrates this point. In 2010, South Africa held the 32nd position as the most popular destination, but in terms of receipts, it is 29th on the list of tourism earners. Australia, in contrast, occupied the 41st position on arrivals and 8th on receipts (UNWTO, 2011).

Although arrivals in South Africa have increased substantially over the past few years, compared to, for example, Australia, the revenue derived from tourist spending is still lagging behind. Most tourism demand studies measure tourism demand by means of arrivals and this is also true for research on tourism demand for South Africa. By using expenditure rather than arrivals as the dependent variable, the research aims to contribute towards tourism demand literature by exploring the differences in elasticities for the different measures of demand. Furthermore, this approach is embedded in micro-economic theory, since the individual revealed demand for a destination is taken as the dependent variable, that is, not total tourist spending, but spending per person, per day. The current research is also based on survey data rather than aggregate country tourist expenditure data. This is a key feature of this research that distinguishes it from other similar research (Song *et al*, 2010).

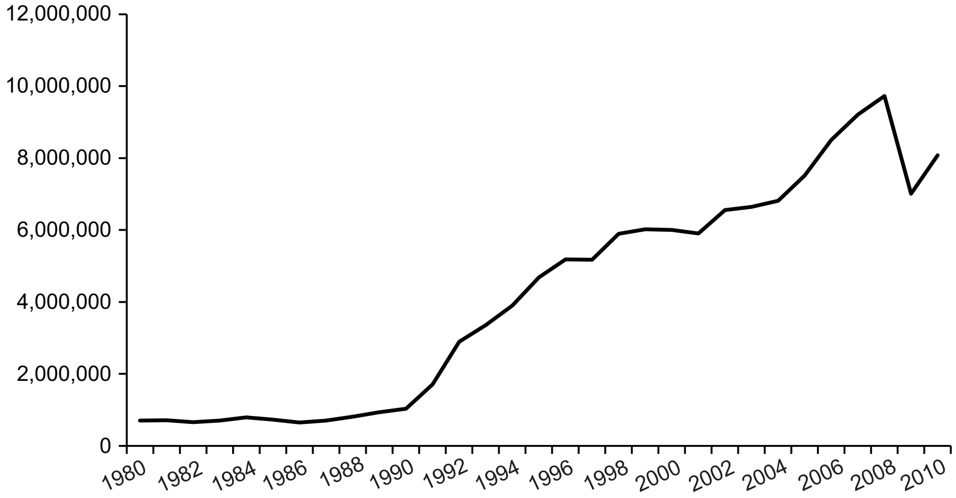

Figure 1. Foreign tourist arrivals in South Africa, 1980–2010.
Source of data: Statistics South Africa.

The purpose of this article is to determine the sensitivity of inbound tourist expenditure in South Africa to changes in prices, income and other variables. This research therefore follows micro-economic theory, where demand (as measured by expenditure) for a product is influenced by price, substitute prices, income and tastes of consumers. Results from such an analysis can assist in policy formulation (Wilton and Nickerson, 2006), strategic planning and marketing (Saayman and Saayman, 2006) as well as product development (Kruger, 2009). Additionally, Naudé and Saayman (2005) state that most of this type of research focuses on developed countries with little attention given to developing countries.

The remainder of the article is structured as follows. A brief literature review is followed by a discussion of the data and method used. In the fourth section, the results of the estimations are presented and conclusions are reached in the fifth and final section.

Literature review

Phakdisoth and Kim (2007) state that each destination has its own unique characteristics, which influence tourists' decision-making processes in their selection of a destination, and therefore the demand for a destination. Tourism demand, according to Fretchling (2001), can be regarded as a measure of visitors' use of goods or services. Song *et al* (2010, p 63) add that the concept of tourism demand follows from economic theory and can be viewed as the need to make use of a service, or to acquire a commodity, and that this need translates into a purchase of the good or service. Song *et al* (2010) add that tourism demand can be measured by means of tourist arrival or tourist expenditure data. There are a number of fundamental differences between these two data series, namely (i) expenditure is measured by means of surveys, while arrivals data is recorded on border entries; (ii) expenditure is more useful for government and economic impact assessment, while arrivals indicate changes in demand for businesses, and (iii) the two data series also show different patterns of evolution over time.

Most research on tourism demand focuses mainly on the modelling of tourist arrivals. Song and Li (2008) indicate that this is mainly due to the availability of data, since secondary data sources are most commonly used in these models. These authors affirm that using econometric models to explain tourism demand provides useful economic interpretations, policy recommendations as well as a measure to evaluate policy performance. Lim (1997, p 841) reviewed 100 empirical studies on tourism demand and concludes that the explanatory variables that are the most popular to be included are, in order of importance, income, relative prices, some qualitative factor and transport.

In terms of tourism demand for South Africa, the focus has also been on tourist arrivals. Tourism demand for South Africa has been modelled by, among others, Saayman and Saayman (2008) and Seetanah *et al* (2010). Results from these studies indicated that income is the main determinant of arrivals, and that tourism to South Africa is relatively income elastic. Both studies find relative inelastic price elasticities, while Seetanah *et al* (2010) find positive and low cross-price elasticities as well as a negative relationship between arrivals and distance. This is supported by the negative effect result for transport cost by Saayman and Saayman (2008). Additionally, Saayman and Saayman (2008) find strong positive relationships between South Africa's attributes (infrastructure and climate) and arrivals. The literature review furthermore revealed that no study to date has been done for tourist expenditure in South Africa. Concerning this, Song *et al* (2010) showed that tourism expenditure as dependent variable is more likely to produce significant results in terms of price elasticity, compared to arrivals as dependent variable, and expenditure also produces more accurate forecasts of tourism demand. South Africa, as a developing destination, provides an interesting case study compared to the existing literature.

Studies using expenditure data as dependent variable to explain inbound tourism include those of Phakdisoth and Kim (2007) for inbound tourism to Laos, Lee *et al* (1996) for inbound tourism expenditure in South Korea, and Song *et al* (2010) for tourism demand in Hong Kong. The results from Lee *et al* (1996) show that income is the main determinant of tourist expenditure in South Korea, followed by price. The income elasticities found are quite high, ranging from just over 1 to elasticities of 14. The elasticities for the price variables are negative and range between 0.5 and 7, with most elasticities greater than 1 (that is, elastic). However, Phakdisoth and Kim (2007) found both income and price elasticities for tourism expenditure in Laos to be less than one (in absolute value terms), indicating inelastic demand with respect to both price and income.

In a comparative study completed by Song *et al* (2010), results showed that prices play a more prominent role in determining tourism expenditure relative to tourist arrivals, while income is more prominent in explaining arrivals. The price elasticities all tend to be above unity (in absolute value terms), indicating a price elastic demand, when expenditure is considered. However, this was not always the case when arrivals were considered.

Methodology

Model and data

According to Wu *et al* (2010), the tourist faces three stages of decision making in their expenditure: stage 1 entails how much of their budget to allocate between non-tourism goods and tourism goods; stage 2's decision must determine how much of their tourism budget to allocate to a specific destination; stage 3 focuses on the allocation of this last budget between goods and services in the destination of choice. This research addresses the second stage of decision making, that is, how much should be spent in this destination?

Following economic theory, spending on a product depends mainly on the price of the product, as well as the income of the consumer and the price of substitute and complementary products. Additionally, tastes and preferences also play a role in determining demand. Bonham *et al* (2009, p 533) indicate that incorporating these micro-economic foundations in the demand for a destination results in the following demand function:

$$D_{ij} = F(Y_i, P_i, P_j, P_j^s, Z), \quad (1)$$

where D_{ij} indicates the demand for destination country j by origin country i; Y_i is the income of the origin country, P_i and P_j the price level in the origin and destination country respectively; P_j^s is the price level in competing destinations and Z is a vector of other factors affecting the demand for the destination.

The demand function can be rewritten in terms of real income and relative prices if homogeneity is assumed (Bonham *et al,* 2009, p 533):

$$D_{ij} = F(Y_i/P_i, P_j/P_i, P_j^s/P_i, Z). \quad (2)$$

This paper follows this standard economic specification and models the demand for South Africa (specified as average expenditure per day in the destination) as a function of real income, relative prices and relative substitute prices.

The demand for South Africa is measured in terms of spending per day on South African products and services within the country by international tourists. The expenditure data are compiled through surveys of visitors at points of departure by South African Tourism and spans from January 2003 to December 2010. Only direct spending in South Africa (excluding capital expenditure) is included to derive average total spending per respondent in the country. The average total spending is divided by the average number of days spent in the country (also compiled by South African Tourism from the surveys) in order to obtain a 'spending per day' variable. Since the data is based on surveys, it does not capture total spending by the foreign country in South Africa due to tourism, but rather the average total spending per visitor. To control for bias caused by changing length of stay, spending per person per day is calculated. The monthly data is converted into quarterly average spending in order to be compatible with income data. Therefore, this is clearly a micro-economic approach in which average individual spending is analysed instead of total spending.

Real gross domestic product (GDP) of the origin country is used as a measure of real income. The data series were obtained from the IMF's International Financial Statistics (IFS) database and the real GDP index (2005 = 100) series of all the origin countries were used.

Witt and Witt (1995) indicate that the tourist takes cognisance of two prices when visiting a destination, namely the price of reaching the destination, and the price of living in the destination. The first refers to transport cost and the price of oil (in US dollars) is used as a proxy for transport cost in this research. Again, the data was obtained from the IFS database. The second cost is the price of consumption at the destination. As a proxy, we use the real exchange rate (the nominal exchange rate adjusted for price differences) in order to capture the true cost differences between the origin and destination country, since high inflation may be offset by currency devaluations. The inflation series used are the two country's CPI indices, while the exchange rate is the bilateral exchange rate between South Africa and the origin country. The series is denominated in South African rand (ZAR). Again, the data was sourced from the IFS database. The relative price variable (P_t) was therefore compiled as follows:

$$P_t = (CPI_{it}/CPI_{jt})*er_t, \tag{3}$$

where CPI_i is the consumer price index of the origin country (2005 = 100), CPI_j the consumer price index of South Africa (2005 = 100) and er_t the nominal exchange rate, defined as ZAR for foreign currency (that is, direct quotation of the currency).

Tourism demand studies often take the price of the destination's closest substitutes that provide tourism products similar to that of the destination, into consideration. Three African destinations are combined to derive the substitute price, namely Kenya, Tanzania and Botswana. This series is only included in non-African arrival estimations, since Botswana is also an origin country used in the analysis. The substitute price is determined as follows:

$$P_t^s = \Sigma_{i=1}^n w_i(CPI_{it}/CPI_{jt})*er_{it}, \tag{4}$$

where CPI_i indicates the cost of living in Botswana, Kenya and Tanzania, CPI_j the consumer price index of South Africa, er_{it} the nominal exchange rate, defined as ZAR for foreign currency and w_i is the weight assigned to the various countries. In all instances the base year is 2005 and in this paper we use an equally weighted substitute price index.[1] Data were again obtained from the IMF's IFS database.

Naudé and Saayman (2005) indicate that tastes and preferences are often included in tourism demand studies through the inclusion of variables such as marketing expenditure (since the promotion of a country creates awareness), climate (since tourist activities such as skiing, beach holidays and hiking depend on a certain climate or weather conditions) and the infrastructure of the destination (roads, accommodation and entertainment, which attract certain types of visitors). However, we argue that these are all 'pull' factors (see Dann, 1977) that influence the decision to visit a destination and not necessarily spending at the destination. Therefore, it is not included in this analysis.

Models are estimated for the following countries: the UK, the USA, Germany, France, the Netherlands, Australia, Brazil and India. The rationale for including these countries are: European arrivals in South Africa form the bulk of the country's overseas arrivals (59.5% in 2010), with the UK as the country's main source market (33.9% of European arrivals in 2010). Germany (15.3% of European arrivals), France (8.9% of European arrivals) and the Netherlands (9.3% of European arrivals) are also part of the top five overseas markets of South Africa. The USA is the second most important source of overseas tourists for South Africa (12.6% of overseas arrivals in 2010), and the main market from the North-American continent. From South America, Brazilian tourists are the main source of tourists to South Africa (44.7% of arrivals from South America) and Australia fulfils this role from Australasia (84.2% of arrivals from the area). India is the main source of tourists from Asia to South Africa (27.6% of Asian arrivals in 2010).

While arrivals from Africa are the main source of international tourists to South Africa, data limitations make it difficult to model these markets. Swaziland, Lesotho, Mozambique and Zimbabwe (the top four African source markets of South Africa) have limited data available, making modelling practically impossible. Graphical plots of all the variables are illustrated in the Appendix and it is evident that the tourist expenditure variable (SPENDD1) does not show the severe seasonality that is often found in tourist arrivals data, although there are irregular components visible in the data as is often found in survey data.

Econometric method

A linearized demand function is estimated, with expenditure in South Africa as the dependent variable:

$$\ln D_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 \ln P_t^s + \beta_4 \ln TC_t + u_t, \tag{5}$$

where D_t is expenditure, Y_t is income, P_t is relative prices, P_t^s is substitute prices, TC_t is transport cost, and u_t is an i.i.d. white noise error term. All variables are in natural logs in order to ensure measurement consistency and easy interpretation of the β coefficients. Quarterly data are used in the analyses.

The order of integration of all variables was scrutinized to understand the properties of each time series. The standard augmented Dickey–Fuller and Phillips–Peron tests were used, using all test assumptions. The results indicated that the series are integrated of different orders. A summary of the test results for the series in levels is presented in Table 1.

The autoregressive distributed lag model (ARDL) includes lagged values of the dependent and independent variables as well as current values of independent variables (Song and Witt, 2000, p 74). Therefore, the model makes provision for the fact that some changes in the variables may take time before they influence the dependent variable. A typical ARDL specification takes the following form (Enders, 2010, p 286):

$$y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i y_{t-i} + \sum_{j=0}^{n} \beta_j x_{t-j} + u_t, \tag{6}$$

Table 1. Unit root test results (*p*-values).

Country	Variable	Augmented Dickey–Fuller			Phillips–Peron		
		None	Intercept	Trend	None	Intercept	Trend
Brazil	Spend	0.5723	0.0090**	0.0280**	0.5087	0.0115**	0.0423**
	Price	0.9618	0.6160	0.9515	0.9401	0.6174	0.8969
	Income	0.9964	0.9233	0.0102**	1.0000	0.7517	0.0013**
Australia	Spend	0.5862	0.2623	0.0260**	0.5248	0.2876	0.0269**
	Price	0.2604	0.0823*	0.3830	0.2414	0.1072	0.3056
	Income	1.0000	0.2514	0.5652	1.0000	0.2402	0.5432
USA	Spend	0.4604	0.0008**	0.0048**	0.3150	0.0008**	0.0048**
	Price	0.2224	0.2362	0.5111	0.2262	0.2362	0.5111
	Income	0.9069	0.1750	0.3122	0.9786	0.1578	0.6496
India	Spend	0.6872	0.0208**	0.0099**	0.7710	0.0223**	0.0122**
	Price	0.5219	0.5955	0.3238	0.6016	0.5955	0.29050
	Income	0.9654	0.8148	0.1139	0.9999	0.8495	0.0001**
UK	Spend	0.8652	0.0014**	0.0001**	0.7782	0.0005**	0.0001**
	Price	0.1403	0.9035	0.9560	0.1403	0.8587	0.9310
	Income	0.7348	0.2010	0.6160	0.9157	0.2156	0.8536
France	Spend	0.5914	0.0005**	0.0016**	0.5121	0.0004**	0.0016**
	Price	0.3906	0.6944	0.9328	0.4134	0.5520	0.8714
	Income	0.9440	0.1447	0.5808	0.9694	0.3207	0.8795
Germany	Spend	0.4880	0.0003**	0.0020**	0.4064	0.0003**	0.0021**
	Price	0.3822	0.6945	0.9315	0.4084	0.5475	0.8648
	Income	0.8969	0.4582	0.4514	0.9252	0.6361	0.7051
Netherlands	Spend	0.6797	0.1136	0.0003**	0.6903	0.0001**	0.0001**
	Price	0.1817	0.1227	0.2162	0.1591	0.1681	0.3250
	Income	0.9530	0.4127	0.5679	0.9807	0.6151	0.8906
All countries	Fuel cost	0.9240	0.1532	0.0974*	0.9604	0.6273	0.6770
	Substitute price	0.3235	0.2897	0.5815	0.3212	0.2711	0.5487

Note: $^{**}\alpha < 5\%$; $^{*}\alpha < 10\%$.

where y_t is the dependent variable, x_t a vector of independent variables and u_t as defined above.

The ARDL can be estimated when data is available for a limited period of time (Salleh *et al*, 2007, p 353), as is the situation with the current data. The ARDL can also be expanded to include an error correction model specification, so that it takes both the long-run and short-run relationships between the variables into account (Kulendran and Divisekera, 2006, pp 193–194).

Since not all the variables are integrated of the same order, the Johansen and the Engel–Granger cointegration tests will provide biased results (Pesaran *et al*, 2001, p 315). The bounds test approach is preferred in such circumstances and is therefore also followed in this research (Wang, 2009). The bound test is based on an ARDL specification with an error correction component (Pesaran *et al*, 2001; Wang, 2009):

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \sum_{j=0}^{p} \beta_j \Delta x_{t-j} + \lambda z_{t-1} + u_t, \quad (7)$$

where z_t is a (kx1)-vector of all the variables in the model and λ a (1xk)-vector of coefficients.

Table 2. Bounds test results.

	BRA	AUS	USA	IND	UK	FRA	GER	NL
Test statistic	9.729	12.231	28.423	22.142	40.045	34.989	13.247	26.012

The null hypothesis is that of no cointegration and the F-values to evaluate the hypothesis are derived from the Wald test results. The Wald test is used to test whether the long-run coefficients are equal to 0 ($\lambda_1 = \lambda_2 = \lambda_3 = 0$ in Equation (7)). However, the F-critical values are different than the normal F-test and can be found in Pesaran *et al* (2001). Table 2 summarizes the results of the bound test where spending is the dependent variable (y_t). F-statistics greater than the upper bound of the test for the number of regressors result in a rejection of the null hypothesis, while values less than the lower bound mean that the null hypothesis cannot be rejected. F-statistics between the two bounds fall in the zone of indecision. The lower bound for $k = 3$ and $\alpha = 0.1$ is 2.72 and the upper bound 3.77. For $k = 4$ and $\alpha = 0.1$, the lower bound is 2.45 and the upper bound 3.52, and for $k = 5$ and $\alpha = 0.1$ the bounds are 2.26 and 3.35 (Case III, unrestricted intercept and no trend) (Pesaran *et al*, 2001). Table 2 shows that all test statistics lie above the upper bound, meaning the null hypothesis of no cointegration can be rejected and the long-run relationship can therefore be estimated together with the short-run relationship.

Since the bounds test requires the error term to be a white noise residual, each of the models was tested for residual normality (Jarque Bera normality test with null hypothesis of normality), serial correlation (serial correlation LM test with null hypothesis of no serial correlation), heteroscedasticity (ARCH test with null hypothesis of no heteroscedasticity), and structural breaks (CUSUM test[2]). In addition, a dummy variable to account for irregular components in the data was included in the specification, as well as seasonal dummies to control for seasonality (where significant). Table A1 in the Appendix summarizes the various test results for each market and shows that the residual is indeed white noise.

Results

Since the bounds test indicates the existence of one unique cointegrating equation, an ARDL is used to estimate the long-run determinants of tourism spending per day in South Africa. The vector z_t consists of the following individual time series, $z_t = (LSPEND_t, LGDP_t, LPRICE_t, LFUEL_t, LSPRICE_t)$ and the associated lag lengths are indicated in brackets in the same order (row 2 of Table 3). Due to the relatively few observations (only 32 per country), the number of lagged independent variables was restricted in order to obtain the most parsimonious models. This decision was confirmed by the Schwarz Information Criterion of the lag length test for all the countries, which indicated a maximum lag of one for every country under consideration. Most of the insignificant lags were excluded and the final models were chosen based on the Akaike information criterion, the Schwarz information criterion and the

Table 3. ARDL results.

	BRA	AUS	USA	IND	UK	FRA	GER	NL
ADLM order	(0,1, 1,–,0)	(0,0, 0,–,0)	(0,1, 0,–,0)	(0,1,1, 1,–)	(0,1,1, 1,1)	(0,0, 0,–,1)	(0,1, 1,–,0)	(1,1, 1,–,0)
C	5.668	–13.775**	6.160	4.879	–4.826	–12.020	6.917**	12.465**
LGDP	–6.725*	3.817**	–9.677	3.853		3.721**	0.563	
LPRICE	0.745	1.038**	0.033	–2.477**		0.253	–0.762*	
LFUEL				–0.637*				
LSPRICE	–2.516**	1.237*	0.339			0.506	1.595**	
LSPEND(–1)								–0.212
LGDP(–1)	7.014**		9.713*	–3.682	2.810**		–0.757	–0.850*
LPRICE(–1)	–0.217			2.854**	–0.792**		0.702**	–0.637**
LFUEL(–1)				0.854**	–0.038			
LSPRICE(–1)					1.581**	1.409		1.651**
R^2	*0.765*	*0.821*	*0.588*	*0.684*	*0.750*	*0.866*	*0.751*	*0.810*
F-stat	*5.650***	*23.836***	*3.932***	*4.333***	*8.293***	*17.824***	*7.074***	*8.543***
DW	*2.130*	*1.992*	*1.526*	*2.071*	*2.388*	*1.753*	*1.385*	*2.281*

Note: *Significant at 10%; **significant at < 5%.

Table 4. Long-run elasticities.

	BRA	AUS	USA	IND	UK	FRA	GER	NL
Income	**0.29**	**3.82**	0.04	0.17	**2.81**	**3.72**	–0.19	**4.01**
Price	0.53	**1.04**		**0.38**	**–0.79**	0.25	**–0.06**	**3.00**
Transport cost				**0.22**	–0.04			
Substitute prices		1.24	0.34		**1.58**	1.92	**1.60**	**–7.79**

Note: Significant elasticities are in bold type.

adjusted R^2 (see Table 3 for these values). All estimations were done using EViews7.

Witt and Witt (1995) indicated that care should be taken when including both costs in the model, since it may cause multicollinearity. This has led to the exclusion of one or more of the price variables[3] in some of the models, since its inclusion caused most variables to be insignificant and/or the signs of the variables to be incorrect, according to theory. The models presented in Table 3 were subjected to diagnostic tests and each model satisfies the assumptions of the classical linear regression model. Therefore, the models suffer from no autocorrelation, heteroscedasticity, structural breaks and the errors are normally distributed (that is, white noise error terms – see Table A1 in the Appendix). It is also interesting to note that the models more often take a distributed lag specification rather than an autoregressive representation, implying that spending per day in South Africa have little inertia.

Using the long-run estimates as indicated in the ARDL results, the various long-run elasticities were calculated (by dividing the coefficient by that of the lagged spending value where appropriate, summing the effects where lags are included), and the results are indicated in Table 4.

From Table 4 it is evident that foreign tourist spending in South Africa is relatively price inelastic in the long run, with most elasticities equal to or less than 1 in absolute value terms. The only exceptions are tourists from the Netherlands, where the elasticity is greater than |1|, indicating a relatively price elastic demand. In general, however, an increase in price leads to an increase in earnings in South Africa. This result is in line with research on tourism demand for South Africa using arrivals as the dependent variable (see Saayman and Saayman, 2008; Seetanah *et al*, 2010). However, where both Saayman and Saayman (2008) and Seetanah *et al* (2010) found no elasticity greater than |1.2|, the elasticity for the Netherlands, has elasticities greater than |1.2|. It should also be noted that the price variable takes into account the prices in both countries as well as the exchange rate. This is in contrast with Seetanah *et al* (2010), but similar to previous research by Saayman and Saayman (2008), who also found positive elasticities for some markets when price is constructed as a real exchange rate variable.

The long-run income elasticities are all positive and are mainly greater than 1, indicating a relative income elastic demand. Tourist spending in South Africa is therefore a luxury good. For tourists from Brazil, the income elasticity is less than one, indicating a relative income inelastic demand. The income elasticities in Table 4 are in line with that found by Saayman and Saayman (2008) when arrivals is used as the dependent variable; however, it is much higher than the elasticities found by Seetanah *et al* (2010), who used panel data techniques. The income elasticities are less than what Lee *et al* (1996) found for South Korea (elasticities between 1 and 14), but higher than that found by Phakdisoth and Kim (2007) for Laos (income elasticities less than 1).

The positive price elasticity found for some markets justify some additional clarification. For the Australian market, a similar result was found using arrivals as the dependent variable (Saayman and Saayman, 2008). Possible explanations for this may be the substantial strengthening of the Australian dollar over the time period under consideration and the fact that the motivation for visiting South Africa might be quite different due to, for example, annual sport tournaments. A similar result is found for tourists from the Netherlands. South Africa and the Netherlands have strong cultural ties and the country was initially a Dutch colony (in 1652) before Cape Town became part of the British Empire (in 1806). The reason why the Dutch visit South Africa may therefore differ from other markets and have an influence on the elasticities.

In line with the price elasticities, the long-run elasticity for fuel is also mainly less than |1|, confirming the relative price inelastic demand for South Africa as a tourism destination. It should be mentioned that the proxy for travel cost, namely fuel prices, was the variable that had to be excluded most often due to multicollinearity between fuel prices and real GDP.

The substitute price elasticity, consisting of a combination of the real exchange rates between South African and that of Kenya, Botswana and Tanzania, is mainly positive, indicating that international tourists rather view these countries as substitute destinations for South Africa. The values for the elasticity are quite high – indicating a relatively elastic demand. Again, this result confirms the research by Seetanah *et al* (2010) that these destinations are in fact substitutes for South Africa, although it contradicts the panel data results where low cross-price elasticities were found when arrivals are considered as

Table 5. ECM-ARDL results.

	BRA	AUS	USA	IND	UK	FRA	GER	NL
	(0,1,0, 0,0)	(0,0,1, 1,0)	(0,1,1, 0,0)	(0,0,0, 1,1)	(0,1,1, 1,1)	(0,0,1, 1,1)	(0,1,1, 1,1)	(0,1,0, 1,1)
ECT(–1)	–1.016**	–1.138**	–0.691**	–1.213**	–1.518**	–0.876**	–0.941**	–1.930**
R^2	*0.747*	*0.824*	*0.819*	*0.475*	*0.838*	*0.907*	*0.704*	*0.815*
F-stat	*5.611***	*8.897***	*6.421***	*2.381**	*11.541***	*37.734***	*3.897***	*7.248*
DW	*2.032*	*1.624*	*1.743*	*1.494*	*1.543*	*1.890*	*2.060*	*2.053*

the dependent variable. The only exception is tourists from the Netherlands, which view these destinations as complements rather than substitute destinations.

Subsequently the error correction presentation of the ARDL was estimated, incorporating the errors from the various long-run ARDL models. The results are summarized in Table 5 and it is evident that the error correction term is significant and negative in all the models. Therefore, there is convergence to a unique long-run solution and it is evident from the magnitude of the error correction coefficient that the adjustment is within one quarter.

Conclusion

The purpose of this paper was to determine the sensitivity of inbound tourists' expenditure in South Africa to changes in prices, income and other variables. While tourism demand is mostly measured in arrivals, recent literature places emphasis on expenditure as a measure of tourism demand. This research follows this trend and uses tourist expenditure data, derived through surveys, to examine the income and price elasticities within the South African context. The approach followed differs from most other studies, since expenditure is not measured as total expenditure in the country, but rather as average expenditure per day. The approach is therefore more embedded in microeconomic theory and focuses on the second stage budget decisions taken by the tourists; that is, how much to spend in a destination compared to other destinations. Recent developments in econometric modelling make it possible to estimate long-run coefficients, as well as short-run adjustments when all the variables are not integrated of the same order.

The results confirmed and contradicted some of the previous research findings. The main findings can be summarized as follows: First, from a methodological point of view, the expenditure analysis gives different price and income elasticities compared to an arrivals analysis. This finding is also an important contribution, since Song *et al* (2010) state that the elasticities based on expenditure deliver more accurate forecasting results than those based on arrivals. Second, foreign tourist spending in South Africa is found to be relatively price inelastic. Third, the long-run income elasticities are all positive and greater than 1. Fourth, the substitute price elasticity shows that international tourists mainly regard Kenya, Botswana and Tanzania as substitute destinations for South Africa.

The above findings hold implications for both policy-makers and the tourism industry in general. The research again confirms that tourist spending in South Africa is a luxury good, which implies that changes in international economic conditions (such as the recent recession) will have a severe impact on income generated through tourism expenditure (this effect is also evident in arrivals – see Figure 1). As a long-haul, developing destination, South Africa is more susceptible to changes in world conditions than more developed destinations and this will not only affect arrivals, but also revenue derived from tourists.

From a marketing perspective, it is essential that South Africa remains a price-competitive destination. Currently, most markets are still relatively inelastic to price changes in the country, indicating that an increase in price will cause an increase in revenue. However, contrary to previous South African research, we find that the cost of the destination (the combined own price and travel cost elasticities) is becoming a concern for some markets, especially the Dutch. From a sustainability point of view, an increase in price will cause a shift of these markets to competing destinations.

Furthermore, the results indicate that destinations in Southern Africa, notably Botswana, Kenya and Tanzania, are viewed by most international tourism markets as substitute destinations to South Africa. Therefore, these destinations can be regarded as competitors, which imply that if prices in South Africa increase significantly, there will be a loss in competitiveness. Furthermore, packages that include these destinations together with South Africa may result in less spending in South Africa in favour of spending in the substitute countries.

With the research design, the main limitation faced is the fact that the spending data is based on surveys, but the other variables are macroeconomic variables. Therefore, the income of the respondents as such cannot be modelled. Furthermore, spending is an average variable and divided by 'average' length of stay, which does not reflect the variability within the survey sample.

Endnotes

1. Although we use equal weighting in this paper, if we base the weighting on total tourist arrivals in the three substitute countries, the weight of Tanzania should decrease slightly and that of Kenya and Botswana should increase slightly (that is, 40:40:20 weighting).
2. The CUSUM results are available from the authors.
3. The fuel variable was often correlated with GDP ($r > 0.9$).

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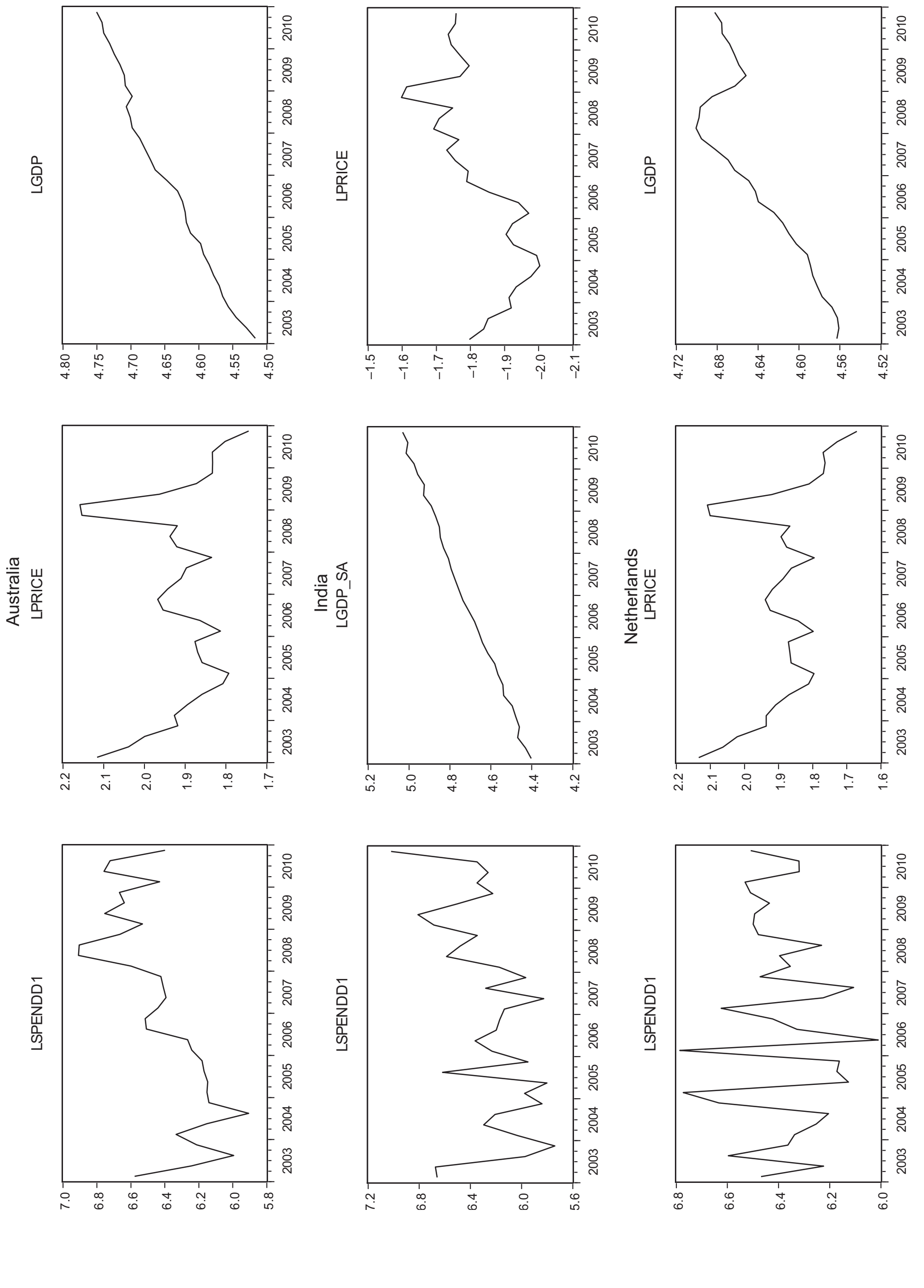
Appendix

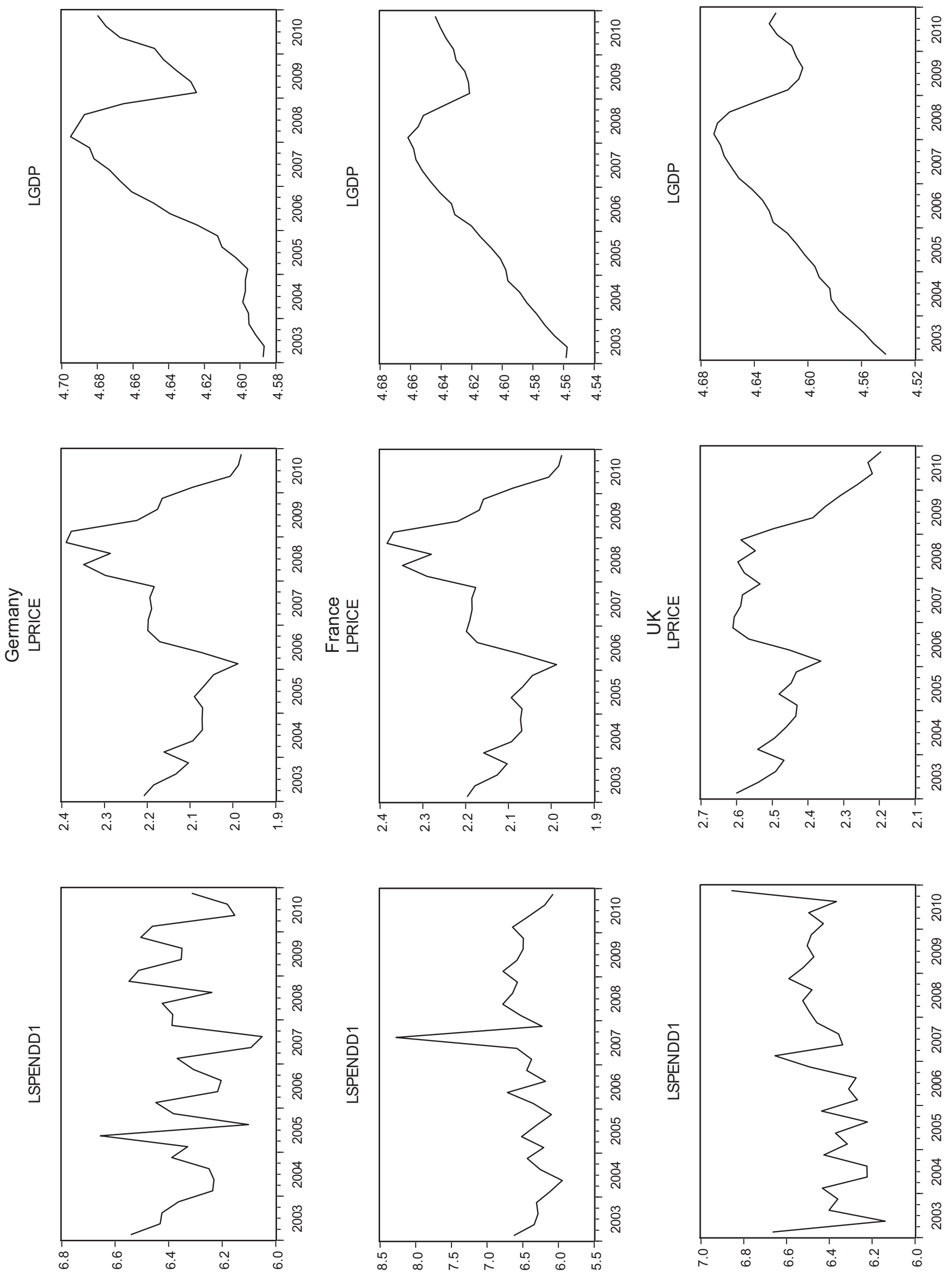
Table A1. Diagnostic test results.

Country	JB	LM	ARCH
Brazil	0.899 [0.637]	4.778 [0.091]	0.758 [0.684]
Australia	1.649 [0.438]	1.158 [0.560]	0.310 [0.856]
USA	0.961 [0.618]	2.643 [0.266]	0.656 [0.720]
India	1.408 [0.494]	0.415 [0.812]	0.225 [0.893]
UK	0.663 [0.717]	5.312 [0.070]	2.046 [0.359]
France	0.430 [0.806]	0.587 [0.745]	0.988 [0.610]
Germany	0.130 [0.986]	1.574 [0.455]	1.910 [0.384]
Netherlands	0.494 [0.781]	2.355 [0.307]	0.977 [0.613]

Note: *t*-values are in square brackets.

Figure A1. Plots of the variables.

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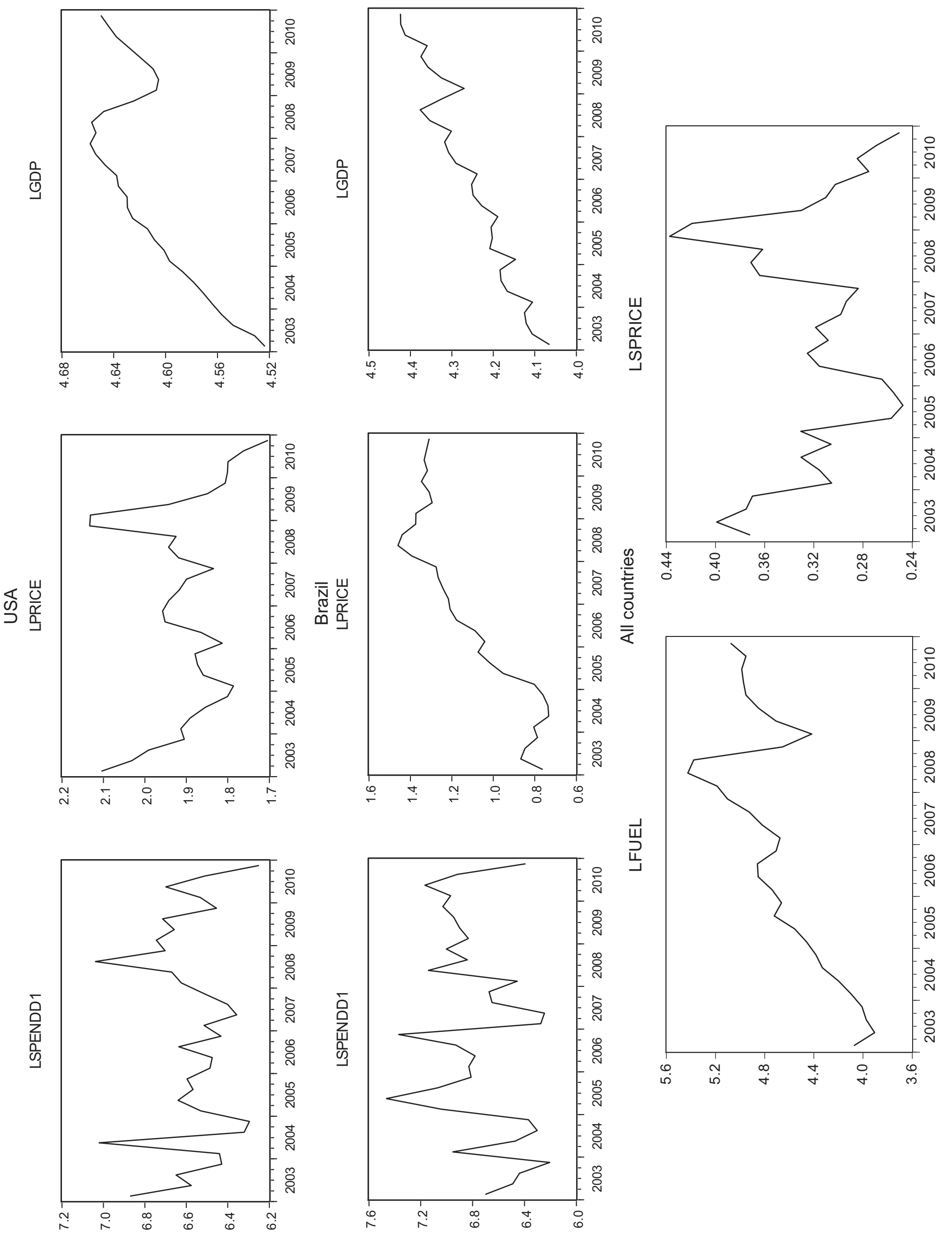
LSPENDD1
LPRICE
LGDP
France
LSPENDD1
LPRICE
LGDP
UK
LSPENDD1
LPRICE
LGDP


USA
LSPENDD1
LPRICE
LGDP
Brazil
LSPENDD1
LPRICE
LGDP
All countries
LFUEL
LSPRICE