

# Analysis of Tourist Consumption, Expenditure and Prices for Key International Visitor Segments

Technical Background Report

November 2008

Susanne Becken

Andrea Carboni

Shane Vuletich

Aaron Schiff

Report No.7





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Reviewed by:

A handwritten signature in black ink, appearing to read 'Markus Landvogt'. The signature is written in a cursive style with a long, sweeping horizontal line extending to the right from the end of the name.

Dr Markus Landvogt  
Senior Research Analyst  
Ministry of Tourism

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## **Executive Summary**

The Tourism & Oil project is undertaken against the backdrop of highly volatile oil prices, especially in the last 6 months, and a major global financial crisis that undoubtedly affects tourist arrivals to New Zealand. Increasing our understanding of tourism's responses to global oil prices and tourists' price sensitivity more generally is therefore timely.

Based on data from the International Visitor Survey we were able to provide a time series (10 years) of typical consumption bundles for 18 visitor segments. These bundles describe tourists' consumption of accommodation, air transport, transport, fuel, and other tourism products. We also produced a Tourism Price Index for each of these visitor segments and observed how the price of tourism changed over the last 10 years, both in New Zealand dollars and tourists' own currency. A key finding is that the price of tourism has increased above inflation rates (with variations across the segments), and that the effect of exchange rate fluctuations has dominated the overall impact on price over time. Overall, our research suggests that oil price volatility has had a limited effect on tourist demand and consumption to date.

Due to severe data limitations we were unable to develop robust price elasticities, but an improved data set might make such analysis possible in the future. We are also exploring options for an in-depth price sensitivity analysis in relation to tourists' transport behaviour.

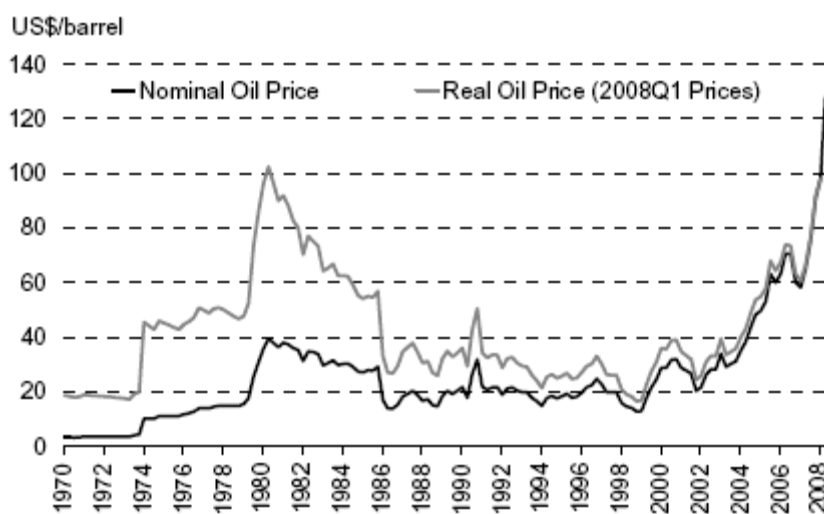


# Chapter 1

## Introduction

Tourism is extremely dependent on fossil fuels for both travel to and within New Zealand and as a result the demand for international tourism is exposed to the price of oil. Oil prices rose significantly in 2006 and 2007 resulting in major cost increases for certain sectors of the tourism industry. Transportation businesses experienced the largest cost increases due to their direct exposure to fuel prices, but most tourism businesses experienced some increase in costs due to either direct or indirect exposure to the price of oil.

**Figure 1**  
**Oil Prices over Time**



([www.treasury.govt.nz/economy/mei/jun08/03.htm](http://www.treasury.govt.nz/economy/mei/jun08/03.htm))

The “Tourism and Oil” project has three main objectives:

**Objective 1:** To understand the influence the price of oil has on international visitor arrivals to New Zealand. We are building econometric models of international visitor arrivals to support this analysis. We will also analyse the consumption patterns of specific international visitor segments while they are in New Zealand, including an examination of the changes in price levels (including exchange rate effects) that each visitor segments has experienced over time.

**Objective 2:** To build a computable general equilibrium (CGE) model for New Zealand that will allow us to assess the impacts of various tourism “states of the world” on the wider New Zealand economy (based, among other things, on oil price scenarios). This model will also allow us to assess the impact of shocks in other parts of the economy on the international tourism sector.

**Objective 3:** To identify strategies for dealing with higher oil prices. These ‘adaptation measures’ will help businesses and regions to understand their vulnerability to oil prices, and

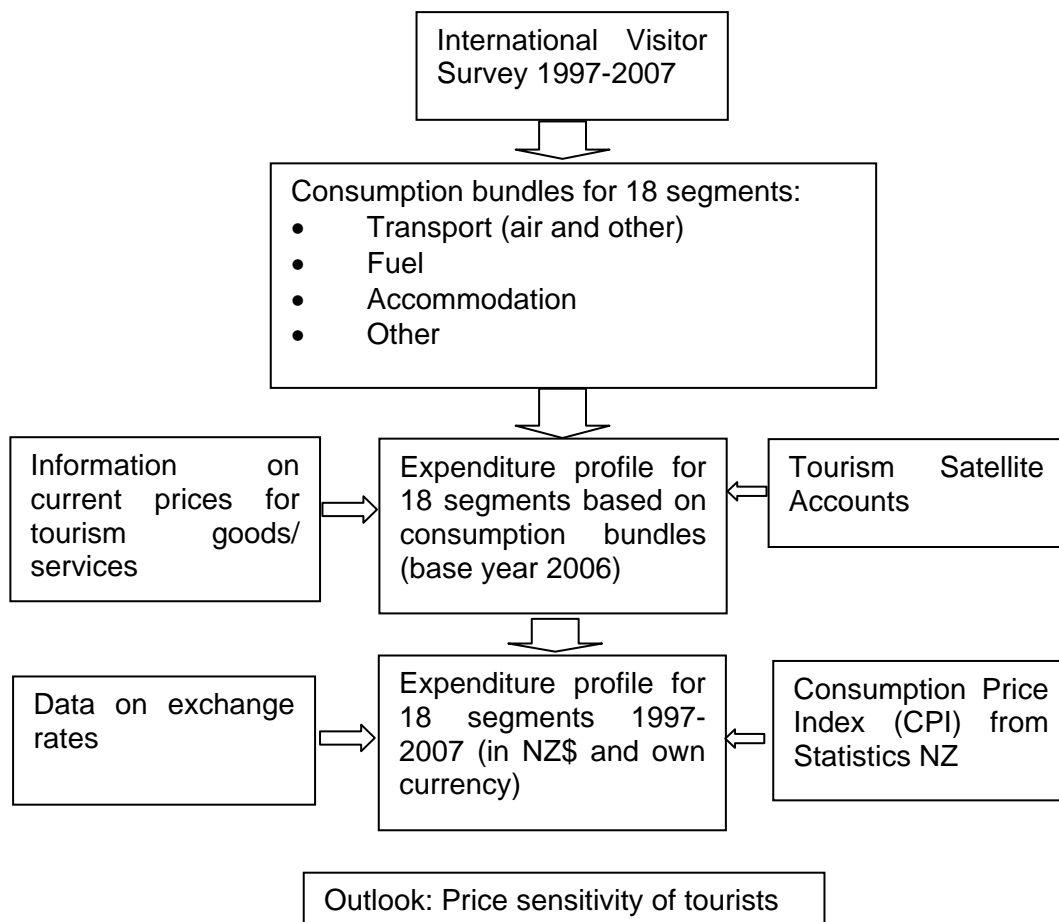
to manage and mitigate these risks over time. Overall, our research will contribute to the maintenance and enhancement of tourism yield in New Zealand.

This report documents three important processes that are essential to the delivery of Objectives 1 and 2:

1. The division of the international visitor market into appropriate groups or segments based on observed travel behaviour. This is important because it provides the customer units for our analysis, and we hypothesise that different segments respond to price changes in different ways.
2. Understanding the consumption patterns of each segment. This is important because it allows us to assess the degree to which each segment is exposed to changes in the price of oil.
3. Determining how the price of a trip to New Zealand has changed for each visitor segment over time, taking into account domestic inflation and changes in exchange rates. This is important because it helps us to understand to what extent changes in the price of tourism influence demand.

The remainder of this document outlines the approach we have used to segment the international visitor market, and the method we have developed to estimate a representative consumption bundle and its price for each segment (Flow chart 1). Unit record data from the Ministry of Tourism’s International Visitor Survey (IVS) have been used to conduct the majority of this analysis. Analysis into the price sensitivity was undertaken as well, but results so far are ambiguous and more research (and better data) is required to establish robust price elasticities.

**Figure 2**  
**Overview of Steps Research Presented in this Report**



## Chapter 2

# Identifying Useful Market Segments

### 2.1 Segmentation Process

In consultation with stakeholders, three segmenting variables were identified to be important characteristics of travel behaviour: country of last permanent residence, purpose of travel and style of travel. Within each variable, the following categories were considered.

- Country of last permanent residence (8)
  - Australia
  - United States
  - Japan
  - South Korea
  - China
  - United Kingdom
  - Germany
  - Rest of World
- Purpose of travel (3)
  - Holiday
  - Visiting friends and relatives (VFR)
  - Other (including business and education trips)
- Style of travel (2)
  - Free and independent travellers (FIT), aggregating semi-independent and fully independent
  - Tour/Group (including fully packaged)

This implies a maximum of 48 visitor segments (8 countries x 3 purposes x 2 styles). However, the sample sizes in the IVS cannot support this level of segmentation if annual data is required. The segments therefore need to be collapsed in a valid and systematic way to provide robust sample sizes. An average sample size for an individual segment of 100 per annum is considered satisfactory, and is likely to result in an average sample error of around +/- 10%. The average annual sample sizes from the IVS are shown below. Sample sizes of less than 100 are shown in bold.

**Table 1**  
**Average Annual IVS Sample Size by Segment**

AUSTRALIA	FIT	Tour
Holiday	379	101
VFR	333	2
Other	332	20

CHINA	FIT	Tour
Holiday	20	52
VFR	33	0
Other	60	30

UNITED STATES	FIT	Tour
Holiday	286	128
VFR	70	2
Other	100	13

UNITED KINGDOM	FIT	Tour
Holiday	420	52
VFR	210	3
Other	62	3

JAPAN	FIT	Tour
Holiday	155	273
VFR	43	4
Other	72	46

GERMANY	FIT	Tour
Holiday	115	20
VFR	14	0
Other	19	2

SOUTH KOREA	FIT	Tour
Holiday	44	88
VFR	29	0
Other	25	6

Segments supported by less than 100 data points (on average) per annum need to be combined with other segments to achieve the desired minimum sample size. The following process has been used to do this:

1. If a segment is supported by less than 100 data points it should be combined with other segments in the same country and style segments e.g. collapse the segments across purpose of travel.
2. If collapsing across purpose of travel still results in insufficient sample then collapse across travel style within each country segment.

The application of this process results in the following 16 market segmentations. In addition, we propose a simple style segmentation for the “Rest of the World” which expands the total number of market segments to 18.

**Table 2**  
**Final Market Segments, their Average Annual Sample Size and their Market Share and Size in 2007**

Segment	Sample size in 2007	Market share in 2007	Total Adults arrivals in 2007
Australia FIT Holiday	312	13.0	291,087
Australia FIT VFR	296	12.7	286,005
Australia FIT Other	252	8.7	195,029
Australia Tour	79	3.9	86,823
UK Holiday	305	6.3	141,995
UK VFR and Other	257	5.6	126,081
USA FIT Holiday	265	4.2	93,247
USA FIT VFR and Other	226	2.9	64,537
USA Tour	97	1.6	35,032
Japan FIT Holiday	107	1.4	30,509
Japan FIT VFR and Other	138	1.2	26,957
Japan Tour	161	2.5	56,418
South Korea All	238	3.8	85,592
China FIT	174	1.2	27,000
China Tour	217	3.7	82,995
Germany All	182	2.5	55,082
Rest of World FIT	1760	22.4	503,736
Rest of World Tour	180	2.5	55,862
<b>Total</b>	<b>5246</b>	<b>100.0</b>	<b>2,243,987</b>

## 2.2 Behavioural Patterns of Segments

The market segments differ significantly (based on analysis of variance (ANOVA) and Chi Square tests, for more detail: see Appendix A) on a wide range of variables, including:

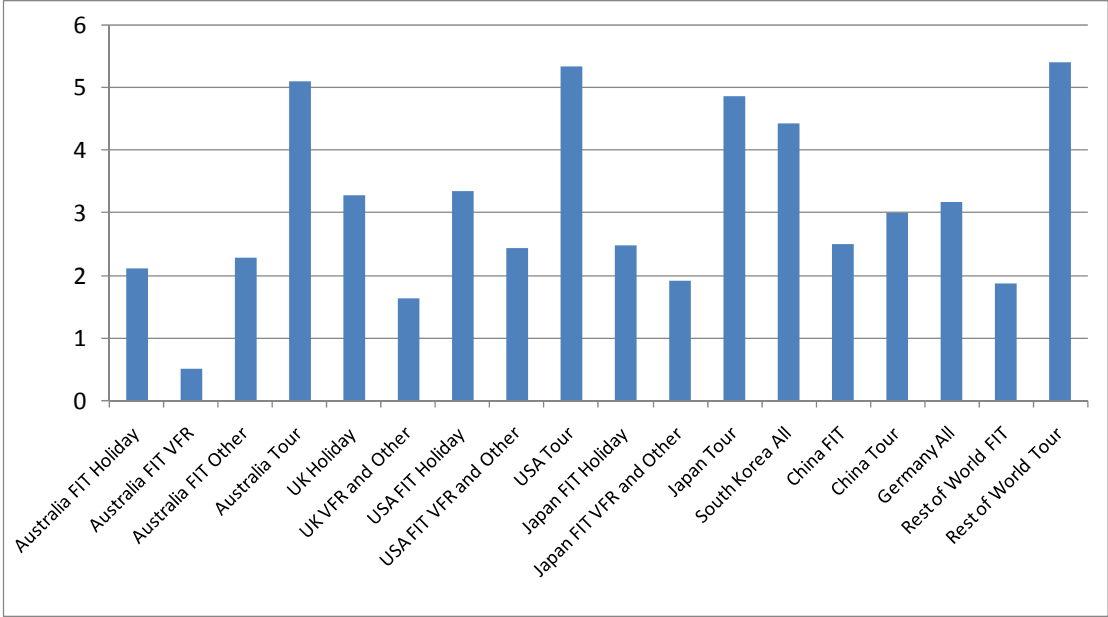
- Length of stay
- Repeat visitation
- Geographic travel patterns<sup>1</sup>
- Recommendation of New Zealand as a destination
- Transport behaviour
- Accommodation choices
- Spending patterns

The difference in accommodation choices, for example, can be seen in Figure 2. Tour group based segments (e.g. Australia, USA, Japan) are more frequent visitors to hotels compared with other visitor segments. Naturally, segments that related to visiting/friends and relatives tourism have a low propensity to stay at hotels.

---

<sup>1</sup> Tourism Flows Model, Ministry of Tourism, [www.tourismresearch.govt.nz](http://www.tourismresearch.govt.nz)

**Figure 3**  
**Nights Spent in a Hotel by an Average Tourist in the Different Segments**



## Chapter 3

# Deriving Consumption Bundles

### 3.1 Overview

The variation in consumption/spending patterns across segments is particularly interesting because it provides useful insights into the extent to which the prices of goods and services consumed by certain segments will change as the oil price changes. We have defined the following consumption/expenditure categories to support this analysis which are broadly consistent with the way that expenditure data are collected in the IVS:

- Accommodation
- Transport
- Fuel purchase
- Other: Recreational activities, Retail shopping, Food and beverage.

The IVS database provides information on spending across all of these categories, although the sample sizes are small for some segments. However, there is a much more serious problem which affects our ability to use these data. Until recently the IVS interviewers did not distinguish between a *zero* value for expenditure (i.e. no money spent in a certain category) and a *missing* value (i.e. the respondent was unable to recall, or refused to report, how much they spent in a certain category). This makes it impossible to calculate a reliable estimate of average expenditure per person for a given expenditure category. We have therefore chosen to *estimate* expenditure using a bottom-up estimation method based on observed travel behaviour (where possible).

The behaviour-based data taken from the IVS on travel distance and number of nights spent in different types of accommodation are more robust and more complete than the expenditure data because they have been collected more accurately by the IVS interviewers. We have therefore developed imputation methodologies based on these data to estimate expenditure on transport, fuel and accommodation for each market segment and each calendar year from 1997 to 2007. Our methods are explained in the following two sections.

### 3.2 Estimating Transport Expenditure

Transport expenditure has been estimated by multiplying the distance travelled by each visitor segment by an appropriate price per kilometre for each of the following modes of transport: air, car, bus, campervan, ferry, taxi and train. The distance information is captured quite accurately in the IVS through the detailed travel itinerary data that is collected from each respondent. If a tourist did not travel by a particular mode the distance equals zero kilometres. This allows us to calculate the average distance travelled by each visitor segment using a particular transport mode for each year.

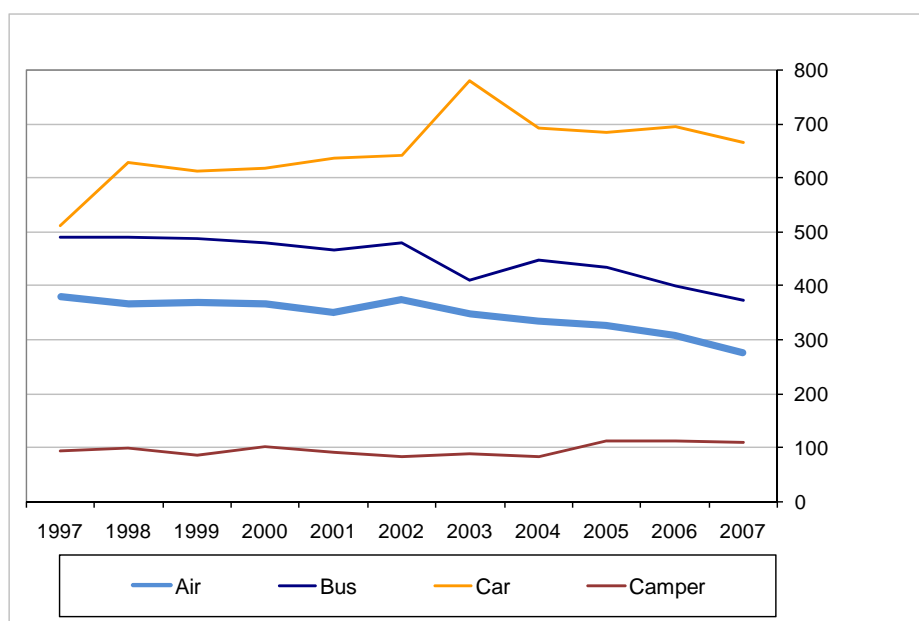
Table 3 shows the estimated average distances travelled by each visitor segment using each mode of transport in 2007. Air, car and bus travel are the dominant transport modes across all visitor segments while campervans, ferries, taxis and trains are less prevalent in terms of kilometres travelled.

**Table 3**  
**Average Kilometres Travelled per Visitor by Transport Mode and**  
**Visitor Segment in 2007**

Segment	Air	Car	Bus	Camper	Water	Taxi	Train	Other	Total
Australia FIT Holiday	155	1,049	265	116	31	13	19	11	1,659
Australia FIT VFR	106	405	28	13	15	10	2	1	579
Australia FIT Other	156	158	29	1	11	27	1	0	384
Australia Tour	197	494	1,024	27	117	16	36	37	1,949
UK Holiday	262	1,135	842	434	96	13	29	13	2,823
UK VFR and Other	326	803	87	48	28	14	15	4	1,325
USA FIT Holiday	564	1,126	389	218	113	24	28	47	2,511
USA FIT VFR and Other	531	662	171	5	47	14	9	5	1,444
USA Tour	724	307	952	8	207	21	33	16	2,267
Japan FIT Holiday	376	544	465	14	46	33	20	9	1,506
Japan FIT VFR and Other	414	346	239	0	8	35	6	1	1,049
Japan Tour	883	56	871	0	8	63	15	4	1,901
South Korea All	444	412	690	13	14	11	14	1	1,598
China FIT	328	550	183	8	13	9	3	0	1,094
China Tour	110	47	531	2	11	0	0	0	701
Germany All	195	1,407	702	606	112	7	11	65	3,105
Rest of World FIT	267	798	308	156	48	16	12	30	1,635
Rest of World Tour	542	294	1,348	47	72	18	18	2	2,340
<b>All Visitors</b>	<b>275</b>	<b>666</b>	<b>373</b>	<b>109</b>	<b>46</b>	<b>17</b>	<b>14</b>	<b>18</b>	<b>1,517</b>

The IVS data is rich enough to enable a time series of travel distances to be constructed. The data show that, at a very aggregate level, average travel distances have remained relatively stable over time. It is likely that some of the variation in the time series data can be attributed to sample error in the IVS.

**Figure 4**  
**Time Series of Average Kilometres Travelled per Visitor by**  
**Transport Mode across all Segments (1997-2007)**



The next

step is to

translate the travel distances into estimates of tourism expenditure, i.e. how much did each tourist pay to travel this number of kilometres? We have done this by estimating the average cost of each travel mode per kilometre travelled. The following sections describe our approach to this in more detail.

### 3.2.1 Price of Air Travel

The cost of air travel was estimated by acquiring prices for selected routes and dates from the Air New Zealand website<sup>2</sup>. Four representative tourist routes were selected:

- Auckland – Christchurch
- Wellington – Dunedin
- Auckland – Wellington
- Rotorua – Christchurch.

Fares were obtained for September to November to reflect shoulder season (i.e. neither peak nor off peak). The ‘flexi saver’ and ‘smart saver’ fare options were assumed to be the most representative for international tourists, particularly since some domestic airfares are purchased as part of a package deal and are therefore likely to be discounted. The airfare price information we obtained is shown in Table 4. The average across the routes for ‘flexi saver’ was \$0.33 per km and \$0.16 per km for ‘smart saver’. We have assumed that flexi-saver and smart saver seats are sold in similar quantities, which suggests an average cost to the tourist of around **\$0.25** per passenger kilometre. This estimate is based on 2007/08.

**Table 4**  
**Domestic Air Travel Price Data (2007)**  
**www.airnz.co.nz**

From	To	When	SmartSaver	FlexiSaver	Approx Km
AKL	CHC	September	\$162	\$442	1,500
WLG	DUD	September	\$236	\$410	1,240
AKL	WLG	November	\$142	\$386	1,000
ROT	CHC	November	\$228	\$396	1,320

### 3.2.2 Price of a Car Rental (excluding fuel costs)

The rental car market is diverse, making it difficult to estimate the size, quality or price of an ‘average’ car. There are a number of budget brands in the market (e.g. Rent-a-Dent), as well as several international brands such as National, Hertz, and Europcar. There are also a range of niche operators specialising in small cars, large cars and limousines. Most of these companies operate dynamic pricing systems which result in significant price variations depending on geographic factors (i.e. pick up and drop off points) and also temporal factors such as the day of the week and the time of the year.

Budget Car and Truck Rental – who also own the Avis brand – provided us with an average rental price of \$0.55 per vehicle kilometre across their vehicle fleet (excluding fuel costs).

<sup>2</sup> www.airnewzealand.co.nz

We have assumed an average occupancy of two passengers per vehicle, which results in an average price per passenger kilometre of around **\$0.28**.

### ***3.2.3 Price of Bus/Coach***

Data were sourced from three coaching companies to estimate the average price of bus travel: Intercity, Magic Bus, and Real Journeys<sup>3</sup>. Magic Bus operates a hop-on-hop-off coach service and provides pricing information for specific itineraries on its website. We have selected a range of itineraries on the Magic Bus website, observed the price of each itinerary and the length (in kilometres) and have used this information to derive an average price per kilometre of \$0.25.

We applied the same logic to the Real Journeys operation which sells coach tours to Milford Sound (ex Queenstown). The price advertised on the Real Journeys website includes a \$65 boat excursion in Milford Sound; hence this expense was excluded from the advertised price to isolate the coaching component of the price. The resulting price per kilometre for a return trip between Queenstown to Milford Sound was \$0.26, calculated as \$150/582kms.

Intercity offers a more diverse range of routes, so in this case we examined the prices and distances of ten different routes to derive an average across the Intercity offering. Once again the average price per kilometre was around \$0.25.

Based on the consistency of our findings across three independent coaching companies we have adopted a price of **\$0.25** per passenger kilometre as being representative of the average price paid by an international visitor for coach travel in New Zealand.

It is worth noting that our analysis of Intercity data suggests that the price of a ticket depends not only on the distance travelled but also on the duration of the trip, which makes sense since the driver is paid by the hour and vehicle depreciation and operating costs depend on time in use as well as kilometres travelled.

### ***3.2.4 Price of Water Transport***

There are three major ferry routes in New Zealand:

- Cook Strait crossing between Wellington and Picton
- Ferry between Waiheke Island from Auckland CBD (via Deveonport)
- Ferry between Bluff and Stewart Island<sup>4</sup>

We examined the prices and distances of all three services to determine an average price per passenger kilometre for water transport. The Interislander, which operates between Wellington and Picton, was assumed to be typically travelled by two people in a small vehicle one-way which would cost \$262 (based on a 'super saver' fare). We acknowledge that some visitors will travel as foot passengers at a lower cost than this, but expect this to be balanced by visitors travelling in large vehicles and campervans which cost more. The fare we have chosen is essentially the median of all possible fares. Based on an average travel distance of 96km (one-way), the average price per passenger kilometre would be \$1.36.

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3 [www.intercity.co.nz](http://www.intercity.co.nz), [www.magicbus.co.nz](http://www.magicbus.co.nz), [www.realjourneys.co.nz](http://www.realjourneys.co.nz)

4 [www.interislander.co.nz](http://www.interislander.co.nz), [www.fullers.co.nz](http://www.fullers.co.nz), [www.foveauxexpress.co.nz](http://www.foveauxexpress.co.nz)

The cost of a return trip between the Auckland CBD and Waiheke Island is \$28, and the return distance is around 42km. This yields an average price per passenger kilometre of around \$0.67. This price is around half the price of the Interislander because the Waiheke ferry carries foot passengers only while most Interislander passengers travel with a vehicle.

The cost of a one-way trip between Bluff and Stewart Island is \$55, and the distance is around 39 kilometres. This yields an average price per passenger kilometre of \$1.41. This price is marginally higher than the Interislander service (which carries vehicles as well) and more than twice the price of the Waiheke service (which only carries foot traffic). The high relative price of the Stewart Island service is probably attributable to the small number of passengers travelling between Bluff and Stewart Island relative to the Cook Strait and Waiheke services.

Data from the IVS indicates that 90% of all water transport kilometres travelled by international visitors are on the Cook Strait, with the remaining 10% split between Waiheke (8%) and Stewart Island (2%). We have used these percentage shares to form a weighted average price per passenger kilometre for water transport of **\$1.30**.

### ***3.2.5 Price of Campervan Rental (excluding fuel costs)***

There are a wide range of campervan products in New Zealand, differentiated by size, price and quality. Kea Campers was able to provide us with an accurate estimate of revenue per vehicle kilometre travelled for their campervan fleet of \$0.72, which includes insurance. This figure is equivalent to the price paid per vehicle kilometre. We have assumed that each campervan carries an average of two people, which results in an average price per passenger kilometre of **\$0.36**.

To test the representativeness of the Kea Campers result we researched the prices offered by other campervan companies on the internet. The website of Motorhomes and Cars<sup>5</sup> was used to obtain rental estimates for a wide range of campervans, both for peak (example: 29 January to 3 February) and off peak periods (example: 29 July to 3 August 2008). A daily rental price was averaged across all the different companies advertised on this site, and across all the different types of campervans available for 2 people. The average daily price of a campervan in the high season was \$201.95 and in the low season \$57.63 (reflecting the wide variance in demand between peak and off peak periods).

We then used data from the IVS to calculate the average utilisation of campervans during peak and off peak periods. The data suggests that 67% of campervan usage occurs during the peak period of October-March, with the remaining 33% occurring off peak. Applying these shares to the peak and off peak rental prices suggests an average price per vehicle day of around \$154 across the entire year. We were also able to use the IVS data to estimate the average daily distance travelled by campervan – 199km based on the median distance (which is less affected by outliers than the mean). This results in an average price per vehicle kilometre of \$0.77, and an average price per passenger kilometre of around \$0.38 (based on an average of two passengers per campervan). This is broadly consistent with the estimate provided by Kea Campers of \$0.36; hence we have used an average price of **\$0.36** per passenger kilometre for campervans.

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5 [www.motorhomesandcars.com](http://www.motorhomesandcars.com)

### 3.2.6 Taxi

Taxi fares (including fixed charges) have been estimated at \$3.50/km. This figure was arrived at by calculating the average cost of travelling from the airport to the CBD in each major city:

- Auckland – \$65 for a 20km trip = \$3.25/km (excluding the airport tax)
- Wellington - \$30 for an 8km trip = \$3.75/km (excluding the airport tax)
- Christchurch - \$40 for an 11km trip = \$3.64/km (excluding the airport tax)

It is assumed that an average taxi trip involves two passengers; hence the average price per passenger kilometre is estimated at **\$1.75**.

### 3.2.7 Price of Train Travel

There are three main train routes used by international visitors in New Zealand:

- The TranzAlpine (Christchurch to Greymouth)
- The Overlander (Auckland to Wellington)
- The TranzCoastal (Picton to Christchurch)

Prices are available from the TranzScenic website<sup>6</sup>, but vary between seasons and between standard prices and specials. The average price per passenger kilometre has been estimated at \$0.35 for both the TranzCoastal and the Overlander. The TranzAlpine is estimated to be twice as expensive at \$0.70 per passenger kilometre. Prices on all of these services are much cheaper in winter; for example \$0.45 per passenger kilometre for a winter special on the TranzAlpine or \$0.19 per passenger kilometre for a special fare from Christchurch to Kaikoura. It is difficult to provide an average price, but for all subsequent analysis a unit cost of **\$0.35** per passenger kilometre has been assumed.

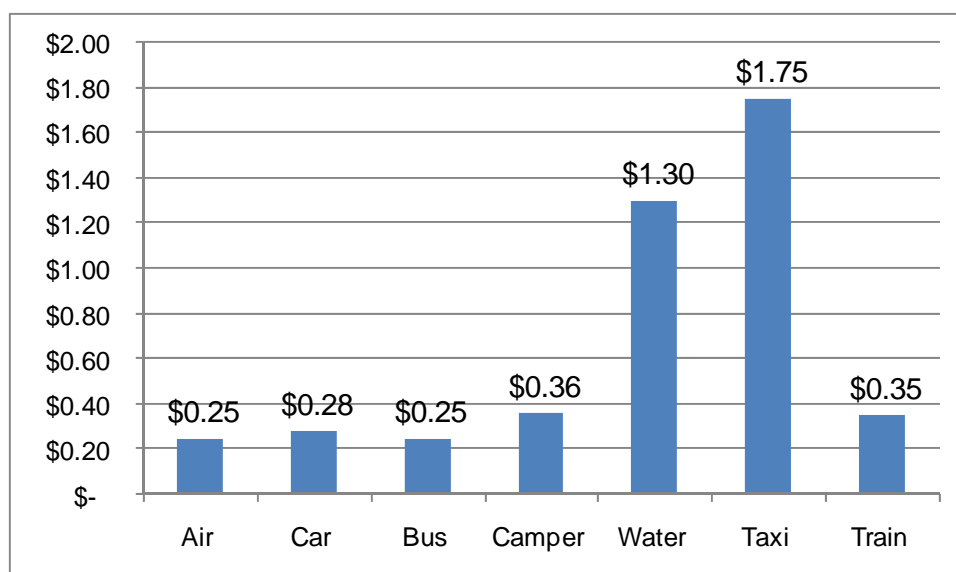
### 3.2.8 Overview

The per-kilometre cost is comparatively similar for the main transport modes, but much higher for the less frequently used modes such as water transport and taxis (Figure 4). The overall amount spent on transport is composed of the unit cost and the distance travelled.

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6 [www.tranzscenic.co.nz](http://www.tranzscenic.co.nz)

**Figure 5**  
**Overview of Transport Costs per Passenger-Kilometre**



### 3.3 Deriving Fuel Costs

This section estimates the amount of money spent on fuel by visitors hiring rental cars and campervans (fuel was not included in the vehicle hire rates estimated above, but it was included in all of the other transport modes). The average distance travelled by car or campervan has been estimated from the IVS, and the results are shown in Table 3. It is also known from a study undertaken by the Energy Efficiency and Conservation Authority (EECA, 2005) that an average rental car in 2005 consumed 9.97 litres of fuel per 100 km of travel<sup>7</sup>. Furthermore, the proportion of petrol cars in the rental vehicle fleet was estimated at 76% in the 2005 study. The remainder of the rental fleet is assumed to be powered by diesel. In the absence of better data we have applied these proportions to every year between 1999 and 2007.

It is worth noting that the EECA data applies to fleets of between 51 and 100 rental vehicles. Anecdotal evidence suggests that smaller fleets have higher proportions of diesel vehicles and larger fleets have higher proportions of petrol vehicles. The mid-range of possible fleets (i.e. 51-100) was assumed to provide a reasonable estimate of the national rental fleet.

For campervans, an average fuel consumption of 13 litres per 100km was assumed. This is based on figures published in Becken & Hay (2007) and personal communication with a major campervan company (KEA Campers). For simplicity it is assumed that all campervans are diesel vehicles, although a small (but unknown) proportion of vehicles use petrol.

Table 5 provides information on petrol and diesel prices between 1999 and 2007. These prices have been derived from quarterly fuel prices published by Statistics New Zealand. The average price of petrol in 2007 was \$1.549 per litre and the average price of diesel was

<sup>7</sup> This figure was derived by dividing the 119 million litres of fuel used by rental vehicles in 2005 by the estimated amount of 1,194 million vehicle-km travelled in rental cars (EECA, 2005: 39).

\$1.048 per litre. Applying the rental fleet petrol/diesel ratios to these prices results in an average price per litre of fuel (across all fuel types) of \$1.43. Dividing this number by 10 (the average number of kilometres for a rental car per litre of fuel) results in an average fuel price per rental car kilometre of around **\$0.14**. Applying the same logic to campervans results in the same outcome – an average fuel price per campervan kilometre of **\$0.14**

**Table 5**  
**Average Petrol and Diesel Prices 1999-2007 (calendar years)**

Year	Retail petrol (inc. GST) (c/l)	Retail diesel (inc. GST) (c/l)
1999	85.36	50.00
2000	107.11	72.89
2001	104.52	71.90
2002	102.88	64.83
2003	105.04	62.18
2004	116.44	72.99
2005	131.95	90.13
2006	154.89	112.94
2007	154.90	104.88

### **3.4 Deriving the Accommodation Component**

The IVS also captures information on the number of nights spent in various forms of commercial and private accommodation. These data have been used to estimate the average number of nights spent in certain forms of accommodation by each visitor segment.

We have defined the following accommodation categories for our analysis: hotel, motel, backpacker, other commercial<sup>8</sup> and non-commercial (private). The data indicates that a high percentage of international visitor nights are spent in non-commercial accommodation (Table 5).

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<sup>8</sup> This includes rented apartments, bed & breakfasts and camping grounds.

**Table 6**  
**Average Number of Nights Spent in Different Types of Accommodation**  
**by Market Segment (2007)**

Segment	Hotel nights	Motel nights	Backpacker nights	Other Commercial nights	Non-commercial nights	Total
Australia FIT Holiday	2.1	2.6	1.6	2.7	5.2	14.2
Australia FIT VFR	0.5	0.8	0.1	0.3	10.1	11.8
Australia FIT Other	2.3	0.8	0.3	0.7	6.0	10.1
Australia Tour	5.1	2.0	0.2	2.5	0.2	9.9
UK Holiday	3.3	3.4	7.3	5.4	12.2	31.6
UK VFR and Other	1.6	1.4	1.4	1.7	32.2	38.4
USA FIT Holiday	3.3	2.3	2.3	4.4	4.4	16.8
USA FIT VFR and Other	2.4	1.0	1.2	3.0	18.1	25.7
USA Tour	5.3	0.6	0.6	3.3	1.3	11.1
Japan FIT Holiday	2.5	0.8	2.8	2.4	6.8	15.3
Japan FIT VFR and Other	1.9	2.1	0.4	20.6	21.1	46.1
Japan Tour	4.9	0.1	0.0	3.1	0.4	8.5
South Korea All	4.4	0.3	1.0	2.7	14.2	22.6
China FIT	2.5	1.4	0.8	2.8	34.5	42.0
China Tour	3.0	0.1	0.0	0.2	0.2	3.5
Germany All	3.2	2.0	12.7	10.8	14.0	42.8
Rest of World FIT	1.9	1.7	3.0	4.2	22.1	32.9
Rest of World Tour	5.4	1.5	0.9	5.3	8.7	21.9
<b>All Visitors</b>	<b>2.5</b>	<b>1.5</b>	<b>2.0</b>	<b>3.1</b>	<b>12.7</b>	<b>21.8</b>

We have used this information to develop a bottom-up estimate of the amount spent by international visitors on accommodation in New Zealand. Our methods for estimating average spend per night on each accommodation type are outlined below.

### **3.4.1 Price of Hotels**

The average spend per night on hotel accommodation has been estimated by combining New Zealand Hotel Council (NZHC) data with IVS data. The NZHC data was used to determine the average price paid per room night in each quality band, and the IVS data was used to determine how the hotel nights generated by each visitor segment are distributed across quality bands (using data aggregated across the past four years). This method generated an average price per room night for each visitor segment which was divided by 1.63 (the average number of occupants per hotel room) to estimate average prices paid per person night. This method generated estimates of spend per person night ranging between **\$94** and **\$101** including GST.

### **3.4.2 Price of Motels and Backpacker Hostels**

Average spend per person night on motels and backpacker hostels has been sourced from an economic yield survey conducted by Becken et al., 2007. These data were confirmed by an independent search of published prices on the internet. The values that we have adopted are **\$65 per person-night** for motels and **\$25 per person-night** for backpacker hostels including GST.

### 3.4.3 Price of Other Accommodation

The 'other accommodation' category contains a diverse range of accommodation types including holiday parks, home stays, bed & breakfasts and luxury lodges. Prices for these categories are likely to vary substantially. We have observed the likelihood of each segment purchasing each of the aforementioned accommodation types using IVS data and have used this to produce a weighted average price for each segment. The resulting estimates range between **\$26 and \$54 per person night**.

## 3.5 Deriving all Other Expenditure

The IVS provides some information on expenditure on items such as recreational activities, food and beverage, souvenir shopping and other purchasing activities. However, the data are not considered to be reliable due to low response rates and missing values which could either represent zero spend *or* an inability/refusal to answer. To overcome this problem we have included spend on all of these items as a single residual category which has been calculated as the difference between our bottom-up estimates of spend on transport, fuel and accommodation and the estimates of total spend for each visitor segment generated by the IVS. We acknowledge that the total spend figures in the IVS may be subject to some error (due to oversimplified imputation methods and weighting issues), but we believe that the approach we have adopted is better than the next-best alternative, which is to develop an independent bottom-up estimate of spend based on very unreliable commodity level data.

The expenditure for each visitor segment is presented in Table 7 further below.

## 3.6 Reconciliation with Tourism Satellite Accounts

The Tourism Satellite Account (TSA) has been produced each year since 1999 by Statistics New Zealand to estimate the contribution of the tourism industry to the New Zealand economy. The TSA provides a useful reference point for our research because it provides estimates of international visitor spend across seven consumption categories, some of which are the same as the categories we are using in our bottom-up method. These categories, and the corresponding international visitor expenditures in 2007, are show below:

**Table 7**  
**International Demand**

Air passenger transport:	\$2,032m +GST = \$2,286m
Other passenger transport:	\$809m +GST = \$910m
Accommodation services:	\$1,067m +GST = \$1,200m
Food and beverage serving services:	\$1,381m +GST = \$1,554m
Retail sales – fuel and other:	\$261m +GST = \$294m
Retail sales – other:	\$1,407m +GST = \$1,583m
Other tourism products:	\$1,236m +GST = \$1,390m

It should be noted that air passenger transport in the TSA includes expenditure on both domestic and international flights. For the present analysis we are only interested in domestic flights and we estimate these to be in the order of \$154 million<sup>9</sup> in 2007. We have

Our independent bottom-up estimate of transport expenditure (\$1.09b) is close to the estimate contained in the TSA of \$1.06b (including domestic air travel). Our estimate of accommodation expenditure (\$1.29b) is also close to the TSA estimate of \$1.20b, as is our estimate of fuel expenditure (\$251m vs. \$294m). These are the only spend categories that we have been able to estimate with some degree of accuracy.

The final step in our spend estimation process was to scale our spend estimates up or down at the visitor segment level until our aggregates matched the aggregates reported in the TSA. This ensured that our aggregate visitor spend estimates for transport (excluding international airfares), accommodation, fuel, and all other international visitor spend (residual) matched the estimates reported in the TSA.

We used the resulting figures to estimate aggregate expenditure per visitor segment (excluding international airfares) on accommodation, transport, fuel and all other purchases of goods and services. The results are shown in the table below.

**Table 8**  
**Final Spend per Person by Category and Visitor Segment, Reconciled with the TSA**

Segment	Accommodation	Domestic Air Transport	Other Domestic Transport	Fuel	All Other Expenditure	Total
Australia FIT Holiday	\$509	\$39	\$465	\$168	\$1,343	\$2,523
Australia FIT VFR	\$115	\$26	\$160	\$60	\$1,046	\$1,406
Australia FIT Other	\$340	\$39	\$113	\$23	\$1,505	\$2,020
Australia Tour	\$719	\$49	\$587	\$75	\$2,167	\$3,598
UK Holiday	\$934	\$65	\$828	\$228	\$2,571	\$4,627
UK VFR and Other	\$450	\$82	\$324	\$122	\$2,715	\$3,692
USA FIT Holiday	\$656	\$141	\$680	\$194	\$1,418	\$3,089
USA FIT VFR and Other	\$509	\$133	\$313	\$96	\$2,665	\$3,715
USA Tour	\$689	\$181	\$633	\$45	\$5,015	\$6,563
Japan FIT Holiday	\$518	\$94	\$392	\$80	\$1,711	\$2,794
Japan FIT VFR and Other	\$1,145	\$104	\$226	\$50	\$4,030	\$5,555
Japan Tour	\$543	\$221	\$354	\$8	\$3,349	\$4,475
South Korea All	\$632	\$111	\$329	\$61	\$2,340	\$3,473
China FIT	\$711	\$82	\$232	\$80	\$3,385	\$4,490
China Tour	\$278	\$27	\$158	\$7	\$1,950	\$2,421
Germany All	\$1,122	\$49	\$933	\$293	\$2,571	\$4,968
Rest of World FIT	\$597	\$67	\$444	\$138	\$2,168	\$3,413
Rest of World Tour	\$844	\$135	\$558	\$49	\$2,352	\$3,938
<b>All Visitors</b>	<b>\$535</b>	<b>\$69</b>	<b>\$406</b>	<b>\$131</b>	<b>\$2,017</b>	<b>\$3,157</b>

The breakdown of expenditure by visitor segment shows that the ‘other’ category is by far the largest contributor to overall spending. This is largely driven by tourist expenditure in the retail and hospitality sectors. While it is somewhat disadvantageous that no further breakdown into sub-categories can be justified based on the available data, we are at least confident that the energy-intensive tourism sub-sectors, i.e. transport and accommodation, are captured adequately.

<sup>9</sup> This figure has been derived by applying our 2007 estimate of \$0.25 per passenger-km by air to the total distance travelled by air within New Zealand by international tourists (distance data has been sourced from the IVS). We have conducted this calculation for each year.



## Chapter 4 Price Indices

We have used the consumption bundles derived in the previous section to estimate price indices for ‘on the ground’ (OTG) expenditure by tourists in each of the 18 segments. Each index represents an aggregate price for a typical bundle of OTG expenditure by the tourists in each segment. That is, the price index represents a composite price across the five different expenditure categories shown in Table 8.

To do this, price indices were sourced for each of the expenditure. Where possible, we tried to use a subcategory of the New Zealand consumer price index<sup>10</sup> that corresponded as closely as possible to the tourism expenditure categories as shown above. Where a suitable subcategory did not exist, we used the general Consumer Price Index (CPI) as a proxy. The following series were used:

- Transport: Total transport was further decomposed into domestic air transport and other domestic transport modes, using the distance data for each segment. The price of air transport was measured by the domestic air transport component of the CPI, and other transport modes were measured by domestic road transport.
- Fuel: A weighted average of 76% petrol price index and 24% diesel price index.
- Accommodation: Accommodation services price index component of the CPI.
- Other expenditure categories: General consumer price index.

The consumer price index and its components are released quarterly. To match with the annual expenditure data, we calculated annual averages of the price indices with a base of 1000 in 2006. This base year was chosen to be consistent with the calculation of the CPI, which also currently uses expenditure patterns from 2006. Table 8 shows the price index for each category.

**Table 9  
Price Indices for Tourism Expenditure Categories  
(based on data from Statistics New Zealand)**

Year	Accommodation services	Domestic air transport	Road passenger transport	Fuel	General CPI
	CPIQ.SE909600	CPIQ.SE907303	CPIQ.SE907302		CPIQ.SE9A
1997	797	611	851	546	825
1998	804	629	860	510	835
1999	812	692	875	519	834
2000	816	732	868	667	856
2001	822	833	896	660	879
2002	840	853	898	642	902
2003	882	770	909	648	918
2004	916	802	900	717	939
2005	962	899	940	835	967
2006	1000	1000	1000	1000	1000
2007	1031	994	1044	981	1024

<sup>10</sup> See <http://www.stats.govt.nz/products-and-services/info-releases/cpi-info-releases.htm>

These price indices for the categories were then multiplied by expenditure weights for each segment calculated from the expenditure estimates in Table 9. We held the consumption bundle fixed at the 2006 distribution for each segment, as shown in Table 9. Holding the consumption bundle fixed is important to isolate the effects of price changes from changes in consumption patterns induced by price changes.

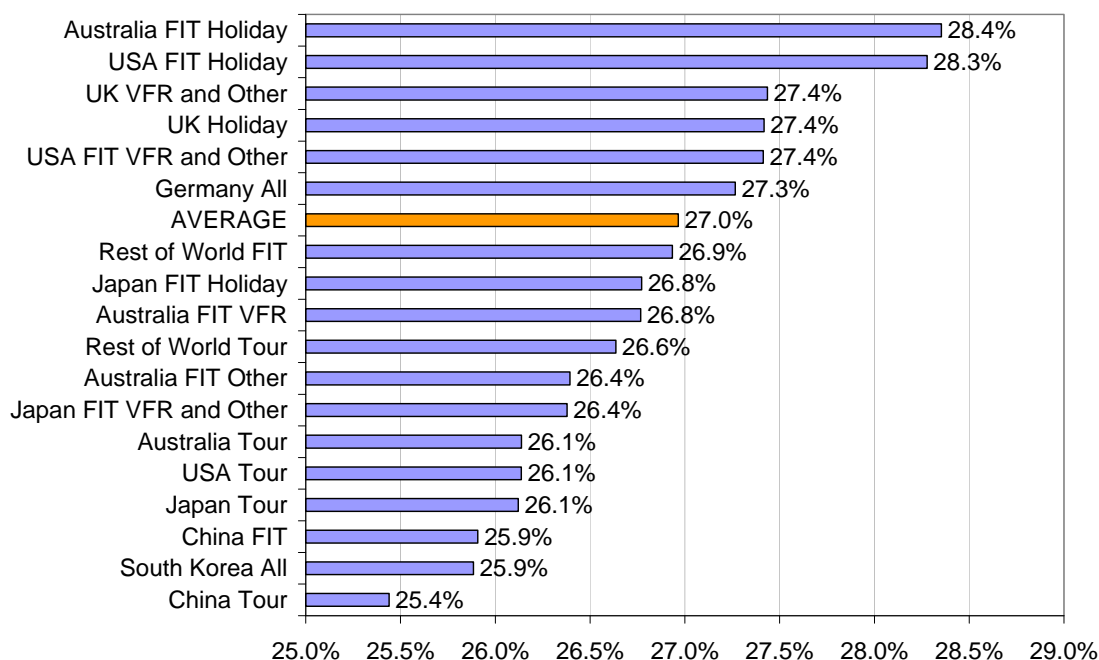
**Table 10**  
**2006 Expenditure Weights**

Segment	Accommodation	Domestic Air Transport	Other Domestic Transport	Fuel	All Other Expenditure
Australia FIT Holiday	22%	1%	21%	8%	48%
Australia FIT VFR	8%	2%	11%	5%	74%
Australia FIT Other	23%	2%	6%	2%	67%
Australia Tour	22%	1%	13%	2%	62%
UK Holiday	21%	2%	18%	5%	54%
UK VFR and Other	14%	3%	12%	5%	65%
USA FIT Holiday	17%	4%	17%	6%	55%
USA FIT VFR and Other	17%	4%	10%	3%	66%
USA Tour	14%	4%	12%	1%	69%
Japan FIT Holiday	19%	4%	11%	2%	65%
Japan FIT VFR and Other	19%	3%	6%	2%	71%
Japan Tour	13%	5%	10%	0%	71%
South Korea All	13%	3%	8%	1%	76%
China FIT	13%	2%	4%	1%	79%
China Tour	11%	3%	7%	0%	79%
Germany All	20%	1%	17%	5%	56%
Rest of World FIT	17%	2%	12%	4%	65%
Rest of World Tour	18%	4%	12%	1%	65%

These expenditure weights were used together with the price indices to produce a composite annual price index for each segment. These price indices are presented in Appendix B.

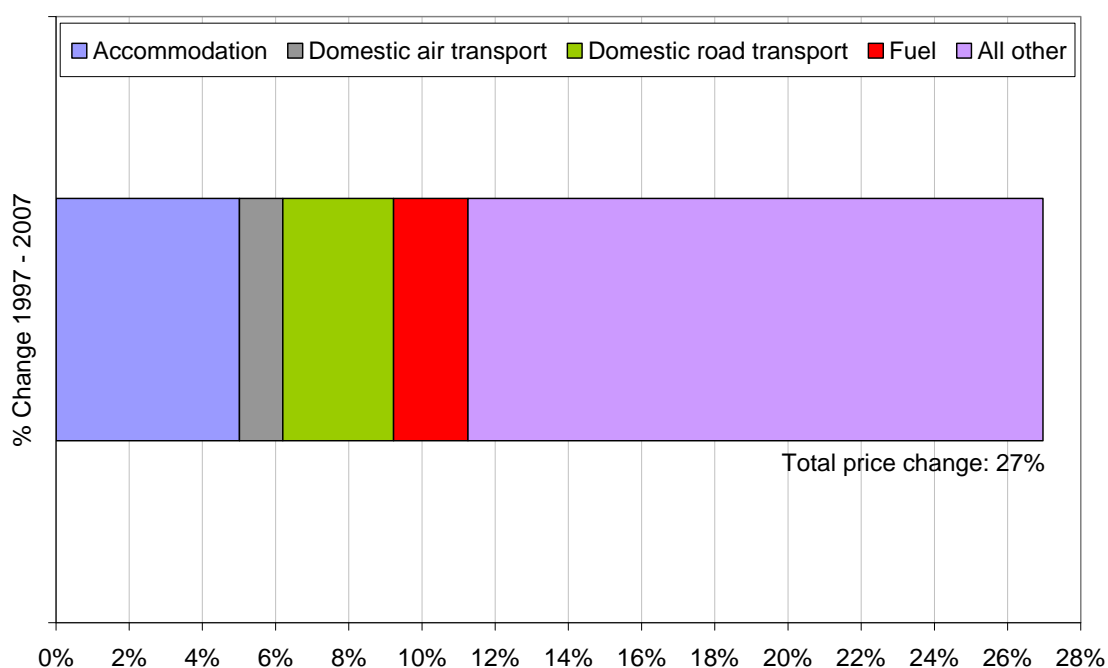
Figure 5 summarises the changes in tourism prices experienced by the different segments by calculating the overall percentage change in the OTG price index for each segment between March 1996 and December 2006. The price changes are very similar across segments, ranging from 25.4% to 28.4%. Over the same period the consumer price index increased by 24.1%. Therefore, the overall price of on-the-ground tourism in New Zealand increased in real terms over this period, for all segments.

**Figure 6**  
**Total change in OTG tourism price in NZ dollar terms, 1997 - 2007**



In terms of the individual components of tourism expenditure, Figure 6 decomposes the total percentage change in the price index for each of the individual expenditure categories between 1997 and 2007. Fuel prices have increased rapidly, however these comprise only about 3% of OTG expenditure on average across segments, thus this has not resulted in a large increase in the overall OTG price indices.

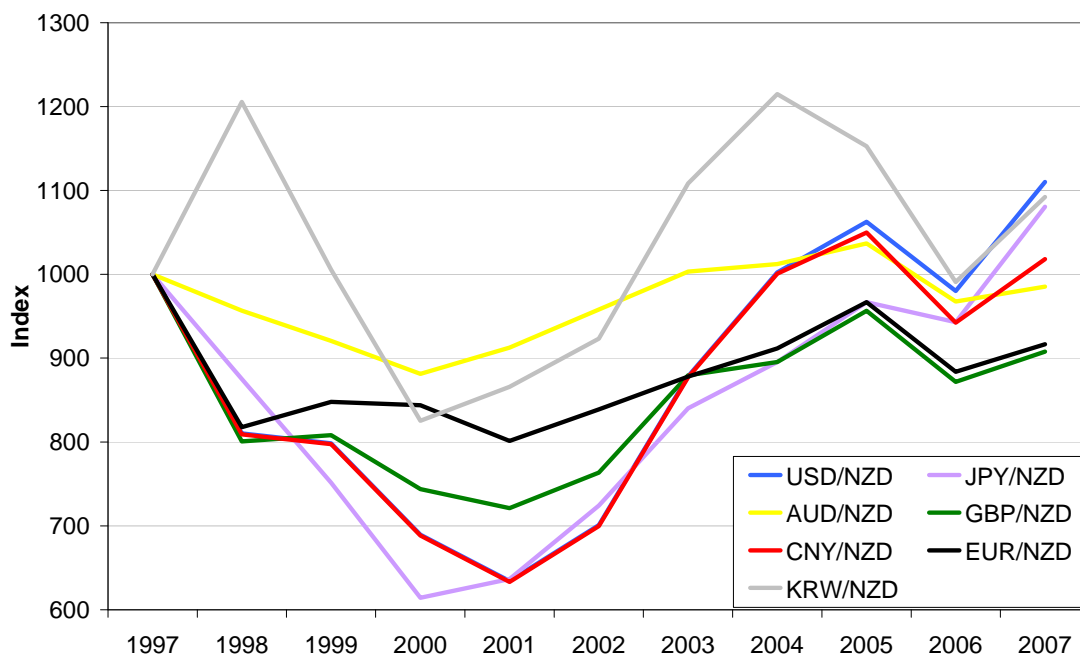
**Figure 7**  
**Decomposition of the Total Price Change Experienced by an Average Tourist, 1997 - 2007**



These tourism price indices are an important input to further work in the Tourism & Oil project relating to the determinants of demand for New Zealand tourism and the effects of changes in oil prices on demand, as they enable us to estimate ‘substitution elasticities’ for tourism, as well as calibrate other parameters of a computable general equilibrium model (Lennox & Schiff, 2008).

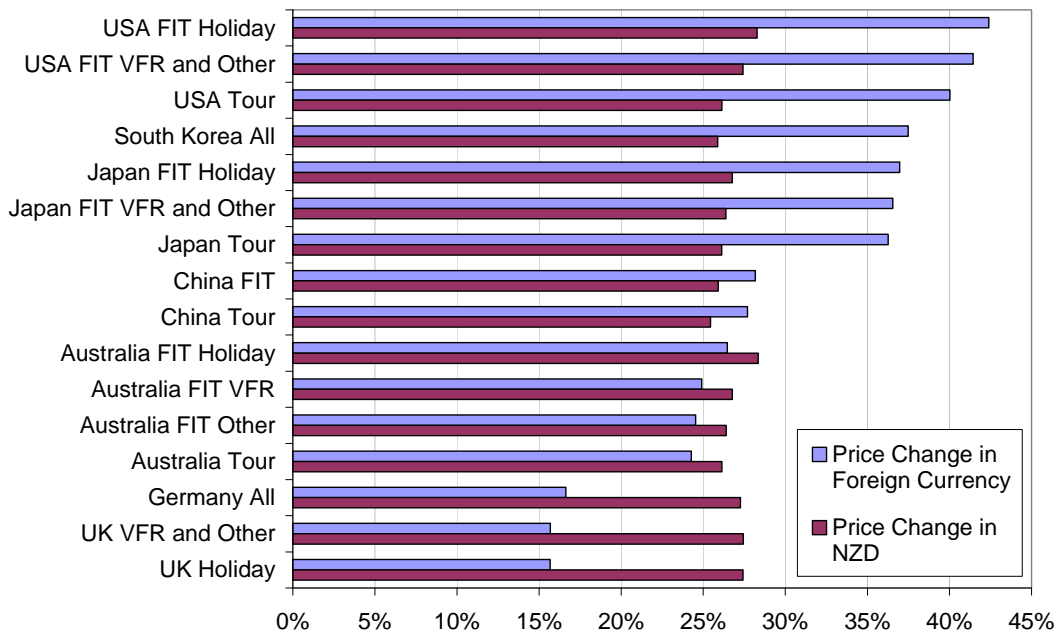
The above analysis is in New Zealand dollar terms. It is also possible to convert the price indices to foreign currency, to reflect the prices that tourists face in their own currency. Figure 7 shows changes in the relevant exchange rates from 1997 to 2007.

**Figure 8**  
**Exchange Rate Changes 1997 - 2007**



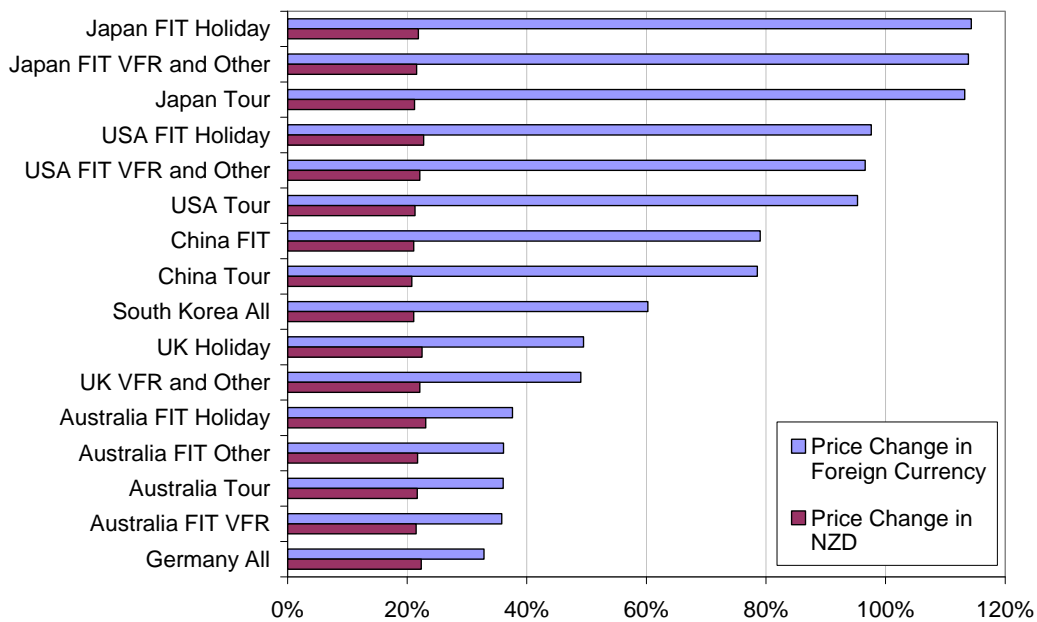
Using these exchange rates, we have converted the domestic on-the-ground price indices to foreign terms, to calculate foreign currency price indices. Figure 8 compares the total change in the on-the-ground price index in NZ dollar terms and in foreign currency terms between 1997 and 2007. This shows that, for some markets at least, exchange rate fluctuations have a much larger effect on the prices experienced by tourists than changes in local NZ dollar prices.

**Figure 9**  
**Total Price Index Changes 1997 - 2007**



Arguably, the comparison shown in Figure 8 under-represents the importance of exchange rate fluctuations, as the total change in the value of the NZ dollar against most of the other currencies was relatively small between 1997 and 2007. Figure 10 shows the total price index changes in NZ dollar and foreign currency terms for the period from 2000 – 2007. During this period, the NZ dollar appreciated strongly, meaning that for most markets the exchange rate effects massively dominate the domestic price effects.

**Figure 10**  
**Total Price Index Changes 2000 – 2007**





## **Chapter 5**

### **Conclusion**

This report details research undertaken on the consumption patterns of tourists and the price they have to pay for typical consumption bundles. To this end, 18 visitor segments have been identified (based on origin + style + purpose) and their consumption patterns were derived based on data from the International Visitor Survey on tourists' transport behaviour, fuel consumption, accommodation choices and other decisions. A time series was developed for the years 1997 to 2007.

Because of the focus on oil in this research programme, we paid particular attention to tourists' transport behaviour. The analysis showed, for example, that we can observe changes in transport behaviour over time (e.g. reductions in travel distance in recent years for some visitor segments), but the patterns are complex and more work is required. More specifically, we will attempt to model travel distance as influenced by a wide range of parameters, including the price of petrol and diesel.

Based on the consumption bundles for each visitor segment we created expenditure profiles. These give an indication on how exposed a particular segment is to components that will increase in price due to higher global oil prices (e.g. transport components). The analysis revealed that some tourists (typically the free and independent travellers) spend substantial amounts of dollars on fuel (directly), i.e. as a result of car or van hire, whereas other segments are more characterised by spending on recreation, retail and hospitality products.

The Consumer Price Index information from Statistics New Zealand was used to track the price of the different consumption bundles (the 18 segments, see above) over time. It emerged that some tourism products, e.g. air travel and fuel, have increased above the rate of inflation, and tourism as whole has also become more expensive than other goods. The effects, however, are dwarfed by those related to exchange rate fluctuations, which made "New Zealand tourism" comparatively cheaper or more expensive for the different visitor segments. At this stage, the price of oil played only a minor role in the price changes of tourism.

We also attempted to gain insights into tourists' price sensitivity, based on the information on prices and arrival numbers. Unfortunately, despite diverse approaches, the current data did not provide conclusive results and price elasticities can not be provided at this point. We are currently exploring options for advancing this line of research.



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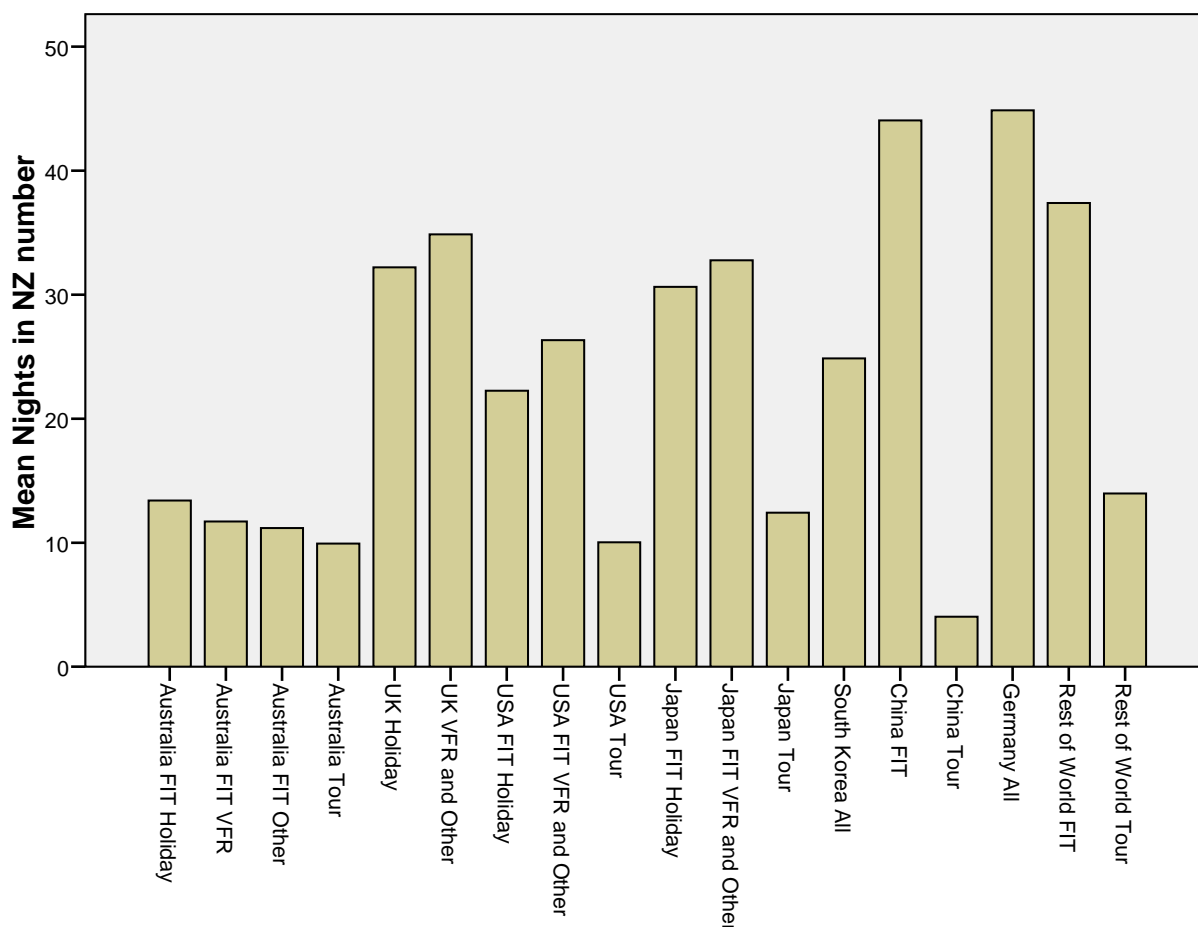


## Appendix A

### Length of Stay

Number of nights spent in New Zealand differs significantly between the 18 segments. The ANOVA test for the year 2006 was highly significant at  $p < 0.001$  ( $F=21.842$ ;  $df=17$ ; 5310).

**Table 11**  
**Length of Stay**



### **Repeat Visitation**

The degree to which tourists were first-time visitors or repeat visitors was statistically related to the market segments. The Chi-square test for the year 2006 was highly significant at  $p < 0.001$  ( $X^2=953.8$ ;  $df=34$ ).

**Table 12**  
**Repeat Visitation**

	<b>First visit to NZ</b>	
	<b>Yes</b>	<b>No</b>
Australia FIT Holiday	49.7%	50.3%
Australia FIT VFR	9.7%	90.3%
Australia FIT Other	21.2%	78.8%
Australia Tour	63.2%	36.8%
UK Holiday	82.4%	17.6%
UK VFR and Other	46.1%	53.9%
USA FIT Holiday	79.8%	20.2%
USA FIT VFR and Other	51.1%	48.9%
USA Tour	92.6%	7.4%
Japan FIT Holiday	60.6%	39.4%
Japan FIT VFR and Other	43.1%	56.9%
Japan Tour	81.3%	18.8%
South Korea All	63.0%	37.0%
China FIT	50.0%	50.0%
China Tour	93.5%	6.5%
Germany All	83.8%	16.2%
Rest of World FIT	55.8%	44.1%
Rest of World Tour	83.4%	16.6%

### *Airport of Arrival*

The gateway of entry into New Zealand is related to the market segments. For example, USA tour group visitors are most likely to arrive by sea (12.3%), whereas Australian tour group visitors are most likely to arrive in Christchurch (51.7%). The Chi-square test for the year 2006 was highly significant at  $p < 0.001$  ( $X^2=1287.4$ ;  $df=85$ ).

**Table 13**  
**Airport of Arrival**

	<b>Auckland</b>	<b>Wellington</b>	<b>Christchurch</b>	<b>By sea</b>
Australia FIT Holiday	43.2	10.5	43.9	0.3
Australia FIT VFR	49.8	27.3	20.7	0.0
Australia FIT Other	52.9	32.8	13.5	0.0
Australia Tour	39.1	8.0	51.7	1.1
UK Holiday	68.3	3.5	26.0	1.2
UK VFR and Other	66.1	9.8	23.1	0.0
USA FIT Holiday	86.1	1.5	9.9	1.8
USA FIT VFR and Other	87.1	6.4	6.4	0.0
USA Tour	67.2	0.8	19.7	12.3
Japan FIT Holiday	62.2	2.4	35.4	0.0
Japan FIT VFR and Other	75.6	6.5	16.3	0.0
Japan Tour	56.3		43.8	0.0
South Korea All	81.0	0.9	17.6	0.0
China FIT	87.2	2.6	10.3	0.0
China Tour	85.7	1.9	12.3	0.0
Germany All	76.5	4.4	18.4	0.7
Rest of World FIT	77.5	4.7	17.0	0.4
Rest of World Tour	70.8	0.8	27.3	1.2

**Recommendation of New Zealand as a Destination**

Visitors from the USA, and the UK are most likely to recommend New Zealand as a destination. Japanese, South Korean and Chinese visitors are slightly less likely to recommend New Zealand. The Chi-square test for the year 2006 was highly significant at  $p < 0.001$  ( $X^2=382.8$ ;  $df=68$ ).

**Table 14**  
**Recommendation of New Zealand as a Destination**

	Recommendation of NZ (%)				
	Very unlikely	Quite unlikely	Neither likely or unlikely	Quite likely	Very likely
Australia FIT Holiday	1.4	1.0	1.4	24.0	72.3
Australia FIT VFR	1.6	0.9	1.6	16.6	79.3
Australia FIT Other	1.5	2.7	5.0	25.5	65.3
Australia Tour	1.1			17.2	81.6
UK Holiday	0.7	0.2	1.5	12.1	85.4
UK VFR and Other	0.3	0.3	2.4	12.2	84.7
USA FIT Holiday	0.3	0.6	2.4	20.2	76.5
USA FIT VFR and Other	0.9		1.7	15.5	82.0
USA Tour		1.6	0.8	18.0	79.5
Japan FIT Holiday	1.6	1.6	2.4	29.9	64.6
Japan FIT VFR and Other	1.6		5.7	32.5	60.2
Japan Tour	0.6	2.3	2.8	35.8	58.5
South Korea All		0.9	15.3	38.4	45.4
China FIT	2.6		7.7	37.8	51.9
China Tour	4.5	1.9	5.2	39.6	48.7
Germany All		1.5	3.7	18.4	76.5
Rest of World FIT	1.0	1.1	3.4	24.1	70.4
Rest of World Tour	0.8	0.8	4.7	24.1	69.6

## Appendix B

### Annual Price Indices for Segments

Segment	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia FIT Holiday	802	808	813	835	853	868	887	909	950	1000	1027
Australia FIT VFR	810	818	820	844	865	884	899	921	957	1000	1024
Australia FIT Other	812	821	824	843	862	883	902	926	962	1000	1026
Australia Tour	815	824	827	844	864	882	902	923	960	1000	1027
UK Holiday	808	815	820	839	858	874	893	915	954	1000	1027
UK VFR and Other	806	814	818	840	861	879	895	917	955	1000	1025
USA FIT Holiday	801	809	815	836	858	874	890	911	952	1000	1025
USA FIT VFR and Other	805	814	819	840	862	881	896	919	957	1000	1025
USA Tour	814	823	828	846	869	889	904	924	960	1000	1026
Japan FIT Holiday	810	819	823	842	864	883	900	922	959	1000	1026
Japan FIT VFR and Other	812	821	824	843	864	885	903	926	961	1000	1025
Japan Tour	813	823	828	846	870	890	905	925	960	1000	1025
South Korea All	815	824	827	847	869	890	906	927	961	1000	1025
China FIT	814	824	826	846	868	889	906	929	962	1000	1025
China Tour	817	828	830	849	872	893	909	930	963	1000	1025
Germany All	808	816	820	840	859	876	894	916	954	1000	1027
Rest of World FIT	809	817	821	842	862	881	898	920	957	1000	1026
Rest of World Tour	811	820	825	843	866	885	901	922	959	1000	1026