Effects of an increase in travel ticket price on New Zealand tourism

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Glossary

FIT	FIT is defined in the International Visitor Survey as a "fully independent traveller" who reports no expenditure prior to arriving in New Zealand. However, we have adopted the apparent distinction in Schiff and Becken between a tour traveller and an FIT or "free and independent traveller".
IVA	International Visitor Arrivals (Statistics NZ survey)
IVS	International Visitor Survey (MBIE survey)
MBIE	Ministry of Business, Innovation and Employment
MPI	Ministry for Primary Industries
OTG	On the ground expenditure (as compared to expenditure before arriving in New Zealand)
VFR	Visiting friends and relatives

Introduction

1. This report estimates the possible effects of an increase in the ticket price for airlines and cruise ships on the number of tourists visiting New Zealand and consequently on tourist expenditure.

2. The context for the report is a possible policy change to recover some border costs arising from people movements into and out of New Zealand. The level of the possible charge is approximately $22.

3. The estimates in this report are based on a simple constant price elasticity of demand model. This assumes that all else remains the same, and estimates the effect on the demand for airline and cruise tickets of a $22 increase in the return fare.

4. The estimate of the reduction in tourism expenditure is based on average expenditure for those people who no longer travel to New Zealand. It assumes no effect on on-the-ground (OTG) spending by those who still choose to visit.

5. The remainder of the report sets out the results and details the methodology and data used, and their limitations.

Summary

6.   The Ministry for Primary Industries (MPI) and Customs are developing a policy that would introduce a charge for people entering and leaving New Zealand to recover some border costs incurred by MPI and Customs. The charge would be levied per person (i.e. including crew) and be recovered from the transport operator.

7.   MPI and Customs want to understand the effect of such a charge on the number of international visitors coming to New Zealand and the level of tourism expenditure. This report considers the effects on short-term international visitors to New Zealand (i.e. those who stayless than 12 months). It provides separate estimates for those visiting for the purpose of a holiday, to visit friends and relatives, or for business reasons including attending conferences. It does not consider any effects on travel from New Zealand or any other possible effects on the economy of such a levy.

8.   We have estimated the effects of the levy individually on key origin markets. Although MPI and Customs are interested in the effect on visitors from the "rest of the world", it is not possible to obtain a robust elasticity estimate for this group as they are highly diverse. We have therefore expanded the number of individual countries considered to the seven largest origin markets:

- Australia
- UK
- US
- Japan
- South Korea
- China
- Germany

9.   MPI and Customs have advised us that the levy is likely to be approximately $22; this is the value that is used throughout the report.

10.   There is limited information on the price elasticity of demand of international visitors to NZ and we have relied on the results of the most comprehensive study available (Schiff and Becken, 2011). We have also presented confidence intervals for the results based on the standard errors reported for the elasticity estimates in that study. The confidence interval estimates the range of outcomes between which there is a 90% probability the elasticity lies. All estimates of arrivals are rounded to 10.

11.   An increase in ticket prices by $22 is estimated to reduce visitors by between 11,460 and 56,190, a reduction of 0.5%-2.4% against those forecast by the Ministry of Business, Innovation and Employment (MBIE) for calendar year 2015. The majority of these are Australian visitors (77%). Based on the central estimate of 34,020, this

would reduce the rate of growth in visitor arrivals forecast by MBIE in 2015 from 5.4% to 3.8%.[1]

12.   Total expenditure is estimated to decline by 0.9%. The effect on expenditure is less than the effect on visitor numbers, because those visitors who choose not to come are more price sensitive and tend to spend less than average.[2] This would reduce the rate of growth in visitor expenditure forecast by MBIE in calendar 2015 from 11.5% to 10.5%.

Figure 1 Total visitor arrivals
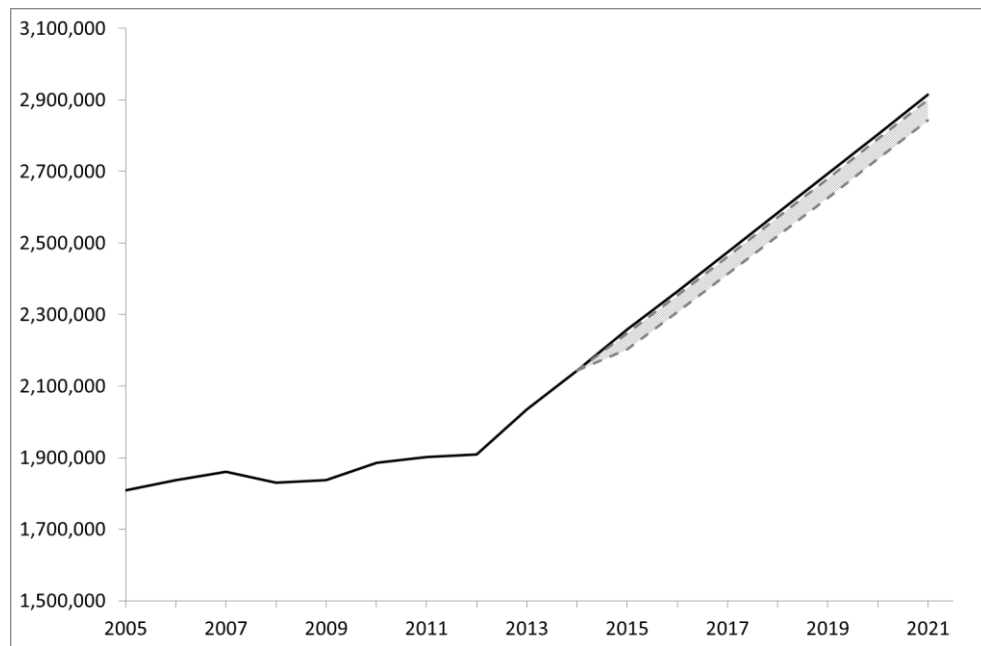
Source: MBIE, Sapere

1. The forecasts in this figure relate to Australia, UK, US, Japan, South Korea, China and Germany only.
2. Excludes transiting cruise passengers.

15.   Figure 1 illustrates the MBIE forecast for total arrivals from the seven key origin markets that are included in the analysis. The estimated effect of the $22 charge on the forecast is shown by the shaded area. This illustrates the boundaries of the confidence interval. The levy will reduce the rate of growth in visitor arrivals in the year it comes into effect. This is illustrated in the graph by the reduction in growth in 2015, after which the rate of growth returns to the MBIE forecast. The timing of the

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1   The MBIE forecasts exclude transiting cruise passengers, while the overall figures presented in this paragraph include these visitors.

2   To proxy this effect we have used the median expenditure by country of origin to estimate the effect on expenditure. See Method section for more information.

reduction in growth will obviously depend on when any charge is introduced; 2015 is used for illustrative purposes only.[3]

16.   Figure 2 illustrates in more detail the estimated effect on 2015 growth rates of a $22 charge. The total height of the column is MBIE's forecast for growth in 2015. The light coloured portion of the column is the reduction in growth that would result from a new charge, with the darker portion representing the new growth rate. These figures are based on Schiff and Becken's central estimates of the elasticities. As mentioned, (assuming a constant level of the charge relative to the airfare) the rate of growth would subsequently return to MBIE's forecasts in 2016, although demand would be at a lower level.

17.   We have not assessed the MBIE forecasts, or the model that is used. However, assuming that these forecasts are a reasonable expectation of future growth, Figure 2 shows that many markets can be expected to continue to grow strongly.

Figure 2 Change in arrivals growth rate in 2015
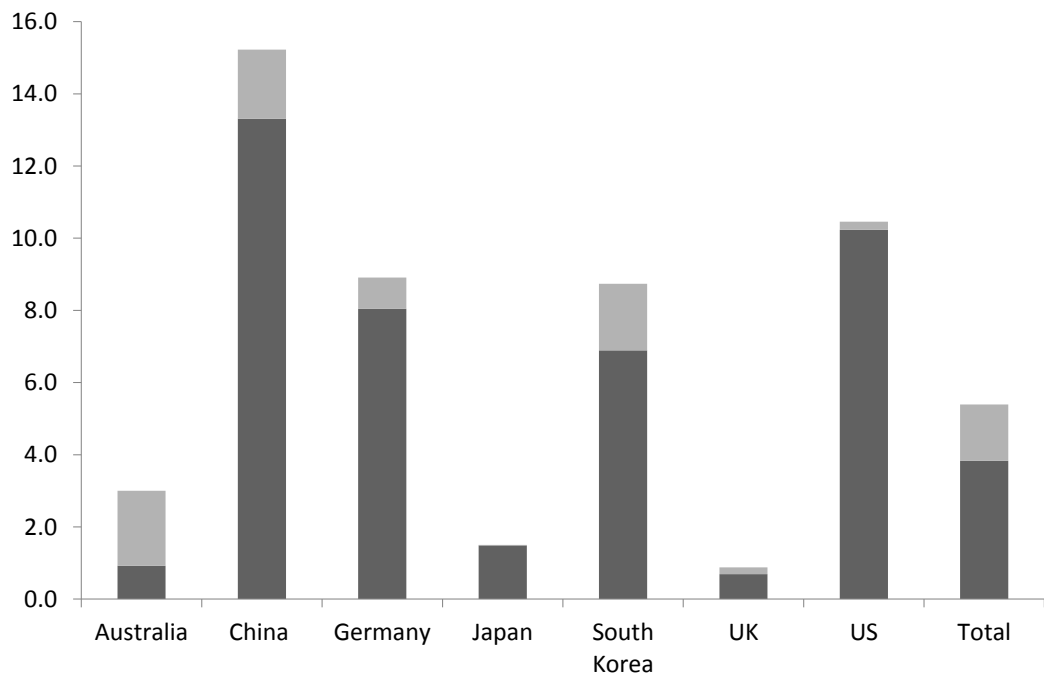
Source: MBIE, Sapere

1.   The forecasts in this figure relate to Australia, UK, US, Japan, South Korea, China and Germany only.
2.   Excludes transiting cruise passengers

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[3]   The model estimates the reduction in demand based on the percentage increase in the cost of the airfare. The decrease in demand will therefore remain the same proportion of total demand until the airfare changes. The chart implicitly assumes that this never happens or equivalently that the charge rises such that it remains the same proportion of the airfare. If this assumption is incorrect the 'gap' may increase (if airfares fall relative to the charge) or decrease (if airfares rise relative to the charge).

Figure 3 Change in expenditure growth rate in 2015
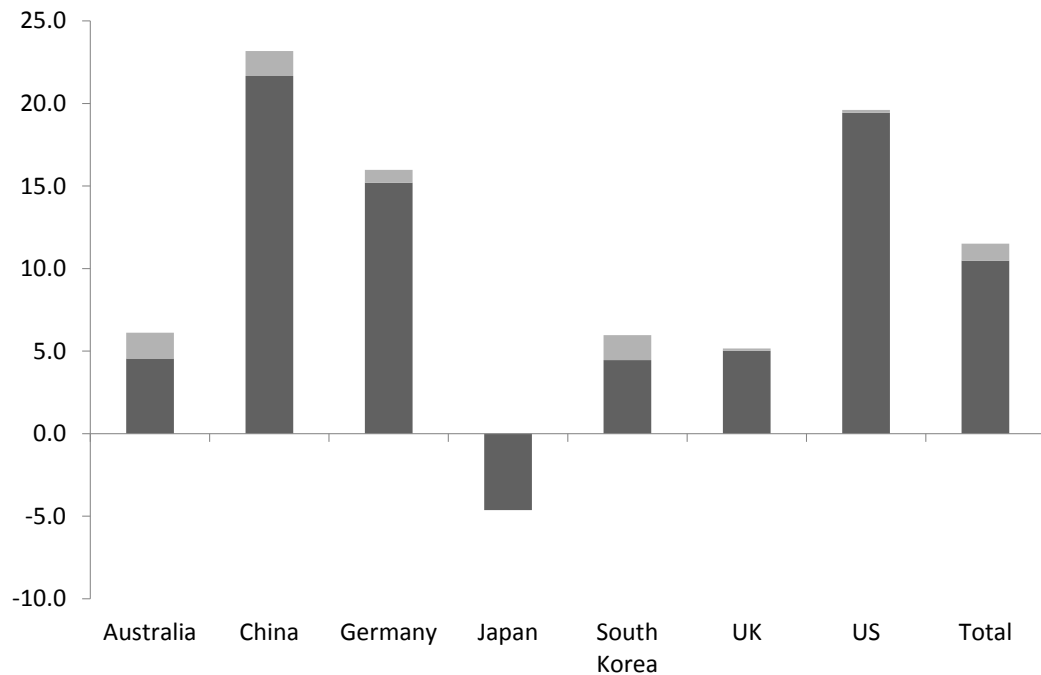
1. The forecasts in this figure relate to Australia, UK, US, Japan, South Korea, China and Germany only.

2. Excludes transiting cruise passengers

18. Like Figure 2, Figure 3 shows the change in the rate of growth of total expenditure by origin market that the charge is estimated to cause in 2015 using the central estimates for the elasticities. The interpretation of the columns is the same: the total height of the column is the MBIE forecast for 2015, the light portion is the reduction in growth as a result of the charge, and the darker portion is the growth that will be achieved. The policy has no effect on expenditure of Japanese visitors.

19. Figure 3 shows the more limited effect that the charge is estimated to have on expenditure growth compared to visitor arrival growth.

20. Table 1 summarises the results. This shows that the most significant effects are in the short haul Australian market, and in the Asian markets. These effects arise for quite different reasons:

    (a) The price of an air ticket from Australia to New Zealand is low relative to all other markets. This means that a given dollar charge has a greater effect in percentage terms on the price of the ticket. The increase in the price of an average return airfare from Australia from a $22 levy is 3.8% compared to 1% or less for all other origin markets. A higher relative price rise causes a larger reduction in visitor demand.

    (b) Asian markets view New Zealand as a luxury destination and as such typically exhibit relatively high demand elasticity. This means that a smaller percent change in the price results in a more significant decline in the volume of

visitors. European markets, in contrast, tend to have relatively inelastic demand. This suggests that there are other non-transport-price factors that are more important drivers of demand from these markets.

21. Table 1 is based on MBIE's forecasts of visitor arrivals and expenditure. These in turn are based on Statistics NZ's International Visitor Arrival (IVA) and MBIE's International Visitor Survey (IVS) data. These data include limited information on cruise passengers. In particular those cruise passengers who arrive and depart New Zealand on the same ship are not included. These so-called transit passengers comprise the majority of the cruise sector, and MPI and Customs advise that these passengers will incur the border charge as the relevant costs are applicable to these types of visitors. We have therefore adjusted the results for transit passengers.

22. The analysis is based on information from reports prepared for Cruise NZ and available on the internet. This adjustment makes very limited difference. Australia is NZ's largest origin market for cruise passengers, and these passengers also tend to incur lower average costs (of the cruise and other international transport). Australian transiting passengers are estimated to reduce by 380, resulting in lower expenditure by $0.3m. This represents only a small decline in the total number of Australian transiting cruise passengers (0.5%).

23. There are a number of important caveats and limitations to the results presented in this report, which are detailed in a separate subsection at the end of the Results section. These caveats may affect the results, and the results should not be interpreted as a comprehensive forecast of tourist arrivals or expenditure; they are more in the nature of a static impact analysis.

    (a) The basis for the estimates is constrained by the availability of data, and assumes the levy affects the number of visitor arrivals (and consequently expenditure). In reality, it is likely that there will be direct effects both on arrivals and also on expenditure levels.

    (b) It is important to note that the effect of the introduction of a levy is considered in isolation of any other factors in the current or future travel environment or the economies of the origin countries that may affect the response to the change. These other effects may be larger than the effects of the levy.

    (c) We have not forecast tourist arrivals or expenditure. Nor have we forecast any of the underlying factors (such as the airfare) that will affect the outcome.

    (d) We have assumed that the full cost of the levy will be passed through to passengers (including crew costs).

    (e) The timing of any possible levy is unclear and the effect on visitor arrivals will depend on the relative value of the charge compared to the airfares at that time.

    (f) Due to data constraints, we have not taken into account variability in airfares chosen or median on the ground expenditure relating to the purpose of the visit, although we consider it likely that there is such variability.

Travel price effects on tourism

Table 1 Estimated effects on MBIE's forecasts for arrivals and expenditure from key origin markets in 2015

Based on a $22 levy on travel ticket prices, adjusted to include transiting cruise passengers

	Australia	UK	US	Japan	South Korea	China	Germany	Total
Total arrivals	1,359,350	202,970	255,950	83,010	60,340	306,570	88,300	2,356,470
Reduction in visitor numbers	26,300	370	560	20	1,020	5,080	700	34,020
Percent reduction in visitors	**1.9**	**0.2**	**0.2**	**0.0**	**1.7**	**1.7**	**0.8**	**1.4**
Total visitor expenditure ($m)	2,240	840	930	190	150	1,280	480	6,110
Reduction in visitor expenditure ($m)	32.3	1.1	1.3	0.0	2.2	15.7	3.2	55.9
Percent reduction in tourist expenditure	**1.4**	**0.1**	**0.1**	**0.0**	**1.4**	**1.2**	**0.7**	**0.9**

Source: MBIE, Covec, Sapere analysis

1.   The figures in this table relate to Australia, UK, US, Japan, South Korea, China and Germany. Totals are for these markets only. Figures may not add due to rounding.

2.   This table adjusts the MBIE forecasts to include the estimated effect on transiting cruise passengers. The number and average expenditure of transiting cruise passengers is based on data from Covec (2012) and Market Economics (2014).

24.   Table 2 shows the results of applying 90% upper and lower confidence bounds to the elasticity estimates from Schiff and Becken using the standard errors they report. This illustrates that while our central estimate for the overall reduction in visitor arrivals is 1.4% the range of estimates across the elasticity confidence interval is 0.5% to 2.4%. The range for the reduction in expenditure is 0.3% to 1.5% around the central estimate of 0.9%.

Table 2 90% confidence interval for the estimated effects on MBIE's forecasts for key origin markets in 2015

Based on a $22 levy on travel ticket prices, adjusted to include transiting cruise passengers

	Australia	UK	US	Japan	South Korea	China	Germany	Total
Reduction in visitor numbers	9,150 - 43,080	80 - 660	240 - 870	10 - 20	410 - 1,630	1,400 - 8,710	170 - 1,220	11,460 - 56,190
Percent reduction in visitors	**0.7 - 3.2**	**0.0 - 0.3**	**0.1 - 0.3**	**0.0 - 0.0**	**0.7 - 2.7**	**0.5 - 2.8**	**0.2 - 1.4**	**0.5 - 2.4**
Reduction in visitor expenditure ($m)	11.1 - 53.1	0.2 - 2.0	0.5 - 2.2	0.0 - 0.0	0.9 - 3.5	4.3 - 27.0	0.7 - 5.6	17.8 - 93.3
Percent reduction in tourist expenditure	**0.5 - 2.4**	**0.0 - 0.2**	**0.1 - 0.2**	**0.0 - 0.0**	**0.6 - 2.3**	**0.3 - 2.1**	**0.2 - 1.2**	**0.3 - 1.5**

Source: MBIE, Covec, Sapere analysis

1. The figures in this table relate to Australia, UK, US, Japan, South Korea, China and Germany. Totals are for these markets only. Figures may not add due to rounding.

2. This table adjusts the MBIE forecasts to include the estimated effect on transiting cruise passengers. The number and average expenditure of transiting cruise passengers is based on data from Covec (2012) and Market Economics (2014).

Results

Interpreting the origin market tables

25.   Tables 3 to 9 show more detailed results by country of origin of the visitor. These tables have been prepared on a different basis from the summary tables. Where the summary tables applied a 'top-down' approach, using a weighted average percentage change to derive an overall effect, the individual origin market tables are based on a 'bottom-up' approach. The two sets of results are not directly comparable, although the bottom-up analysis is used as the basis for the weighted average effects in the summary tables.

26.   Two differences should be particularly understood. First, these tables are based on historical data, whereas the summary is based on MBIE's forecast:

    (a)   The percent fall in demand is the estimated reduction in the number of visitors relative to the total number of visitors in that segment in the year ended 31 March 2015.

    (b)   The reduction in expenditure is based on the median expenditure of people visiting from that country of origin in the year ended December 2014.

27.   Second, the origin market tables do not include all visitors whereas the summary tables are based on the total arrivals from each origin. In these tables we use Statistics NZ's purpose of visit statistics (from the IVA) to directly estimate the effect of a charge. Visitors for the purposes of education, 'not stated' and 'other' are not included in these tables, and the sum of the segments will therefore not be the same as the total number of visitors in the year ended 31 March 2015:[4]

    (a)   Visitors for the purposes of education, are excluded on the basis that we do not have specific elasticities or costs for them, but we expect that a $22 charge would be a very small proportion of the total relevant costs of a decision to come to New Zealand for education and hence unlikely to have a significant impact. For the purposes of the summary tables, we assume no effect on these visitors.

    (b)   'Not stated' and 'other' purposes are excluded from the IVA purpose of visit data reported by Statistics NZ. For this reason they are not included here. For the purposes of the summary tables, we assume that the effect on arrivals in these categories is proportional to those who report the recorded purposes.

28.   The cruise traveller information is based on data on disembarking and transiting passengers (embarking passengers are included in the airport arrivals) from Market Economics (2014). Since the IVA only counts disembarking passengers (those

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4   There may also be sampling error, since the total arrivals figures in the IVA are a census, but the purpose of visit (and all other) statistics in the IVA are based on a sample.

leaving a vessel in NZ, and therefore 'arriving' at a seaport), the MBIE forecasts do not include all cruise travellers who will pay the levy. As noted in the previous section, an adjustment has been made for this in the summary tables. The tables by origin market include both disembarking and transiting passengers.

29. Where a zero is reported there was no elasticity estimate available for that segment. Where a row is blank there were no visitors in that category.

30. The results in this section are based on the central estimates for the change in demand by purpose of visit with confidence intervals provided beneath, where relevant. Estimates of arrivals are rounded to 10.

Detailed results by origin

Australia

31. The largest reduction in visitors in any segment is Australian travellers visiting friends and relatives (VFR). This is due to their relatively high elasticity, low travel price and the sheer number of these visitors (0.51 million in the year ended 31 March 2015).

32. Some reservations were noted by officials about the level of the elasticity for Australian VFR travellers in particular. We examine this issue in more detail in Appendix 1. It is our view, based on this research, that the estimate used (-1.05) is reasonable. The research suggests that the elasticity estimate for holiday visitors (-0.26) may be understated. There is evidence that shorter trips, and the availability of discounted fares contribute to higher price elasticity of demand.

33. The reduction in expenditure associated with this type of visitor may however be overstated as it is based on the median for all Australian visitors. VFR visitors from all origin markets spend less than the average (approximately 35% less in the year ended December 2014). We do not have data for Australian VFR expenditure specifically, and although Australians comprise 56% of the total VFR category, the VFR category median expenditure is the same as the median for Australian visitors overall so it is not possible to draw any conclusions about the likely level of Australian VFR median expenditure.

Table 3 Australia

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	1.0 (0.3 - 1.6)	4,670 (1,440 - 7,900)	5.6 (1.7 - 9.5)
VFR	3.9 (1.3 - 6.3)	19,820 (6,870 - 32,440)	23.8 (8.2 - 38.9)
Business and other	0.0	0.0	0.0
Cruise	0.5 (0.2 - 0.9)	410 (130 - 700)	0.3 (0.1 - 0.6)

UK

34.   There was no elasticity available for VFR and business travellers from the UK. This may mean that these visitors do not respond to small changes in price, perhaps because other factors drive the decision to travel.

35.   It is possible that UK visitors reduce their level of on the ground (OTG) expenditure rather than changing their travel decision. Schiff and Becken find that OTG expenditure by the UK VFR and other segment falls when the total price (including airfares) increases. Their elasticity estimate is 0.51. Given the median OTG expenditure and average airfare, this implies a $22 levy would reduce total expenditure by VFR and other visitors from the UK by 0.2%.

Table 4 UK

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	0.5 (0.1 - 0.8)	360 (80 - 650)	1.0 (0.2 - 1.9)
VFR	0.0	0	0.0
Business and other	0.0	0	0.0
Cruise	0.0	0	0.0

US

36.   Similar to the UK, statistically significant elasticity estimates were not available for the US VFR and business traveller segments. Like the UK, it is estimated that there will be a small reduction in holiday travel as a result of an increase in travel price.

37.   The effect on cruise travel may be overstated as Cruise NZ statements suggest that North American travellers may take longer or more open ended cruises than the Australian round-trip cruise that we have used to estimate the price. The effects are relatively minor in any case.

Table 5 US

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	0.3 (0.1 - 0.5)	380 (120 - 640)	1.0 (0.3 - 1.7)
VFR	0.0	0	0.0
Business and other	0.0	0	0.0
Cruise	0.5 (0.3 - 0.6)	120 (80 - 160)	0.1 (0.1 - 0.2)

Japan, South Korea and China

Table 6 Japan

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	0.0	0	0.0
VFR	0.0	0	0.0
Business and other	0.0	0	0.0
Cruise	1.5 (0.7 - 2.3)	20 (10 - 30)	0.0 (0.0 - 0.0)

38.   Asian markets tend to have relatively high elasticities suggesting that New Zealand is viewed as a luxury destination. Small price increases for these markets would therefore have a greater effect than on visitors from European markets.

Table 7 South Korea

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	1.8 (0.7 - 2.9)	720 (290 – 1,150)	1.6 (0.6 - 2.5)
VFR	1.8 (0.7 - 2.9)	150 (60 - 240)	0.3 (0.1 - 0.5)
Business and other	1.8 (0.7 - 2.9)	60 (20 - 90)	0.1 (0.0 - 0.2)
Cruise			

Table 8 China

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	1.7 (0.5 - 2.9)	3,750 (1,030 – 6,430)	10.9 (3 - 18.7)
VFR	1.7 (0.5 - 2.9)	640 (180 - 1,100)	1.9 (0.5 - 3.2)
Business and other	1.7 (0.5 - 2.9)	240 (60 - 340)	0.7 (0.2 - 1.2)
Cruise	1.0 (0.2 - 1.8)	10 (0 - 30)	0.0 (0.0 - 0.0)

Germany

39.   German visitors have a relatively high median expenditure, so a smaller reduction in travellers is needed to have an effect on expenditure. However, the overall effects, given the size of the origin market, are modest.

Table 9 Germany

	Percent fall in demand	Reduction in number of travellers	Reduction in expenditure ($m)
Holiday	0.8 (0.2 - 1.5)	470 (110 - 830)	2.1 (0.5 - 3.7)
VFR	0.8 (0.2 - 1.5)	90 (20 - 160)	0.4 (0.1 - 0.7)
Business and other	0.8 (0.2 - 1.5)	30 (10 - 60)	0.1 (0.0 - 0.3)
Cruise	0.6 (0.1 - 1.1)	20 (10 - 40)	0.0 (0.0 - 0.0)

Limitations and caveats

40. The basis for the estimates in this report is very simple. In particular, the effect of the charge is considered in isolation. We have not considered whether there are any other factors in the current travel environment or the economies of the origin countries that may affect the response to a new charge. We have not forecast tourist arrivals or expenditure. Nor have we forecast any of the underlying factors (such as the airfare) that will affect the outcome. It is possible that other (positive and/or negative) macroeconomic factors not anticipated in the MBIE forecasts could outweigh any effect from the levy.

41. The analysis estimates what the effect on visitor arrivals would have been in the year ended March 2015, and uses the weighted average decrease to estimate the effect on total forecast visitor numbers in calendar 2015, assuming that the underlying drivers (such as airfares) do not change significantly, and the forecasts produced by MBIE are reasonable.[5] The timing of any possible levy is unclear and the percent decline in visitor arrivals will depend on the relative value of the charge compared to the airfares at that time. A significant rise or fall in airfares would change the effect of the charge.

42. The expenditure that those visitors who do not travel to New Zealand would have otherwise incurred is estimated based on historical (2014) median actual expenditure increased by the growth rate implied by the MBIE forecast.

43. We have assumed that the effect of the levy is on visitor numbers, and that those who visit New Zealand do not change their behaviour. It is more likely that there will be a combination of effects on visitor numbers and OTG expenditure. There is some evidence that visitors make their travel decisions on the basis of the total price (the airfare and OTG expenditure), but data limitations mean this is difficult to estimate.

44. The results should not be interpreted as a comprehensive forecast of tourist arrivals or expenditure; rather more in the nature of an impact analysis.

45. We have assumed that the levy would be fully passed through by airline and cruise operators, including an amount for the increase in crew-related costs.

46. We have not differentiated the travel costs by purpose of visit although it seems likely that more price sensitive travellers will choose lower cost fares on average. This will tend to compound the effect on more price sensitive (elastic) visitors, that is the decrease in these visitor groups may be larger than estimated. Conversely the decrease in less price-sensitive groups, who may pay above average ticket prices will be lower.

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[5] MBIE released its forecasts in May 2015 and we have not adjusted these for any variance to actual arrivals in the intervening period.

47. The price elasticities are based on relatively old data and assume constant elasticity of demand. If prices have changed significantly in the intervening period they may no longer be accurate.

48. The demand curve is assumed to be of log-log form (see the Method section for more information about the form of the demand curve). This may not be an accurate representation of demand. For example, there may be a threshold price for each individual, below which the individual is unresponsive to price changes (i.e. travels) and above which the individual does not travel. This type of dichotomous dependent variable is often characterised as a probit function (where the dependent variable represents the probability of travel). It is not possible to consider this functional form due to data limitations.[6]

49. Where there is no price elasticity estimate we have assumed no effect; that is, that price changes do not have a significant effect on the marginal level of demand. This may not be correct as the missing estimate may be due to data problems when the equations were estimated.

50. The travel costs for a cruise traveller are difficult to identify accurately and we may have underestimated these. The OTG expenditure for cruise visitors is similarly sketchy with only some survey data and estimates available. For cruises, the relatively high price of travel limits the effect of a small levy and so refining these numbers is likely to be of lesser importance.

51. The reduction in expenditure is based on the median expenditure of visitors from that country of origin in 2015. No variability for purpose of visit has been taken into account. However, the IVS shows that holidaymakers tend to spend more than the average or median, while VFR visitors spend less than the median or average and business travellers spend least. This may result in inaccuracies where there are uneven weightings by purpose of visit.

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[6] This paragraph reflects comments from John Creedy of the NZ Treasury.

Method

52. The method for estimating the effect on the number of tourists visiting New Zealand is straightforward. The key limitations of the results relate to the availability of robust, relevant data.

53. The elasticities in Schiff and Becken assume a constant elasticity of demand, which is represented by the log-log function:

$$lnA_t^i = \alpha + \beta lnP_t^i + \gamma lnX_t^i + \varepsilon_t^i$$

where A_t^i is the number of arrivals from segment i in year t, P_t^i is a measure of the price of visiting New Zealand from that segment and X_t^i is a matrix of other variables that may affect arrivals in that segment. In this equation β is the constant price elasticity of arrivals.[7]

54. The estimates of the change in visitor arrivals are therefore derived from:

$$\Delta A^i = \left(1 + \Delta P^i\right)^\beta - 1$$

where Δ signifies the percent change in the variable. All other variables (X^i) are assumed to be constant over time.

55. The percent change in demand is then applied to the number of visitors in the year ended March 2015 to estimate the number of visitors who would not have travelled had the ticket price been at the higher level.

56. For the overall summary table, the percent change in demand by a purpose of visit segment is weighted by the proportion of visitors in that segment for each origin market. The overall weighted percent change is applied to the number of visitors from that origin in the calendar 2015 forecast released by MBIE.[8]

57. The reduction in expenditure is based on the median expenditure in 2014 for a visitor by country of origin. No reduction in expenditure for other visitors (who continue to travel) is estimated. The median level of expenditure is assumed to grow at the same rate as the mean in order to estimate the effect in 2015 in the summary tables.

58. All estimates of arrivals have been rounded to the nearest 10 (with 5 rounded up). We consider this to be a reasonable level of accuracy given the sensitivity of the log-log specification to the value of the inputs and the level of confidence in these values. Figures presented in the report may not add as a result of rounding.

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[7]   Schiff and Becken, p.565, equation (1)

[8]   The totals in the summary tables relate only to the seven origin markets analysed. These represent approximately 75% of all visitor arrivals.

Price elasticity

59.   The price elasticity of demand is defined as the percent change in the quantity demanded of a product (in this case air or cruise tickets) relative to the percent change in price. The value of price elasticity of demand tells us by what percentage demand decreases when the price increases by 1%.

60.   If a good has an elasticity of demand less than -1, we describe the good as having *elastic* demand. For these goods, when the price rises by 1%, the quantity demanded falls by more than 1%. If the elasticity is greater than -1 it is described as having *inelastic* demand. For these goods when the price rises by 1%, the quantity demanded falls by less than 1%.

61.   Different segments of the market for travel to New Zealand exhibit different elasticities of demand. For example, visitors from Asia tend to have more elastic demand than those from Europe or Australia. Business travellers tend to have less elastic demand than holiday makers. For this reason, it is important to segment the market to the extent possible and separately identify the effect on different groups of travellers.

62.   There are very few robust demand elasticity estimates for New Zealand tourism. The elasticities used in this report were all obtained from Schiff and Becken (2011). They estimated constant price elasticities of arrivals and consumption of on the ground (OTG) tourism goods and services. This report focuses on changes in the number of arrivals, since the proposed change in the ticket price has no effect on the price of OTG expenditure.[9]

63.   Schiff and Becken (2011) segmented international visitors into 18 segments and modelled 16 of these. The two 'rest of the world' segments were excluded from the modelling as they considered there was too much heterogeneity in these segments to allow accurate results. We focus on those segments modelled, which represent New Zealand's seven largest tourism origin markets. The key driver for the specific segmentation was sample size as small samples lead to high sampling error and reduces the accuracy of the estimated elasticity.

64.   Their equations are based on annual observations from 1997 to 2007. While this study is therefore now relatively old it remains the most robust study of the elasticity of tourism demand in New Zealand that we were able to identify.

65.   The elasticities estimated are assumed to be constant at all prices. This may limit the applicability of the elasticities if the price of travel has changed significantly since the 1997-2007 period. We have not tested this.

66.   Schiff and Becken's elasticities are reproduced in Table 10.

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[9]   It should be noted that there is some evidence of visitors making demand decisions based on the total price (i.e. the airfare plus OTG expenditure).

Table 10 Price elasticity of arrivals by purpose of visit

Segment	Elasticity	Standard error
Australia FIT Holiday	-0.26	0.11
Australia FIT VFR	-1.05	0.42
Australia FIT Other	n.a.	n.a.
Australia Tour	-0.31	0.13
UK Holiday	-0.52	0.25
UK VFR and Other	n.a.	n.a.
US FIT Holiday	-0.29	0.12
US FIT VFR and Other	n.a.	n.a.
US Tour	-0.78	0.17
Japan FIT Holiday	n.a.	n.a.
Japan FIT VFR and Other	n.a.	n.a.
Japan Tour	-1.55	0.48
South Korea All	-1.75	0.64
China FIT	-1.65	0.73
China Tour	-1.09	0.55
Germany All	-0.87	0.41

Source: Schiff and Becken (2011)

1. VFR denotes "visiting friends and relatives".

2. FIT is defined in MBIE's International Visitor Survey as a "fully independent traveller" who reports no expenditure prior to arriving in New Zealand. It is not clear whether this is the classification used by Schiff and Becken as they describe FIT as "free and independent traveller" and contrast them with "tour group". The IVS describes additional categories of traveller including semi-independent and package travellers. We have adopted Schiff and Becken's apparent distinction, assuming that all non-tour travellers are FIT (see body of text for details).

67. Where no elasticity was able to be estimated it is possible that price is not a significant decision-making factor for that travel segment; this explanation is plausible for some markets such as business travellers, especially where there are relatively small price changes on long haul travel. However it may also simply be due to the limitations of a small sample.

68. We have matched the elasticity estimates to the purpose of visit categories in the IVA to the extent possible. Where there is no elasticity available we have not made an estimate. We have assumed that cruise travellers have the same elasticity as 'tour' travellers. As tour is not a purpose of visit in the IVA and little data is available on tour 'prices' we have not estimated the number of tour travellers arriving by air, adopting the FIT elasticity for all arrivals by air.[10]

69. In addition to these specific sensitivities we have estimated the 90% confidence interval for the elasticities. To do this we have calculated the confidence interval for the elasticity estimates using the standard errors reported in Schiff and Becken and the formula:

$$\text{elasticity} \pm 1.645 \times \text{standard error}$$

70. The standard errors are relatively large, which is not surprising given the relatively small sample size. As a result, the confidence intervals show a relatively wide range of possible outcomes; this illustrates that the estimates should not be considered precise.

Arrivals

71. The arrivals numbers for each air travel market are drawn from Statistics New Zealand's International Visitor Arrivals (IVA) for the year ended 31 March 2015. We have removed those arrivals in the IVA who were identified as arriving at a seaport and although there was no cross-tabulation with purpose of visit available, we have assumed that all arrivals by sea are holiday-makers.

72. Where the purpose of the visit was identified as 'education' these visitors have been excluded from the detailed data as they have quite different demand drivers and expenditure patterns from other visitors, and are less likely to be affected by a relatively small travel fee.[11] Education visitors are included in the totals in the summary tables and there is assumed to be no effect on the number of these visitors.

73. The cruise arrivals data are derived from Market Economics (2014). We have used the forecast number of transit and disembarking passengers for 2014/15 in our estimates. The reason for not including embarking passengers is that although the charge may be split in some proportion between people arriving and departing each international tourist will pay one full fee in addition to the current travel cost. Those

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[10] The tour elasticities in Schiff and Becken are relative to the total price for US and Japan, to the airfare price for Australia and to the price of OTG expenditure for China.

[11] Here the fee is considered relatively small compared to the likely cost of international education fees and other costs of travelling to New Zealand for the purposes of education.

who embark on a cruise in New Zealand will have already been captured in the air arrivals data. So we do not want to double-count them in the cruise data.

74. This approach is likely to somewhat overestimate the responsiveness of so-called exchange passengers, because the cost of a cruise is relatively high compared to a return airfare. However, there is insufficient data to estimate the effects on exchange passengers more accurately as this would require an estimate of the price of the travel package that these passengers buy.

75. MPI and Customs also provided internal data for arrivals by plane and cruise ship. However, as we were interested in international arrivals only (because domestic travellers returning to New Zealand have no effect on tourism expenditure) we did not use these data for tourist arrivals.

76. We did however use the MPI/Customs data to estimate the effect on the level of the charge of the number of crew, we refer to this as the crew multiplier effect. The crew multiplier effect arises because the proposal is to charge a fee to the airline or cruise operator based on the total number of people aboard a plane or vessel (i.e. including crew). The crew multiplier effect estimates the total number of people on board per paying passenger. We cross-checked the MPI/Customs figures against figures in the Cruise NZ report.

77. For airlines, the estimates of the crew multiplier were between 1.041 and 1.045. For cruise ships, the estimates ranged from 1.45 to 1.54. We have used 1.045 for airlines and 1.5 for cruise ships. This implies that for every 100 people onboard a plane there are 4.5 crew, and for every 100 people on a cruise ship there are 50 crew.

Fares

78. The estimates presented in the tables are based on the average mean airfare for the four quarters ending 31 March 2015. All airfares are in New Zealand dollars. The data were provided by MBIE, and are sourced by them from Sabre. MBIE use these data to adjust the International Visitor Survey OTG expenditure data where the survey respondent has reported expenditure including international airfares.

79. Mean airfares by country of origin are available. Prior to calculating the mean, MBIE remove outliers. MBIE provided four quarters of data (i.e. four mean airfares). This is important as there is a seasonal pattern to the cost of travel.

80. There are some potential concerns with using mean airfares. In particular, price sensitive segments of the market are likely to purchase low priced tickets, while less price sensitive segments may prioritise time of travel or length of overall trip and choose higher priced tickets. These variations are not identified when the mean airfare is used for all travellers. As a result, the effect on price sensitive travellers (those with more elastic demand) is likely to be underestimated, while the effect on less price sensitive travellers may be overestimated.

81.   The costs for a cruise traveller are difficult to identify. The cruise costs used were based on searches of websites that aggregate offers from different companies for the relevant period.[12] The method may have underestimated the expenditure. The estimates that we have used are based on the cost of a cruise from Sydney and the addition of a return flight from the main country of origin airport to Sydney. These types of cruises tend to be at the cheaper end of the spectrum of options. This will tend to overestimate the effect of a levy on cruise passengers.

82.   All costs have been converted to New Zealand dollars where these were obtained in the home currency of the traveller, using average exchange rates for the year ended 31 March 2015 reported by the Reserve Bank.

Expenditure

83.   OTG expenditure by country of origin is available from MBIE's IVS. Similarly OTG expenditure by purpose of visit is also available. There is no cross-tabulation of country of origin by purpose of visit.

84.   We have used the 2014 median expenditure by country. The median was chosen because it is apparent from the data that there are some high-spenders who skew the mean. Expenditure by country rather than by purpose of visit was used as this is expected to capture more of the variability between visitors, particularly with respect to relatively low spending Australian visitors.

85.   For cruise travellers, we relied on a survey by Covec completed in the 2011/12 season for the *Economic Value of Tourism* project that was undertaken by MBIE. We have used the data in this report to estimate OTG expenditure per person.

86.   We compared the outcomes of this survey with information in the 2013 Cruise NZ report. The Cruise NZ report builds up an estimate of expenditure per passenger per port day based on a range of sources (including the Covec survey). The Cruise NZ report was broadly in-line with the Covec study. We chose to rely on the Covec study because the methodology was more transparent.

87.   Based on the results of the Covec study we examined two estimates of cruise passenger OTG expenditure. The first included all expenditure on OTG goods and services, while the second excluded expenditure that was made through the cruise operator or a travel agent. This latter category was largely related to onshore excursions and some accommodation. Only a percentage of the money paid through these channels is retained in New Zealand.

88.   There is some evidence in the Cruise NZ report that the proportion of expenditure through cruise lines for onshore excursions is declining (implying that the proportion occurring directly with the excursion operator is increasing). As a result of this statement and since some proportion of accommodation and excursion costs paid by travellers is passed on to the operator, it is our view that the higher estimate of

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12   These sites include expedia and webjet.

expenditure is more realistic. As there was no material difference in the results using the two estimates and because we considered it more realistic only the higher result is provided in the tables.

89.   All expenditure estimates have been inflated using the CPI to the year ended March 2015. For the summary table growth rates have been applied based on the MBIE forecast of expenditure.

Appendix 1 Elasticities for Australia

90.   Officials expressed some concern that the elasticity of demand for VFR visitors from Australia may be too high. To test this assumption we considered broader literature on price elasticity of demand for air travel. The Australian Department of Infrastructure and Regional Development has an online database of publications relating to transport elasticities and we used this as one of our search tools.[13]

Table 11 Airfare elasticity estimates for Australia

Author, paper, date	Elasticity estimate	Comments
Bureau of Transport and Communications Economics, Trends and prospects for Australian international air transport (1988)	-1.09 -0.62	Own price elasticity for Australians travelling to NZ (aggregate) Demand elasticity for non-business travel from Australia with respect to airfare
BTCE, Demand elasticities for air travel to and from Australia (1995)	-0.23	Airfare elasticity for leisure travel by Australian residents to NZ
Hamal – Australian outbound holiday travel demand long-haul versus short-haul (1998)	-1.043	Own price elasticity for Australian holidaymakers to NZ
Gillen, Morrison, Stewart – Air travel demand elasticities: concepts, issues and measurement (2002)	-1.040 (-0.56, -1.7) -1.520 (-1.288, -1.743) Median (third quartile, first quartile)	Long-haul leisure – these studies are for distances greater than 1500 miles or reported as 'long haul' or 'international' Short/medium-haul leisure – these are for distances less than 1500 miles or 'regional' Results are from 12 studies that the authors rated as "passing" a scoring system they developed based on desirable input and output characteristics of empirical demand

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[13]   This is publicly available at https://www.bitre.gov.au/tedb/search.aspx.

Author, paper, date	Elasticity estimate	Comments
		studies. The NZ Commerce Commission used these elasticities in this study when it assessed a proposed Qantas/AirNZ alliance in 2003. It does not specify whether it used long- or short-haul estimates.
Dwyer, Forsyth, King and Seetaram, Migration-related determinants of Australian inbound and outbound tourism flows, 2010	-0.58 (1991) -0.22 (2006)	Point estimates of elasticity of outbound Australian VFR travellers with respect to transportation cost. This study is unusual in that it is based on a cross-section of VFR travel to 29 different country markets (including NZ). This implicitly assumes that VFR travellers to all markets exhibit the same behaviour (i.e. equal elasticity). Cross-sectional elasticities should be interpreted as a short-run elasticity; long-run elasticities should be the basis for policy decisions, since it is long run changes that are being considered.

91.   In its Airfield Inquiry in 2002 the Commerce Commission noted that there were no demand elasticities available for New Zealand a situation it described as "not helpful" (para 3.83). It went on to use estimates of -1.3 for domestic travel and -1.8 for international demand. The domestic figure was based on a survey of overseas (US and Canadian) studies from the 1980s, while the international elasticity was "arbitrarily" chosen on the basis that there were "reasonable grounds" to believe that international demand was more elastic than domestic demand (para 3.85).

92.   In its consideration of a proposed alliance between AirNZ and Qantas the following year, the Commission relied on advice from Gillen, and subsequently his survey study for the Canadian Department of Finance.[14] The Gillen study distinguishes between short- and long-haul travel. Australian travel is often characterised as 'short-haul international' on the basis of distance. While the Commission is not explicit about which elasticity (short- or long-haul) it used, the Gillen study states that long-haul includes all international travel. Short haul flights are at times distinguished on the basis that there is inter-modal competition (from trains or road transport) which is clearly not the case for travel to New Zealand. The distinction is important

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14   Gillen, Morrison and Stewart (2002)

because (as can be seen from Gillen's elasticity estimates) "short trips are more sensitive to changing prices than long trips".[15]

93. Another factor to consider is that there are differences in price elasticity by fare class. Oum, Gillen and Noble (1986) show that demand for more expensive first class fares is inelastic (-0.58 to -0.83) compared to standard economy (–1.48 to –1.60 on vacation routes), while demand for discount travel is relatively elastic (-1.55 to -2.01). They also show that the cross-price elasticity of demand for standard economy fares with respect to the price of discounted fares is positive (i.e. they are substitutes) but relatively low compared to the own price elasticity, suggesting that discounted fares increase overall demand (rather than just being a substitute for standard fares).

94. There are two studies that suggest less elastic demand, but these appear less robust and relevant:

(a) The Dwyer et al (2010) study that has a low elasticity of demand is a cross-sectional model. In discussing their results the authors note that emerging Asian markets make up an increasing proportion of travel to and from Australia. The airfare portion of the cost of visiting these destinations is likely to be low relative to the overall cost. In addition, the authors suggest that outbound travellers (from Australia) "treat airfares as a fixed cost", deciding to travel and subsequently not being very responsive to changes in the airfare. This explanation is less plausible for the short-haul Australia-New Zealand pair than other origin-destination pairs as the airfare is likely to be a much higher proportion of the overall cost of the trip. The introduction of AirNZ's Express product (2003), and Qantas' JetStar brand (2005) followed by "Seats to suit" by AirNZ (2010) are likely to have attracted price sensitive customers.

(b) The BTCE (1995) study uses a linear functional form; other studies use log-log form. This could affect elasticity estimates; Gillen notes that "elasticity estimates can vary widely depending on the functional form".[16] Also, the BTCE study uses a 3-quarter lag of the airfare, rather than contemporaneous airfares. It seems unlikely that travellers from Australia to New Zealand would generally plan three quarters in advance of their travel period. Finally we note that the price elasticity estimate for Australian leisure travel to New Zealand is not significant. This suggests that this estimate should not be relied upon.

95. On balance it seems likely that VFR travel from Australia is somewhat elastic, and the estimate of -1.05 from Schiff and Becken is not an outlier. The research does raise questions about the holiday elasticity estimate, specifically that it may be too inelastic. In this case, the effect on holiday makers from Australia would be greater than estimated in this report.

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[15] Callaghan and Tol (2013)

[16] Gillen et al (2002) Section 3

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