

2014

## Climate Change Policies, Long Haul Air Travel and Tourism

PETER J. FORSYTH

*Department of Economics, Monash University, peter.forsyth@buseco.monash.edu.au*

Larry Dwyer

*School of Marketing, University of New South Wales, l.dwyer@unsw.edu.au*

Follow this and additional works at: <http://tourismresearch.econo.yamaguchi-u.ac.jp/jtephm>

---

### Recommended Citation

FORSYTH, PETER J. and Dwyer, Larry (2014) "Climate Change Policies, Long Haul Air Travel and Tourism," *Journal of Tourism Economics, Policy and Hospitality Management*: Vol. 2: Iss. 1, Article 3.

Available at: <http://tourismresearch.econo.yamaguchi-u.ac.jp/jtephm/vol2/iss1/3>

This Invited Paper is brought to you for free and open access by Journal Publishing for Tourism Economics, Policy and Hospitality Management. It has been accepted for inclusion in *Journal of Tourism Economics, Policy and Hospitality Management* by an authorized administrator of Journal Publishing for Tourism Economics, Policy and Hospitality Management.

## Climate Change Policies, Long Haul Air Travel and Tourism

### 1. Introduction

The impacts of climate change, and of the policies designed to mitigate it, are recognised as a major issue for tourism destinations which are distant from their markets. The fact that long haul travel contributes a considerable amount of Greenhouse Gas (GHG) Emissions in both the flight and ground components of the trip has made aviation something of a target for action. It is generally agreed that a solution to the climate change problem will involve ensuring that decision makers, such as tourists, are faced with the externality costs of their decisions to travel. If GHG emissions mitigation policies result in a price for carbon, there will be an impact on air fares and the overall cost of a trip. This will result in some reduction in long haul travel. This poses some challenges for long haul destinations including what policies are most effective in reducing GHG emissions while having the least adverse effect on the economic contribution of the tourism industry. A number of questions arise which will be addressed in this paper. These include:

- How effective are short term measures specifically applied to aviation, such as taxes and limits on long haul trips, in reducing greenhouse gas emissions and in addressing public concerns;
- What issues need to be resolved if long haul aviation is to be incorporated in comprehensive climate change policies, such as the emissions trading schemes (ETSs) being implemented in Europe and;
- Is incorporation of aviation within an ETS sufficient to address its environmental effects, or are special additional measures required to help reduce emissions?
- How large will be the impact on the cost of long haul air travel as a result of incorporating aviation within carbon mitigation schemes; and
- Is there a case for excluding some international flights from these schemes?

The background to the problem of climate change and long haul travel is considered first, and then short term responses to reduce emissions and address public concerns are discussed. Next, the incorporation of long haul aviation within a comprehensive policy such as an ETS, and the issues it poses, are discussed. Finally, the arguments for and against treating long haul air transport differently, and excluding some flights from the general policy, such as the ETS, are analysed. The paper concludes with a discussion of the implications for long haul destinations of climate change mitigation policies.

#### [The problem]

Policies which seek to mitigate climate change are likely to have a disproportionate effect on long haul air travel and tourism. This will be a particular issue for countries, such as Australia, New Zealand, South Africa and some South American destinations which rely heavily on long haul air travel to bring tourists

to their shores. Inevitably, any visitors from Europe or North America, and to a lesser extent, Asia will require a long air trip to make a visit, and this trip will require considerable use of fuel. This in turn means that its emissions of greenhouse gases will be considerable. If these emissions are priced in some way, the air fares will rise, perhaps significantly in the long run. This will lead to a fall in visits, and a loss of economic benefits from tourism.

The problem is on the agenda because the contribution of a long haul tourist to greenhouse gas emissions will, in absolute terms, be large. The most obvious way in which aviation contributes to GHG emissions is through the burning of aviation fuel. According to one estimate, a visitor to Australia from the UK will emit about four tonnes of GHGs per return trip (Forsyth et al, 2007). This is the basic carbon estimate. In fact, the problem could be greater than this, because of the additional damage to climate change done by aviation rather than ground emissions, and because of the presence of other greenhouse gas emissions. Use of aviation fuel contributes to carbon dioxide emissions. In addition, it contributes to Nitrogen oxide emissions, which are a potent source of climate change. There is a growing opinion that the carbon emissions of aviation are much more damaging to the climate than ground sources of carbon. Aviation condensation trails also contribute to global warming. In addition to the direct effect, there is an indirect effect, coming from aviation's use of goods and services (e.g., electricity), which has been estimated at around 25% of the direct effect (Dwyer et al, 2010). Most estimates of the emissions from aviation do not count the indirect emissions. For a general survey of aviation's contribution to climate change, see Gossling and Upham (2010).

Of the different spending decisions a consumer might make, a decision to make a long haul trip will be one of the most carbon intensive. Apart from the flight, the purchases of goods and services within the destination country by the tourist also give rise to GHG emissions. Travellers to long haul destinations usually stay longer than short haul travellers. While proportionately not as significant as the flight in creating emissions, the ground component cost of a long haul trip, which for a country like Australia, which lasts around 26 days on average, will be considerable.

Long haul travel faces two distinct types of problem. Climate change policies will make it more expensive. However, well before this happens, the attitude of travellers and the public to air travel is changing. Air travel is seen as a polluting activity, and long haul travel in particular is seen as a damaging source of GHG emissions. This makes some potential travellers less willing to travel themselves, and it makes others antipathetic to travel by others. Even with no action by governments or airlines, people may be less willing to travel by air, especially to distant destinations

## **2. Short Run and Targeted Mitigation Policies**

Mitigation policies to address climate change can be classified as short run, targeted policies and as longer run, comprehensive or strategic policies.

Under this heading we can list four types of measures. These are voluntary compliance schemes, carbon offsets, ad-hoc taxes and controls on air travel.

### ***[Voluntary Schemes]***

Many airlines have made carbon offset schemes available to their customers. In the main, these schemes are voluntary- passengers choose to pay extra to have a carbon neutral flight. By paying extra, passengers contribute to a carbon offset scheme which enables their flight to be, in effect, carbon neutral. Some travel agents only sell carbon neutral flights, though these agents are only a small minority. Taking out the offset option on a British Airways return flight to Australia would have added (in 2007) about \$75 to the cost of the flight, at around \$2000 (Forsyth et al, 2007). While the principle of this is good, the execution of it has been challenged (for a discussion, see Broderick, 2010). Some have claimed that money raised from such schemes is not effectively spent, and that the carbon reductions are far less than claimed. It may also be that the estimates of the carbon content of flights, and its damage, are serious underestimates, and that proper accounting for all the damage would result in much higher fare add-ons. Nevertheless, the idea is in its infancy, and better information, combined with more rigorous monitoring of the effectiveness of the offsets in reducing emissions, should lead to a more reliable carbon offset system.

Voluntary offset schemes solve one of the problems for long haul destinations- they are able to offer the climate concerned traveller a carbon neutral flight or trip. Thus the passenger who is concerned about his or her own emissions will not be dissuaded from making a flight.

A real difficulty is that such passengers are likely to be only a minority- most will not be willing to pay more for an already expensive item. After all, global externalities are the perfect example of the free rider problem- individuals realise that there is a problem, but also realise that their own actions will do very little to address it. Thus voluntary offsets can only make a small contribution to the wider problem created by the emissions associated with air travel. Hence critics of air travel are quite correct in regarding this as a distinctly inadequate response to the problem. People are not just concerned about their own travel and emissions, but also the travel and emissions of everyone, and if most people are not willing to make voluntary contributions, the emissions problem of aviation is not effectively addressed. Thus there is a call for much more forceful measures.

If effective compulsory policies are to be adopted, governments need to be involved. Governments may be under pressure to “do” something about aviation, and reduce its emissions. In the medium to longer term, a government may have a policy of introducing general climate change policies, such as an ETS. We shall discuss this measure later in this paper. However it may wish to act before such policies come into effect. There are several policies which a government might choose to implement in the relatively short term to reduce emissions from aviation. These include compulsory carbon offsets, taxes, and mandatory restrictions.

#### ***[Compulsory Carbon Offsets]***

Compulsory carbon offsets involve all air travellers paying a levy which is used for approved offset programs. This is similar to a tax which is earmarked. This policy would reduce emissions through reducing the use of aviation, and it would also reduce them through the offset programs

Airlines themselves could make carbon offsets compulsory for their passengers- they could sell only flights for which they have made offsetting provisions. The problem with this is that they will add to their costs, and they will lose out to their competitors. It may be feasible for some niche operators, like some travel agents, to carve out a market on the basis of being carbon neutral, but for most airlines, operating in competitive environments, doing so will not be viable.

### ***[Passenger Taxes]***

Taxes may be levied on passengers- several countries, including the UK and Germany, are now levying significant passenger duties. Taxes would reduce the use of air travel and thus the GHG emissions associated with it. Since they involve no necessary offsets, the reduction in GHG emissions would be less than under the offset option for a given rise in air fares. In the earlier days of the UK tax, the government claimed that it was for environmental reasons, but in recent years it has admitted that the tax is mainly for revenue raising (on the UK tax, see Seeley, 2013).

### ***[Controls]***

Mandatory restrictions may take the form of limits on the number of long haul trips that travellers may take in a year. Such restrictions would reduce air travel and thereby GHGs from aviation.

Each of these options reduces GHG emissions associated with aviation, though the carbon offset policy would result in the greatest reduction of emissions. Applying the policy to all of aviation of a country or region would put a large burden on the offset industry- a lot of trees would have to be planted. Taxes raised could be used to reduce emissions if they were used to fund offsets, or to fund GHG emission reducing technologies (not necessarily in aviation), though there is no guarantee that this would happen- governments would have to commit to earmark the tax revenues. Restrictions on travel (such as bans on short haul travel) could prove administratively difficult, and would generally be an inefficient means of reducing travel and emissions.

### ***[Effects on Visitor Flows]***

Each of the options would reduce long haul travel, While the mandatory restrictions will have an obvious and immediate effect on long haul travel, as might some of the voluntary schemes, the effects on tourism flows of carbon offsets and taxes will depend on the levels set and the impact on the price of flying as well as the price elasticity of demand for air travel.

While emissions mitigation policies will not make a long haul trip prohibitively expensive, they will make a perceptible difference to cost. This will impact on airfares, which in turn will affect the demand for air travel. Information on the price sensitivity of passengers is thus needed to predict the effectiveness mitigation policies. When climate change mitigation policies come into effect, while all trips by air are affected, the impact on the cost of long haul trips is certain to be perceptible. Given that fuel accounts for a high proportion of an airlines cost (up to 30% of the total), an increase in fuel prices as a result of

climate change mitigation policies will have a significant impact on the all up cost of flight, and the total cost of the trip.

It might be thought that long haul travellers are more sensitive to price than short haul travellers given the initial greater airfare outlay. However, in his meta-analysis of factors affecting the demand for international tourism Crouch (1992, 1995) has concluded that long haul travellers are less sensitive to airfare changes than short haul travellers. He puts this down to three factors: (i). the relative lack of substitute modes on longer distance flights; (ii).the fact that long-distance flights are usually more expensive to begin with than short-distance flights, so that an increase in costs will require a larger share of a passenger's budget – suggesting that long-haul travel may attract wealthier travellers who might be less price sensitive and (iii) a lower awareness of prices in the more distant destinations and a lesser ability to change travel plans upon arrival (Crouch 1994, 1995- see also Gillen et al, 2002 and InterVISTAS, 2007).

The Bureau of Transport and Communications Economics (BTCE, 1995) estimated demand elasticities for air travel between Australia and twelve countries: Germany, Italy, UK, Japan, Korea, Taiwan, Indonesia, Malaysia, Singapore, Fiji, New Zealand and USA. The travel demand equations were estimated using quarterly data from March 1986 to June 1994. Airfares were found to be important determinants of *leisure travel*. Airfare elasticities for international leisure visitors ranged from -0.5 to -1.86. Generally, airfare elasticities tended to be lower on shorter distance routes. In a meta-analysis of airfare elasticities (Brons et al 2002) found that travellers are less price sensitive, as flight distance increases. Another finding was that long-run price elasticities are higher in absolute value. This implies that basing long-run policy instruments on short-run elasticities will lead to distortions. The fact that passengers become more price sensitive over time; also needs to be acknowledged in the design of long-run policy instruments.

While inbound tourism is likely to be reduced as the price of flying rises, so also will outbound tourism. Depending on the extent to which outbound travellers divert to a domestic tourism experience as a result of higher air fares, this will offset losses to the host tourism industry. There are several unknowns here. One uncertainty involves the perception of travellers as to the 'substitutability' of domestic tourism for international tourism. The more highly regarded is a domestic tourism experience, the more will holiday travellers be inclined to substitute one for the other. Another uncertainty involves the mode of travel taken for the domestic tourism experience. Flying domestic short haul will increase emissions, as will increased use of ground transport.

#### ***[Limitations of Short Term Measures]***

To be effective, the short term measures might have to raise air fares considerably. This would certainly reduce long haul trips.

The underlying problem with these aviation directed policies is that they are very partial in their coverage, and this blunts their effectiveness. They are partial in that they apply only to air travel, and leave other industries out. Thus travellers will be given an incentive to reduce their air travel but they may switch to other forms of travel- they may cancel their long haul trip and make short haul trips by car

or train. There may be little or no reduction in emissions as a result of this. Raising the cost of air travel, especially in the short term, is likely to be a quite ineffective means of reducing emissions, because the mitigation options in aviation are limited, and aviation cannot reduce its emissions nearly as readily as other industries.

These measures are also likely to be partial in that only one country or region may be implementing them. In long haul travel, destinations are substitutes. Thus, if air fares to and from New Zealand are raised by climate change policies directed to aviation, other destinations become relatively more attractive. While New Zealand might attract a small proportion of climate concerned travellers, others will be inclined to save money and go to competitor destinations. While there is likely to be some overall reduction in long haul travel, much of New Zealand's loss of tourists will be made up by gains to its competitors. The net reduction in emissions will be modest, though the cost to New Zealand significant.

In terms of public perceptions, the compulsory carbon offsets policy would be the most effective. Airlines would be offering all travellers an effectively carbon-neutral flight. This would appeal to the climate concerned traveller, and it would also deflect criticism of the airline industry as a major source of emissions. The other alternatives will not be able to offer such travellers a carbon neutral flight- the traveller knows that even though they are paying a higher fare, they are still generating the same amount of emissions as before. They will not do much to deflect criticism of the airline industry either, since they will only produce small reductions in emissions unless taxes are set very high and restrictions are very tight.

In summary, short term measures specifically directed towards aviation will be negative for long haul travel. Countries imposing them will receive fewer tourists (though they will also experience some reduction in outbound international tourism). Other than the offsets policy, they will not offer the possibility of a carbon neutral flight or trip, and they will not counter the criticism of aviation that it is a major source of emissions. Finally, apart from the offset policy, these measures will not make for a significant reduction in GHG emissions, unless they are set very tightly and travellers do not respond to them by switching to other alternatives. Apart from the offset policy, which may be difficult to implement in an extensive way, they are costly policies which will produce little environmental benefit.

### **3. Long Run and Comprehensive Climate Change Policies**

Several countries, and even entire regions (e.g. Europe), are now implementing long run comprehensive climate change mitigation policies. These schemes take some time to set up and get working. They are intended to be long run policies- in force for many decades at least. Significantly, they are intended to be comprehensive, and cover most if not all sectors of the economy. The two main options are carbon taxes and Emissions Trading Schemes (ETS). Thus Europe and New Zealand have implemented ETSs which will incorporate aviation and other forms of transport along with other industries. Australia has a carbon tax, though this is expected to be repealed. Currently, none of these apply to long haul aviation, though the European ETS is intended to shortly

An ETS would set a cap on the total amount of GHG emissions allowed to be generated in an economy, and permits to generate these emissions would be allocated in some way, to firms which generate them, or which produce the fuels that other firms use. Permits might be given free to firms, sold at a concessional rate or auctioned.

Of the two options, many countries prefer the ETS. New Zealand and Europe both plan to make an ETS their primary climate change mitigation policy. While ETSs are similar to taxes in that they raise the price of goods and services which directly or indirectly produce emissions, they also differ in some important aspects- some of these will be noted later. The discussion here will focus on how the ETSs will affect long haul travel, since this is the policy option which is actually being considered for long haul aviation.

Ideally, all countries or regions would adopt climate change mitigation policies, such as carbon taxes and ETSs, and all would take action to reduce their emissions. In reality, many countries will not do so, at least for some years. When their ETSs are in full operation, New Zealand and Europe will be leaders in taking action against climate change. This will have implications for how long haul aviation is handled.

An issue which is attracting attention is that of 'pass through' (see Forsyth, 2009). If airlines are subjected to a tax, will they be able to pass all of the tax on to their customers? In some cases, they may not be able to do this, especially if they are operating in constrained markets (such as slot constrained markets at airports) and in less competitive markets. In the longer term it is likely that the extent of pass through will be greater than in the shorter term. If they are granted permits, which command a price, on a free basis, will airfares reflect the value of these permits? If airlines are seeking to maximise their shareholder value, they will do so. However if they are pursuing other objectives, such as gaining market share, they may not pass on the full value of the permit to the customer. Clearly, if airlines do not pass on the value of permits through higher air fares, the impact on travel will be less, and the reduction in GHG emissions will be smaller.

Since aviation is a rapidly growing industry and options for reducing emissions through improved technologies are limited, over time, airlines will need to purchase more permits- especially since the permits available will probably be reduced over time. Depending on the extent of pass through, and the extent to which permits are allocated on a free or concessionary basis, and on the rules by which permits re-allocated, airlines could gain from being part of the ETS. Airlines will need to be directly involved in the ETS to gain, however- smaller airlines which are indirectly incorporated, through paying higher fuel prices, will not gain.

Of these, the option most likely to take the major role when it comes to international aviation is the ETS. Some countries, such as Australia, have implemented carbon taxes, but they have not applied them to international aviation. Even though Australia is planning to change to a different climate change policy, there is no expectation that it will apply the carbon tax internationally at any time in the near future. At the domestic level, carbon taxes are easy to implement; at the international level they pose several difficulties. In particular, there are real problems of harmonising different countries opting for different rates of tax and different structures. In addition, there are problems with countries taxing international

aviation, since air service regulations rule out countries taxing it. As a result, if there is to be international action, it is likely to be of the form of an ETS.

One thing which could happen would be for individual countries or regions (such as the EU) to extend their domestic ETS to cover international aviation. Subsequently, other countries might do the same - for example, New Zealand might extend its ETS to cover international aviation, and as a result, a flight from London to Auckland could be covered by the combined schemes.

Thus far, only the EU has attempted to cover international aviation in its scheme. Under the EU scheme, introduced in 2012, flights to and from the EU are covered by the ETS so far as the first stop outside Europe (Commission of the European Communities, 2006). Thus direct flights from London to Dubai, Singapore or Tokyo are covered by the ETS. This, however, has been very controversial. Most of the large aviation countries, such as the US, Russia and India have objected strongly to their carriers being required to obtain permits for their flights- such countries regard this as a form of taxation by the EU. Recognising this, the EU has bowed to these other countries, and suspended the requirement (intra-European aviation is still required to be in the ETS). This is termed the “stop the clock mechanism”. The stated policy is that flights to and from the EU will be suspended if alternative climate change policies are adopted by other countries in general. There is considerable debate on how long the clock should be stopped for.

The stand-off could be resolved if the International Civil Aviation Organisation (ICAO) were to come up with market based mechanism, such as an ETS, which would cover international aviation in a similar way to that of the EU ETS. ICAO is a United Nations organisation charged to develop climate change policies for international aviation. Currently, ICAO is working to develop market based mechanisms to apply. Progress has been slow, and it is not clear whether there can be a compromise agreement which satisfies the EU, on the one hand, and other countries which do not see the need for climate change policies in the first place. Furthermore, even if a compromise position were adopted, ICAO could only recommend it, not require countries to implement it (Lyle, 2014).

The likely outcome of all of this is that implementation of climate change policies in long distance aviation will be only gradual. It is unlikely that the preferred position of the EU will be accepted. If it were accepted, flights from London to Tokyo and Singapore, along with the London to Singapore stage of a London to Sydney flight, would be subject to rising carbon prices through the ETS. However it is unlikely that other countries would accept this and the EU would have to bow to pressure and limit its ETS to within EU flights. It may be that a limited number of other countries may join the EU in applying climate change policies to international aviation. The most likely of these would be countries which already subject domestic aviation to an ETS, such as New Zealand. In the medium term, ICAO may come up with a mechanism which significant countries may accept, and these countries may apply carbon pricing to international aviation. However, it is unlikely that all countries, or even all developed countries, will apply climate change policies to international aviation. However, as countries, including developing countries such as China, move to limit emissions from other industries, including energy and

perhaps domestic aviation, they will turn their attention towards international aviation. Action on long distance aviation will probably come, but only gradually.

#### 4. Impacts on Trip Costs

We have argued that climate change policies will have the effect of making long haul air trips more expensive. Under an ETS, airlines will need to use valuable permits when offering flights, and, depending on the extent of pass through, this will raise air fares. Airlines based in the home country will also be paying more for goods and services they purchase at home, since these indirectly increase emissions (foreign airlines operating from countries without climate change policies will not face an increase in the costs of goods and services they purchase at home). In addition to the higher air fares, visitors will also have to pay more for the goods and services they buy in the destination country, reflecting the emissions which they directly create, such as through the use of domestic air travel and car, and indirectly create, such as through their use of electricity.

Using calculations for Australia, some estimates of the impacts on air fares, costs incurred within Australia, and total trip costs to Australia from various origin countries, for particular types of travellers are presented in Tables 1, 2 and 3. These estimates assume full pass through of the cost of permits for international flights, and allow for the direct and indirect costs of permits for the within Australia expenditure. They do not include any estimate of the additional cost to the airlines of higher goods and services prices due to the ETS.

The 'within Australia' GHG emissions associated with tourist expenditure are based on a study undertaken by Lundie, Dwyer and Forsyth (2007) which developed environmental yield estimates (energy use, water use, greenhouse gas emissions and ecological footprint) for several different market segments of Australian inbound tourism. A hybrid approach was employed, combining input-output analysis with an on-site audit for tourist accommodation.

Table 1 reproduces the estimated emissions per trip associated with range of typical visitors: New Zealand over 55's, first time visitors from Hong Kong, repeat visitors from the United Kingdom and Canadian over 55s. The bottom row indicates the average amount of expenditure within Australian associated with each of the tourism market segments. Table 1 contains two rows indicating the total cost of the emissions when priced at \$20 and \$50 per tonne, respectively. The bottom row of Table 1 indicates the total tourism expenditure per trip for each of the selected markets based on data from the International Visitor Survey (IVS), undertaken by the Australian Bureau of Statistics. This enables us also to estimate the percentage of total tourism expenditure represented by these costings. Thus at \$20 per tonne the GHG emissions represent 4.1 per cent of the total 'within Australia' expenditure of New Zealand mature travellers, with 3.0 per cent for Hong Kong first timers and 4.8 per cent for UK repeat visitors and Canadian mature tourists. The \$20 per tonne is slightly less than the (soon to be abolished) carbon tax in Australia (Dwyer, et al, 2013). At \$50 per tonne the percentages are, respectively 10.4 per cent, 7.6 per cent, 9.1 per cent and 10.7 per cent of total 'ground content' expenditure.

In this way we estimate the emissions associated with the 'ground content' of tourism to Australia from different source markets. Of the selected markets, UK repeaters are the greatest spenders per trip and are also the greatest emitters of greenhouse gases (with costs representing 9.1 per cent of their total expenditure). The second greatest spender per trip and the second greatest emitter of greenhouse gases is the mature Canadian tourist. Given that the expenditure data indicates purchasing patterns, destination managers have the opportunity to determine which are preferred inbound markets from an environmental perspective.

**Table 1: Impacts on 'Within Australia' Expenditure of Climate Change Policies, Visitors from Selected Countries, 2002-2004**

	NZ Mature	% of Total within destination Expenditure	Hon g Kon g 1 st time	% of Total within destination Expenditure	UK Repea t	% of Total within destination Expenditure	Canada n Mature	% of Total within destination Expenditure
Tonnes of GHG emissions	2.5		3.6		4.8		4.8	
Cost at \$20 per tonne (\$)	50	4.1	72	3.0	96	3.7	96	4.3
Cost at \$50 per tonne (\$)	125	10.4	180	7.6	240	9.1	240	10.7
Total Expenditure (\$)	1205		2381		2626		2246	

Source: GHG emissions estimated are from Lundie, Dwyer and Forsyth (2007). Visitor expenditure data are from Tourism Australia (2004) and based on Australia's International Visitor Survey.

Table 2 provides estimates of the impact of emissions on airfares, assuming that their cost is passed on fully to airline passengers. The increased costs depend upon the amount of GHG emissions and its costs per tonne. These estimates are made for low and high carbon prices, and they are made for different assumptions about the damage caused by aviation emissions. The high damage scenario assumes that once non carbon emissions and the higher damage done by aviation as compared to ground carbon

emissions are taken into account, the damage is 2.5 times more than the simple carbon emissions would indicate (for discussion of these estimates, see Daley, 2010). If the damages are high and the cost per tonne is high, GHG associated with flying from the long haul markets of UK and Canada comprise over 20 per cent of tourist expenditure.

These estimates are preliminary, and must be qualified in several ways. However, they do give an indication of the impact on international air fares and long haul trip costs of the climate change policies being considered.

**Table 2: Impacts on Air Fares of Climate Change Policies, Visitors from Selected Countries, 2002-2004**

	New Zealand	% of Total Airfare	Hong Kong 1st Time	% of Total Airfare	UK Repeat	% of Total Airfare	Canadian Mature	% of Total Airfare
Tonnes of GHG	0.6		1.67		3.82		3.67	
Cost at \$20 per tonne low damage (\$)	12	24	33	2.8	76	3.4	73	3.6
High damage (\$)	30	6.0	84	7.0	191	8.5	184	9.0
Cost at \$50 per tonne low damage(\$)	30	6.0	84	7.0	191	8.5	184	9.0
High damage	75	15.0	209	17.4	478	21.2	459	22.3
Total Expenditure on Air Fares (\$)	501		1198		2259		2054	

*Source: Expenditure data supplied by Tourism Australia (2004); Forsyth et al (2007)*

Table 3 is an aggregate table indicating the total GHG emissions associated with a trip to Australia including air travel plus the 'within Australia' content.

**Table 3: Impacts on Total Trip Costs of Carbon Pricing, Visitors from Selected Countries, 2002-2004**

	New Zealand Mature	% of Total trip Expenditure	Hong Kong 1 <sup>st</sup> Time	% of Total trip Expenditure	UK Repeat	% of Total trip Expenditure	Canada Mature	% of Total trip Expenditure
Cost at \$20 per tonne,								
low damage	62	3.6	105	2.9	172	3.5	169	3.9
high damage	80	4.7	156	4.4	287	5.9	279	6.5
Cost at \$50 per tonne								
low damage (\$)	155	9.1	264	7.4	431	8.8	424	9.9
high damage (\$)	200	11.7	389	10.9	718	14.7	699	16.3
Total Expenditure on Trip	1706		3579		4885		4300	

Source: authors' estimates

Source: Calculated from Tables 1 and 2

The estimates suggest that the impact on long haul trip costs could be substantial if a high carbon price emerges in Australia. Air fares for the long haul origins, the UK and Canada, are particularly affected. Because the impact of carbon pricing on the 'within Australia' component of a trip is proportionately smaller, the impact of carbon pricing on the total trip cost is less than on the air fare. It is still quite significant, at around 15% for the high carbon price scenario. The tables suggest that short or medium haul trips will be less affected. Even with moderate demand elasticities these price increases will have a perceptible impact on long haul tourism to Australia.

### 5. Are Further Measures Necessary?

The impact that climate change mitigation policies will have on reducing GHG emissions from aviation will come mainly through their effect in reducing air travel. Even in the medium term, there is only

limited scope for airlines to adopt more fuel efficient technologies. With low to moderate reductions in air travel, and long haul air travel in particular, some may argue that the reduction in aviation emissions is insufficient, and may call for further measures to reduce aviation's contribution to climate change (e.g. see Committee, on Climate Change, 2009).

There are two responses to such calls. Firstly, they fail to appreciate the rationale of the ETS. The purpose of the ETS is to impose the same carbon price on all industries, and induce them to reduce their emissions. The costs of these reductions will differ from industry to industry- in some cases, substantial reductions in emissions might be achieved at relatively little cost. It makes good sense to rely more heavily on reducing emissions where it is cheapest to do so. The most cost effective means of say, reducing emissions by 20% in total might involve the electricity industry reducing its emissions by 40% and aviation by only 10%. As long as the system as a whole is achieving the target set for it, it does not matter if one industry, such as aviation, is reducing emissions by less than the average.

Secondly, if special measures are imposed on the aviation industry to reduce emissions, and the ETS is effective, they will be totally ineffective in terms of reducing overall GHG emissions. If aviation is subjected to a special tax, or restrictions are placed on the number of long haul flights people may take, the demand for air travel will fall, and the emissions from aviation will also fall. However this will achieve nothing, since other industries will increase their emissions to take up the slack. Since airlines need fewer permits, they will sell them to other industries. Since the number of permits is fixed, the reduction in emissions from aviation will be exactly matched by the increase from other industries. Imposing special measures on aviation, granted that it is covered by the ETS, will simply increase its costs and discourage air travel and tourism, with no benefit in the form of reduced GHGs. In spite of this, there are calls for special measures towards aviation (e.g., see Committee on Climate Change, 2009).

Overall, long haul air travel does create significant GHGs, and the climate change costs of these are mostly not factored in to decisions by travellers. Confronting travellers with the GHG cost consequences of their travel decisions will raise the cost of air travel, and will discourage this travel somewhat. These costs are minimised if aviation is included within a comprehensive climate change policy, such as the one being implemented in the EU. Once aviation is included, there is no case for further action- additional measures directed at aviation in general, or long haul air travel, will simply reduce the benefits from aviation and tourism to the economy, with no benefit in terms of lower GHG emissions.

## **6. Is There a Case for Excluding Long Haul Aviation From the ETS?**

When climate change policies, such as an ETS, are proposed, it is often recognised that they can pose particular problems for footloose export industries. Increasing the costs of the home export industry will render it less competitive on world markets, and customers will shift elsewhere. Production may actually shift offshore. While the home economy will reduce its production of emissions, the global total emissions may increase. Thus the economy imposes a cost on itself and achieves no reduction in global

GHG emissions (these could actually increase). Special provisions are sometimes suggested to address this problem.

Long haul tourism is very much a footloose industry. If one country raises the costs of visits to its shores, many travellers will switch to other countries. Thus, if the EU imposes climate change policies which raise the cost of inbound tourism, but its destination competitors do not, then visitors will, to some extent, shift to competitor destinations. While the EU will lose out, global emissions may not fall. While the EU ETS is likely to have provisions to ease the adjustment of footloose export industries, they are not particularly suited to the tourism and long haul aviation industries. This raises the question of whether it would be in a country or region's interest to exclude international aviation from the ETS.

The footloose industry problem will not arise if other countries also impose climate change policies. While many of the EU's sources of visitors and destination competitors are not likely to implement such policies in the near future, some will. We have indicated that New Zealand has an ETS and it could apply it to international aviation. To this extent, the footloose industry problem will not arise if New Zealand incorporates aviation into its ETS. New Zealand's competitors for European visitors, which do not implement their own climate change policies, will be affected by the European policy. All flights from Europe will factor in a carbon price, not just flights to New Zealand. By choosing to include aviation within the ETS, New Zealand will not lose out.

The situation could be different if other countries with which New Zealand has air links do not apply climate change policies to aviation. Suppose the US does not include aviation in any policy. If New Zealand includes aviation in the ETS, flights from the US will become more expensive, while the prices of flights to other destinations, say Thailand, which do not apply climate change policies will be unchanged. US tourists will, to some extent, switch to Thailand. If New Zealand keeps to its emissions target, global emissions will actually increase to the extent that additional tourism to Thailand increases emissions.

New Zealand (or the EU) could exempt from its own ETS flights to countries which do not apply climate change policies to international aviation. It might do this while maintaining the same cap on emissions. There would be a number of changes which would need to be taken into account:

- Achieving the target would mean that there would be higher costs of adaptation imposed on other industries;
- ☐ There would be greater benefits from inbound tourism to New Zealand;
- There would be a larger flow of outbound tourism from New Zealand, at some cost to the economy;
- ☐ GHG emissions produced in competitor destinations would be lower;
- GHG emissions produced in the destinations visited by New Zealand outbound travellers would be higher;

- Profits to New Zealand airlines would be lower to the extent that they would have profited from free or cheap permits; and
- New Zealand government revenues would be lower to the extent that the permits would have been sold to the airlines.

The balance of benefits costs and GHG emissions would be changed if a country excluded aviation from its ETS, but adjusted its emissions cap accordingly, so as to impose no burden on other industries. A looser GHG emissions target would mean that the costs imposed on other industries by the ETS would be lower, but it would mean that New Zealand emissions would increase, and most likely, global emissions would increase.

Thus excluding international aviation from the ETS would involve costs and benefits to New Zealand, the balance of which could go either way. It would also have an uncertain impact on global emissions, though probably it would reduce them. Thus the merits of doing this are unclear, though modelling simulations should be able to give some guidance on the likely balance.

## 7. Conclusions

Long haul air travel is a source of GHG emissions, and thus policies to mitigate climate change will impact upon it. Higher costs will feed into higher fares, and thus air travel will be reduced, with consequent loss of benefits to a country's travellers, and loss of benefits due to reduced inbound tourism. Countries such as New Zealand which have introduced climate change policies will need to determine how to fit long haul aviation into them. The issue is made more complex by consumer attitudes and public perceptions. The desires of some travellers to be responsible travellers, and be carbon neutral can be accommodated relatively easily, however the perception by many that aviation, and in particular long haul aviation is inherently damaging to the environment is more difficult to address.

Some conclusions which emerge are as follows:

- Short term policies which target aviation mainly or exclusively, such as restrictions on long haul flights or special taxes on aviation will prove relatively costly, though they may not achieve much by way of reducing emissions;
- Long term policies which incorporate long haul and other aviation within an effective and comprehensive policy framework, such as an ETS, are likely to minimise the overall costs of achieving a given target in terms of reduction of emissions;
- If aviation is fully incorporated in an ETS, there is no merit in further aviation specific measures, such as taxes or restrictions. Even if the emissions reductions from aviation are smaller than average, specific measures will be ineffective in achieving additional reductions in overall emissions;

- Preliminary estimates suggest that long haul trips could experience moderate price rises (15% with a high carbon price) and that this would lead to a perceptible reduction in long haul air travel; and
- Granted that other countries including destination competitors may not apply climate change policies to international aviation for some time, there *may* be a case for excluding international flights to them from an ETS.

Several of these conclusions are fairly straightforward. Two, however, merit further study. Firstly, more comprehensive analysis of the likely impact of climate change policies on the price of international long haul trips would be useful. Secondly, the economic costs and benefits of excluding some long haul flights from the ETS, along with the implications for global GHG emissions, need to be estimated, and the balance between them determined.

## References

- Broderick, J (2010): "Voluntary Carbon Offsetting for Air Travel," in S Gossling and P Upham (eds) *Climate Change and Aviation: Issues, Challenges and Solutions*, Earthscan, London.
- Brons M., E Pels, P.Nijkamp, P. Rietveld (2002): "Price Elasticities of Demand for Passenger Air Travel: A Meta-analysis," *Journal of Air Transport Management*, 8, 165-175.
- Bureau of Transport and Communications Economics (1995): *Demand Elasticities for Air Travel to and from Australia, Working Paper 20*, Department of Transport, Canberra, Australia.
- Commission of the European Communities (EU) (2006): *Commission Staff Working Document, Summary of the Impact Assessment: Inclusion of Aviation in the EU Greenhouse Gas Emissions Trading Scheme (EU ETS)*, Brussels, December.
- Committee on Climate Change (2009): *Meeting the UK Aviation Target – Options for Reducing emissions to 2050*, Committee on Climate Change, London.
- Crouch, G.I. (1992): "Effects of Income and Price on International Tourist Demand," *Annals of Tourism*, 19(4), 643-664.
- Crouch, G.I. (1994): "The Study of International Tourism Demand: A Review of Findings," *Journal of Travel Research*, 33, 12-23.
- Crouch G.I. (1995): "A Meta-Analysis of Tourism Demand," *Annals of Tourism Research*, 22(1), 103-118.
- Daley, B (2010): *Air Transport and the Environment*, Ashgate, Farnham.
- L. Dwyer, P. Forsyth, R. Spurr, S. Hoque (2010): "Estimating the Carbon Footprint of Australian Tourism," *Journal of Sustainable Tourism*, 18(3), 355-366.
- Dwyer, L, P Forsyth, R Spurr and S. Hoque (2013): "Economic Effects of a Carbon Tax on the Australian Tourism Industry," *Journal of Travel Research*, 52(2), 143-155.
- Forsyth, P (2009): *The Impact of Climate Change Policy on Competition in the Air Transport Industry*, *Competitive Interaction between Airports, Airlines, and High-Speed Rail, Round Table 145*, OECD / ITF Paris.
- Forsyth, P, L Dwyer, R Spurr, J Bultjens, N White and S. Willacy (2007): *Climate Change and Australian Tourism*, Sustainable Tourism Cooperative Research Centre, Report.
- Gillen D, W Morrison and C Stewart (2002): *Air Transport Demand Elasticities: Concepts, Issues and Measurement, Final Report*, mimeo

- Gossling, S and P Upham, Eds) *Climate Change and Aviation: Issues, Challenges and Solutions*, Earthscan, London.
- InterVISTAS (2007): *Estimating Air Travel Demand Elasticities*, Report for IATA Vancouver.
- Lyle, C (2014): "Mitigating International Air Transport Emissions Through a Global Measure: Time for Some Lateral Thinking," *Green Air Online*, [www.greenaironline/news](http://www.greenaironline/news) Feb 15, 2014.
- Lundie, S. L. Dwyer and P. Forsyth (2007): "Environmental-Economic Measures of Tourism Yield," *Journal of Sustainable Tourism*, 15(5), 1-18.
- New Zealand Ministry for the Environment (2007): *Emissions Trading and Transport, Factsheet 6*, Wellington September, [www.mfe.govt.nz](http://www.mfe.govt.nz)
- Scheelhaase, J and W Grimme (2007): "Emissions Trading for International Aviation- an Estimation of the Economic Impact on Selected European Airlines," *Journal of Air Transport Management*, April.
- Seeley, A (2013): "Air Passenger Duty: Recent Debates and Reform," *Standard Note SN5094 House of Commons Library* (UK).
- Tourism Australia (2004): *International Visitor Survey 2002–2004*, Canberra, Australia.