CHAPTER 1.8

What Is Driving Travel Demand? Managing Travel's Climate Impacts

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The focus of existing policy aimed toward reducing CO_2 emissions from air travel, with measures such as the United Kingdom's recent doubling of air passenger duty, has been on trying to manage air travel demand by raising the cost of travel for passengers. Even the recent debate on emissions trading in Europe has focused on the costs it will impose on airlines and their passengers. This paper presents new research that shows that policies aiming to reduce emissions by managing demand by raising the cost of air travel are likely to fail. Tourists are shown to be very sensitive to prices for air travel on competing airlines or to alternative destinations. However, at the national or pan-national level, these choices cancel each other out; the overall market is much less sensitive to the cost of air travel. It is economic growth and incomes that are found to be the key drivers of air travel demand, and those drivers are expected to remain particularly strong in the developing markets of Asia. Decoupling emissions from travel growth needs to focus not on demand management but on mechanisms to bring about emission reduction measures from technology, infrastructure, and operations.

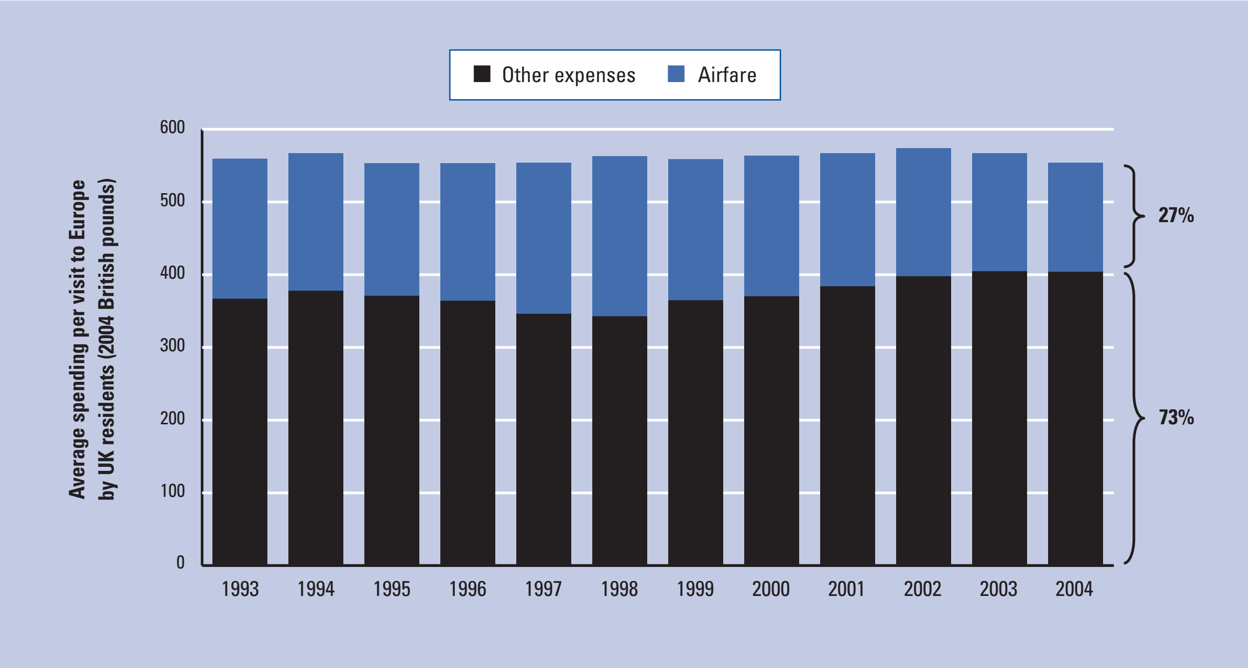
The price sensitivity of airline passengers

In policy discussions about the sensitivity of airline passengers to the cost of travel there is an apparent paradox. On the one hand, the boom in low-cost travel, the transparency brought by the Internet, and the intense competition on deregulated markets all point to an increasing sensitivity of the passenger to price. On the other hand, increasingly lower airfares, in real terms, mean that the airfare is becoming a smaller and smaller part of the total spent on a typical journey, implying a reduction in passengers' sensitivity to price.

The proportion of total spending on an overseas visit by air will vary by country. In particular, airfares are likely to represent a higher proportion of travel spending in low-income countries that have air travel markets that have not been liberalized. However, for the bulk of air travel in liberalized Organisation for Economic Co-operation and Development (OECD) markets, the example in Figure 1 is probably representative. In this case, for UK residents traveling to Europe by air, the fare now represents only around one-quarter of the total cost of the visit.

Since travel for the purpose of tourism is not a necessity, there are good reasons for believing the statistical evidence that tourists are sensitive to the cost of travel. If travel costs rise sharply, tourists may well decide to take their holidays at home and not travel by air. Commonly used price elasticity estimates suggest that tourist arrivals will fall 15 percent for every 10 percent rise in the cost of travel.[1] That would certainly make sense if the cost of a typical visit to Europe by UK residents rose from £550 to £633, leading to a 10 percent fall in tourist numbers (Box 1).

Figure 1: Airfares represent a declining proportion of travel spending



Source: UK Office of National Statistics, International Passenger Survey 2005.

Box 1: Defining the sensitivity of travel demand to changes in price and income

The term used by economists to measure the sensitivity of demand to price and income is *elasticity*. The price elasticity of demand is commonly expressed as a measure representing the percentage change in demand for a given percentage change in price. For instance, a price elasticity of air travel for leisure of –1.5 implies that if prices rise 10 percent, then demand for air travel for leisure would fall 15 percent. Likewise an income elasticity of 1.8 implies that if incomes rise 10 percent, then demand for air travel will rise by 18 percent.

When demand is very sensitive to price—that is, when a 10 percent price rise causes a greater than 10 percent fall in demand, economists say that demand is *price elastic*. When demand is relatively insensitive with a price elasticity of less than –1 (e.g., –0.7) demand is said to be *inelastic*. We use the terms *sensitivity* and *elasticity* interchangeably within the text.

However, that is the price sensitivity of air passengers to the total cost of travel. If the airfare component of that cost rose 15 percent from £150 to £173, that would represent a rise in the total cost of a visit to Europe of 4 percent. A 10 percent fall in passengers as a result of a 15 percent rise in the airfare (but a 4 percent rise in total travel cost) would therefore represent a travel demand price elasticity in respect of the total travel cost of –2.5. This looks implausibly high.

Yet everyone in the Travel & Tourism industry knows they are dealing with very price sensitive customers, and that changing fares and prices does produce a large demand response. How can this apparent paradox be resolved?

Box 2 sets out a rather technical explanation of why exactly the effect of airfares on passenger numbers should be expected to be much less at an aggregate or national level than at a route level.

Table 1 uses the same example to work through the effects.

The effect of a 10 percent fare increase on both routes (caused, for instance, by a rise in a national passenger tax) would be to reduce the total traffic in the market by 8 percent (the weighted average of the route net effects), which is exactly what is implied by the aggregate market price elasticity of –0.8. Using the weighted average price elasticity of –1.5, on the other hand, would incorrectly imply a 15 percent decrease in aggregate air travel.

Box 2: Why price sensitivity is lower at the level of countrywide air travel

The relationship between the price sensitivity at the aggregate market level E and at destination-specific route levels (own-price elasticity E_{ii} and cross-price elasticity E_{ij}) was very well described in a study carried out by the UK CAA,[1] where S_i is the traffic share of destination i:

$$E = \Sigma_i S_i (\Sigma_j E_{ij})$$

A hypothetical example will help illustrate the implications for policy. Assume there are just two routes for a national market, A and B, with own-price elasticities $E_A = -1.5$ and $E_B = -1.5$. Own-price elasticities indicate, for instance, that a 10 percent rise in airfares just on route A would lead to a 15 percent decline in passengers on that route. Cross-price elasticities are, say, $E_{AB} = 0.7$ and $E_{BA} = 0.7$. This means that, for example, the 10 percent rise in airfares just on route A would, as well as causing a 15 percent decline in passengers on route A, would boost passengers on route B by 7 percent. The price rise does not only suppress demand—it also diverts it, which clearly affects the overall net impact. If both routes have a market share S_i of 50 percent, then the weighted average national own-price price elasticity is –1.5. This might suggest that a policy that raises the cost of air travel nationwide by 10 percent would reduce air travel volumes by 15 percent. However, that conclusion would be wrong. To see why, using the expression for aggregate elasticity above:

$$E = S_A (E_A + E_{AB}) + S_B (E_B + E_{BA}) = 0.5 (-1.5 + 0.7) + 0.5 (-1.5 + 0.7) = -0.8$$

This shows that the aggregate price elasticity is not –1.5 but –0.8 in this example—that is, the reduction in passengers that result from a 10 percent rise in airfares is not 15 percent but 8 percent. This is a relatively inelastic or price insensitive response, in contrast to what seems to be the current view among many policymakers.

Note

1 UK CAA 2005.

This example considers the impact on outbound leisure passengers, in which a rise in passenger tax will affect all destination choices. That is not the case for inbound tourists. The choice facing US residents in traveling to destination A, say the United Kingdom, or destination B, say Italy, will be significantly affected by national passenger taxes. For instance, the recent doubling of the UK passenger departure tax added roughly 4 percent to the cost of travel. This will have had a relatively small impact (–3.2 percent) on UK residents departing on overseas holidays, for the reasons set out above. However, it will have led to a relatively large impact (–6 percent) on the choice of US residents traveling to the United Kingdom. Many travelers (2.8 percent) will have been diverted to holiday in, say, Italy. In total, this demand response would significantly limit the effectiveness of national passenger taxes as a way of managing demand or limiting the rise of greenhouse gas emissions from air travel.

Table 1: Impact of fare increases at the route and market level

Change in airfare	Effect on route A (percent)	Effect on route B (percent)
10 percent rise in airfare A	–15	+7
10 percent rise in airfare B	+7	–15
Net effect	–8	–8

Source: UK Civil Aviation Authority, 2005.

These of course are hypothetical elasticity examples, though the doubling of UK passenger duty was an actual policy decision. To see whether the theory is in evidence in practical market experience, economic consultants InterVISTAS, on behalf of IATA, undertook new econometric research into travel markets in the United States, Europe, Asia, and many other regions of the world, using a variety of airfare and passenger databases. What they found was indeed that the sensitivity of passengers to the level of airfares depends very much on the level of the market being considered. In short, at the level of competition between airlines or city-pair markets, sensitivity to price is very high. But at the national or regional level, air travel is relatively price insensitive. This has important implications for climate change policies aiming to manage demand by raising the cost of air travel.

A review of the existing literature of previous studies on price elasticities shows a number of consistent themes:

- All of the studies reviewed, spanning a period of over 25 years, found that there was a significant demand response to changes in airfares. The consistency of this result strongly indicates that any policy action that results in higher fares (e.g., passenger taxes, increased landing fees) will result in a decline of tourist numbers. Critically, however, the extent of that decline will depend on a number of factors, as discussed below.

- The review of studies also shows that, all other things being equal, business travelers are less sensitive to fare changes (less elastic) than leisure travelers. Intuitively, this result is plausible—business travelers generally have less flexibility and are less able to postpone or change their travel plans than leisure travelers. Nevertheless, the studies do show that even business travel will decline in the face of fare increases, albeit to a lesser extent than leisure travel.

- Another consistent finding was that price elasticities on short-haul routes were generally higher than on long-haul routes. In part, this reflects the opportunity for intermodal substitution on short-haul routes (e.g., travelers can switch to rail or car in response to airfare increases).

- One of the key issues considered was whether price elasticities faced by individual airlines are higher than those faced by the whole market. This seems to be the case. For example, Oum et al. (1993) estimated firm-specific price elasticities in the United States and found values ranging from –1.24 to –2.34—that is, they were highly price sensitive, while studies estimating market or route price elasticities ranged from –0.6 to –1.8—that is, these were less price sensitive. Moreover, Alperovich and Machnes (1994) and Njegovan (2006) used national-level measures of air travel in Israel and the United Kingdom, respectively, and found even lower price elasticity values (–0.27 in Israel and –0.7 in the United Kingdom).

- Most of the studies also included income as an explanatory variable of air travel demand. Clearly the demand for air travel from individuals will depend not just on its price, but also on the individual's income. Virtually all of these studies estimated income elasticities above 1, generally between +1 and +2. This indicates that, even without declining real airfares, air travel will increase at a higher rate than incomes or GDP. So, for example, with an income elasticity of 1.8, air travel demand will increase 18 percent for every 10 percent rise in incomes. This has important implications for climate change policies seeking to manage air travel demand by raising the cost of travel.

InterVISTAS then carried out an econometric analysis using three different datasets. The first was the US Department of Transportation's air travel database DB1A, which takes a 10 percent random sample of all tickets purchases in the United States for travel on US airlines. Data from 1994Q1 to 2005Q4 was used for the top 1,000 city-pair routes. The second dataset was the IATA PaxIS Plus database, which captures transactions data through IATA's Billing and Settlement Plan (BSP) and uses various estimates to address missing direct sales, low-cost carriers, charter flight operations, underrepresented BSP markets, and non-BSP markets. This gives traffic and fares for routes around the world but for a relatively short time series, from 2005. Finally, the UK Office for National Statistics (ONS)'s International Passenger Survey provided a random sample of outbound leisure passengers from 2003Q2 to 2006Q2. Over 500 regression models were estimated on these datasets.

The literature review and econometric analysis demonstrated that price elasticities vary depending on a number of factors such as location, distance, and level of market aggregation. When addressing policy issues, determining the right price elasticity value to use depends on the type of question being asked. The traffic impact of higher travel costs on a given route that result from a rise in airport landing charges requires a different (higher) price elasticity that the traffic impact of an across-the-board travel cost increase that results from a passenger tax on all routes in a country, which requires a lower price elasticity.

The price elasticities in Table 2 were developed by InterVISTAS as a synthesis of the literature review and econometric analysis. The approach taken was to develop three base price elasticities to reflect the three levels of aggregation (route, national, and pan-national level). Multiplicative adjustors were then developed to adjust the price elasticities to reflect specific geographical markets.

Base price elasticities were estimated econometrically from a variety of databases:

- At the route level, estimates centered around a price elasticity of –1.4, suggesting a high sensitivity to price. The literature review found that price elasticities at the route or market level ranged from –1.2 to –1.5. This was verified by InterVISTAS' own econometric analysis of the US DB1A where it was possible to capture the effects of route substitution. These regressions produced price elasticities in the region of –1.4.

- But at the national level, estimates showed that air travel demand is less responsive to price, with a relatively inelastic or insensitive –0.8. The econometric analysis of all three datasets found that, without the route substitution term, elasticities fell to around –0.8. This elasticity is essentially a combination of the route's own price elasticities (the sensitivity of route demand to price on that route) with cross-price elasticities (the sensitivity of route demand to prices on other routes), when all national routes have prices that vary in the same way. The less elastic or less price sensitive result is consistent with observations that part of the apparent market stimulation by low-cost carriers at secondary airports involves diversion from primary airports in the catchment area, or diversion from trips on other routes. When this is controlled for, low-cost carriers have a lower level of market stimulation, consistent with less elastic national price elasticities.

Table 2: Estimated price elasticities of passenger demand

	Route/market level		National level		Pan-national level	
Region	Short-haul route	Long-haul route	Short-haul route	Long-haul route	Short-haul route	Long-haul route
Within North America	–1.5	–1.4	–0.9	–0.8	–0.7	–0.6
Within Europe	–2.0	–2.0	–1.2	–1.1	–0.9	–0.8
Within Asia	–1.5	–1.3	–0.8	–0.8	–0.6	–0.6
Within sub-Saharan Africa	–0.9	–0.8	–0.5	–0.5	–0.4	–0.4
Within South America	–1.9	–1.8	–1.1	–1.0	–0.8	–0.8
Transatlantic	–1.9	–1.7	–1.1	–1.0	–0.8	–0.7
Transpacific	–0.9	–0.8	–0.5	–0.5	–0.4	–0.4
Europe-Asia	–1.4	–1.3	–0.8	–0.7	–0.6	–0.5

Source: Kincaid and Trethaway, 2007.

- At the pan-national level (e.g., the European Union), estimates show that air travel demand is even less sensitive to price, with a price elasticity of –0.6. This is because, as the number of routes covered expands, the number of choices for passengers to avoid any travel cost increase diminishes. There is less opportunity for traffic to be diverted.

So the route price elasticity described above applies to a situation where the price of an individual route changes. For example, higher airport charges at the Paris Charles de Gaulle Airport (CDG) would raise the cost of travel from London, diverting leisure traffic to a destination unaffected by the charge, such as Frankfurt. The national price elasticity applies to a situation such as the doubling of the UK passenger tax, affecting all UK departing routes equally but leaving the cost of travel from elsewhere in Europe unchanged. Pan-national price elasticities would apply, for example, to the travel cost impact of the proposed extension of the European Union (EU) Emissions Trading Scheme to air travel, showing a very limited impact on demand (though there would be other mechanisms influencing the supply response).

The econometric analysis of the IATA PaxIS Plus data found considerable differences between geographic air travel markets:

- **Within North America.** This is our reference point, with a price elasticity multiplier of 1. In other words, the estimated price elasticities are not adjusted in any way.

- **Within Europe.** The evidence points to traffic in this region being more sensitive to price, with a multiplier to be applied to the estimated price elasticity of 1.4. The reasons include shorter average travel distances, other transport modes being available as substitutes, and a traditionally high charter airline share now being converted to very low fare low-cost carriers, pointing to a more price-sensitive passenger.

- **Within Asia.** By contrast, the evidence suggests a less price sensitive demand in this region, with a multiplier of 0.95. Low-cost carriers are now emerging in Asia but average distances are longer, and the key middle class is still relatively small in many markets in this region.

- **Within sub-Saharan Africa.** This region shows a much lower sensitivity to price, with a multiplier of just 0.6. These economies have a much smaller middle class. Travel is concentrated with higher-income individuals who will be less price-sensitive.

- **Within South America.** At the more price sensitive end of the scale this region shows a multiplier of 1.25. There is an emerging middle class making the region more price elastic plus low-cost carriers s are emerging in Brazil, Chile, and Mexico.

- **Transatlantic.** This market has long been developed by low-fare charter airlines and shows a more price-sensitive response than US domestic markets, with a multiplier of 1.2.

- **Transpacific.** In sharp contrast, markets across the Pacific Ocean show a much less sensitive response to travel cost and have an estimated multiplier of just 0.6. There are no transpacific charter services and there remain markets with less liberal pricing regulation. There are early signs of long-haul low-cost carriers emerging, but at present this market shows much less sensitivity to travel cost than the US domestic market or the transatlantic market, which serves a substantial middle class.

- **Europe-Asia.** This market shows a slightly less price sensitive passenger than the US domestic market, with a multiplier of 0.9.

The literature review also found research consistently showing that price elasticities on short-haul routes were higher than on long-haul routes. In part, this reflects the opportunity for intermodal substitution on short-haul routes (e.g., travelers can switch to rail or car in response to airfare increases). Although the geographical breakdowns capture some variation by length of haul, there is still considerable variation within each market.

On this basis, a multiplicative adjustor of 1.1 is estimated to be necessary to adjust price elasticities for short-haul markets. Note that this does not apply to the analysis of transatlantic or transpacific markets, which are entirely long haul with virtually no opportunity for modal substitution.

The following examples illustrate how the price elasticities in Table 2 were constructed and how they can be used for various policy choices:

- To look at the demand impacts of higher travel costs caused by extending the EU Emissions Trading Scheme just to intra-EU travel—that is, short-haul markets—the relevant price elasticity would be derived as follows:

  Base price elasticity –0.6 (pan-national) multiplied by 1.4 (intra-Europe geographic multiplier) multiplied by 1.1 (short-haul multiplier), which equals –0.92. So a 10 percent rise in intra-EU travel costs would lead to a relative inelastic 9.2 percent reduction in air travel.

- To look at the impact of the doubling of UK passenger tax on transatlantic traffic, the price elasticity would be derived as follows:

  Base price elasticity –0.8 (national) multiplied by 1.2 (transatlantic geographical multiplier), which equals –0.96. For outbound traffic from the United Kingdom, this implies the resulting 3.7 percent rise in the cost of long-haul travel will cut demand by 3.6 percent. For inbound traffic from North America, the United Kingdom represents only a 20 percent market share, so while the United Kingdom will lose inbound tourists, many will just be diverted to other destinations.

- To examine the impact of an increase in airport landing fees on a particular short-haul market in South America, the price elasticity would be derived as follows:

  Base elasticity –1.4 (market) multiplied by 1.25 (Intra–South America) multiplied by 1.1 (short-haul multiplier), which equals –1.93. A 10 percent rise in the airport landing fee would reduce passenger numbers on short-haul markets serving that airport by over 19 percent.

The full range of possible price elasticities is shown in Table 2. The route- or market-level price elasticities range from –0.8 to –2, depending on the geographic market and length of haul. The national-level price elasticities range from –0.5 to –1.2, while pan-national price elasticities range from –0.4 to –0.9.

How income growth drives travel demand

If passengers are relatively insensitive to price at a national aggregate market level, and even less so at a pan-national level, this strongly suggests that falling real airfares have not been the main driver of air travel growth.

Indeed, this is the conclusion reached in a recent study of the well-established no-frills sector in the United Kingdom where, since the mid-1990s, airfares have fallen substantially as a result of the increasing share of no-frills airlines. That study concludes that the no-frills sector had a major impact on the industry and took market share from incumbent airlines, but "[d]espite the spectacular growth of no-frills carriers in the UK, and the perceptions about the impact they have had on travel habits, there has been little change in long-term aggregate passenger traffic growth rates."[2]

Falling real airfares have been critically important in passengers switching from one airline to another, and from one destination to another. However, airfares seem to have been much less important in driving aggregate national-level air travel or tourism growth.

There are a number of other non-price drivers of air travel, including market liberalization and globalization. However, the growth of incomes and wealth, often proxied by GDP, has been found to be the fundamental driver of the demand for air travel.

As expected, income elasticities—that is, the sensitivity of air travel demand to incomes—were consistently found to be positive and greater than 1. This suggests that, as households and individuals get more prosperous, they are likely to devote an increasing share of their incomes to discretionary spending such as air travel. The responsiveness of passenger demand to incomes is greatest for developing-country travel markets, where the average income elasticity is around 2. So for every 10 percent rise in GDP or incomes, air travel demand will increase 20 percent in developing-country markets, all other things being equal.

There is some evidence that income elasticities decline as countries become richer and markets mature. The evidence points to developed-country travel markets having income elasticities around 1.5—that is, travel demand rises 15 percent for every 10 percent rise in GDP.

However, there are variations around this average. For the US travel markets, income elasticities are higher, though not as high as for developing countries (Table 3). This suggests that many passengers view travel to and within the United States as more desirable and less

Table 3: Estimated income elasticities of passenger demand

	Route/market level				National level			
Economy	Short-haul route	Medium-haul route	Long-haul route	Ultra long-haul route	Short-haul route	Medium-haul route	Long-haul route	Ultra long-haul route
United States	1.8	1.9	2.0	2.2	1.6	1.7	1.8	2.0
Developed economies	1.5	1.6	1.7	2.4	1.3	1.4	1.5	2.2
Developing economies	2.0	2.0	2.2	2.7	1.8	1.8	2.0	2.5

Source: Kincaid and Trethaway, 2007.

budget-oriented than travel in Europe and other developed economies. There is also evidence that long-haul journeys are seen by passengers as different, and more desirable, than the more commoditized short-haul markets, and so income elasticities are higher for the former.

All together, the evidence on income elasticities suggests that the expansion of economic activity and incomes have been the principal drivers of air travel in the past. During the past 20 years, global passenger traffic has expanded 2.9 times, averaging an annual growth of 5.1 percent. During that same period, global GDP has risen just over 2 times, averaging 3.7 percent economic growth each year. That implies an average income elasticity of 1.4, which is close to the average estimated above for the developed economies, where most of the air travel growth has taken place.

The implication is that economic growth can explain virtually all of the expansion in air travel seen in the past 20 years. The fall in real airfares has played a part, but mostly in diverting travel between airlines and markets rather than significantly boosting overall travel volumes. And economic growth increasingly is taking place in developing economies where income elasticities are higher. As a result, the underlying drivers for overall air travel growth are likely to remain strong.

Policy implications

The strong implication from this research is that policies that seek to reduce aviation's climate impacts by trying to manage demand, through raising the cost of travel, are likely to fail. At a national and pan-national level, air travel is relatively insensitive to the cost of travel. Falling real airfares seem to have played a relatively minor role in boosting air travel during the past two decades. Economic growth, particularly in the developing economies, will continue to be the major driver of increase demand for air travel.

Climate policies will need to focus on creating incentives where there can be effective investment in emissions reductions. The major potential would appear to be on decoupling emissions from travel growth through supply-side innovations, rather than trying to manage demand through raising the cost of travel.

IATA's four-pillar climate strategy,[3] which was endorsed by the Assembly of the International Civil Aviation Association this year, focuses action on emission reduction measures from technology, infrastructure, operations and those brought about by well-designed economic instruments (Table 4).

Table 4: The effectiveness of existing economic instruments

Emission cut measure	Player	Passenger tax	Emissions trading
Technology	Manufacturer	No impact	No impact
	Fuel company	No impact	No impact
Infrastructure	Government	No impact	No impact
	ANSP	No impact	No impact
	Airport	No impact	No impact
Operations/fleet	Airline	No impact	Impact
Reduced demand	Passenger	Minor impact	Minor impact
Cuts elsewhere	Other industry	No impact	Impact

Source: IATA.

It is clear from the analysis in this paper that, to provide effective incentives to the various players along the air transport value chain who can invest in emissions reduction, we must look beyond simple economic instruments that seek to manage demand by raising the cost of travel for the passenger.

The research described shows how ineffective instruments such as passenger taxes are for reducing CO_2 emissions. This is not just because demand is relatively price insensitive at a national and pan-national level. It is also because raising the cost of travel for the passenger does nothing to provide incentives for the manufacturer to produce new airframes or engines, nothing to incentivize the fuel company to produce a clean fuel, nothing to incentivize the EU to implement a Single European Sky, nothing to incentivize air navigation service providers (ANSPs) to straighten routes and reduce stacking, nothing to incentivize airports to reduce taxiing emissions, and nothing to incentivize airlines to improve operations and renew their fleet.

Emissions trading can be more effective than passenger taxes or charges, if well designed. Because it is linked directly to emissions, it incentivizes operational and fleet improvements. If well designed to be open to trading with other industries and global, it allows the reduction of CO_2 emissions to take place in industries where reductions are most efficient. However, even emissions trading has little impact on the key technology and infrastructure pillars.

Effectively decoupling emissions from air travel growth will require policymakers and the industry to look beyond simple economic instruments. Technology progress will require collaboration across the value chain and across countries. Governments will need to play a role in funding fundamental research. Political will is perhaps one of the most important mechanisms for delivering emissions reductions from infrastructure improvements. The lack of implementation of a Single European Sky is one glaring omission in policy action to reduce emissions from air travel. IATA is actively promoting collaborative efforts on technology and is lobbying hard for governments to improve infrastructure. On the operations front, there is a major initiative to spread best practice. More needs to be done in the face of the challenge of climate change, but the airline industry is already stepping up its efforts with a bold vision of zero emissions and an important future milestone of carbon-neutral growth.[4] The key lesson for both policymakers and the industry is to look beyond simple economic instruments for mechanisms to bring about an effective reduction in emissions from air travel.

Notes

1 Gillen et al. 2003.

2 UK CAA 2006.

3 IATA 2007.

4 IATA 2007.

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