

# The inflating porcupine of travel

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**IMAGINE** a world where air travel was several times more expensive than now. Would the tyranny of distance return? How would our lives change?

The tyranny of distance is a colonial-era expression. Diaries of early migrants from England to Australia show how far they felt from old friends and familiar landscapes. For most modern migrants, there is no tyranny. Scandinavian students in Australia routinely fly home for Christmas. Suburban newspapers advertise cheap holidays worldwide. Backpackers blog casually about worldwide wanderings. The World Tourism Organisation claims that travel is not a privilege, but a right.

It was not always so. It is not so for everyone, even now. And it may not be so for anyone, in the near future.

I have a wonderful book called *Travellers' Tales*, a collection of excerpts dating back to the earliest days of writing. There were nomadic and seafaring nations, there were military marches and migrations – and everyone else stayed close to where they were born. Long-distance travel by individuals was rare, slow and risky. The situation prevailed, effectively, throughout the Middle Ages and the era of colonial explorations and expansions. In the days before airlines and electronics, all forms of communication and travel were slow and uncertain. Messengers, merchants and occasional monks made epic journeys, but not for amusement.

Historians mark the modern era of mass tourism from the beginnings of scheduled air travel after the Second World War. The baby boomers and younger generations all believe that friends are never more than two days away, and one can talk to them any time. Logistics are no longer a matter of distance, merely of time and cost.

In reality, of course, this applies only to the wealthier developed nations. For billions of people in the developing world, air travel remains barely imaginable, let alone affordable. For billions of people in Eastern bloc countries, private travel was heavily restricted until very recently. Even within the Western middle class, many people have family and financial commitments that keep them at home. A significant proportion of air travel involves a rather small set of so-called hypermobile individuals. Despite all these caveats, however, it is indeed true that for many people, the far side of the globe is only 24 hours away.

**THIS HAS GIVEN** us a very different map of remoteness. Instead of large-scale geographical distance, remoteness now depends on local-scale travel logistics and restrictions. Think for a moment of the tables of driving distances published by automobile associations, showing how far it is between each possible combination of various different towns.

Imagine an enormously larger version, a giant matrix showing direct surface distances between every point on the planet. Is it possible to map that matrix onto a single surface? Yes indeed – the matrix was drawn directly from the surface of the globe, and maps directly back onto that surface.

Now imagine a corresponding matrix where the cells show not direct distance, but travel time. What surface would that map onto? I think it would look a little like a porcupine or sea urchin, a globe with spikes all over it. Between major air travel destinations, you are on the main surface of the time globe, but once you shift to a vehicle you are on a spike, and where you start walking you are on a hair-like thread protruding out from one of the spikes.

But only a tiny proportion of the world's surface is right next to an airport. So there would be a globe-shaped spider

web of tiny thin lines, a hollow ball of web, where the spherical surface of the travel-time globe could be seen. Everywhere else would be hairs on hairs, spikes on spikes. And in fact, the spider web tracery would have to tunnel under the spikes.

Now make yet another mental leap, from a matrix of travel times to one showing costs, and carry out the same mapping exercise. The result would be something like the porcupine or sea urchin of travel times, but changing day to day, as costs change. So it might look more like a sea anemone, or a topologist's dream.

This is too hard to visualise all at once. So let's look at some actual examples: places remote from modern transport, where distance means what you can travel using only your own vehicle, or boat, or feet.

In the 1970s, I was driving alone across the sand dunes of the Simpson Desert in central Australia, far from any track, at least a week's drive from the nearest water. Crossing these dunes is slow and difficult, even in a well-equipped four-wheel-drive, so I took a foolish short cut across a giant salt pan. All went well until I had nearly reached the far side, when the wheels cut through the salt crust and the vehicle slowed to a juddering crawl, wheels spinning and engine screaming. With the vehicle, I was on a travel-time spike within reach of safety. Without it, I would have been on a hair, unable to carry enough water to walk out.

In the 1990s, I travelled for days by dugout canoe, far up a fifth-order tributary of the Amazon River in western Brazil, with a remarkable local guide. We were well beyond the last human habitation, with no means of communication. Then my guide accidentally speared a large fish hook into his eye socket, and it was up to me to carry out some very delicate surgery using only a pocket knife and some tiny sticks. I was very much aware of how distant we were from any hope of help.

A few years ago, I was in a group of rafters and kayakers trying to make a first descent down a giant river gorge in Tibet. We reached an impassable section, and had to hike out for six days, along tiny cliffhanging tracks and snow-covered mountain ranges. The crow-fly distance was not far, but our speed was limited by our feet.

All these examples are hairs on the porcupine, places where local travel is hard and slow. All these hairs connect with the main body, places where travel is quick and easy. Unless you have a military jumpjet which can take off and land almost anywhere, however, you can't hop between hairs. You have to walk down one hair, drive down the spike, fly to the next spike, drive back up and walk to the end of the other hair.

The time-travel porcupine shows time between places. But, as with the actual globe of travel distances, people are not spread evenly over the travel-time porcupine. If it takes 24 hours to fly from one side of the world to the other, and you live one hour's drive from an airport, then you are on quite a small spike, about one sixteenth as high as the globe is wide. For most of the people in the developed world, it does not matter how long the hairs may be, because they are not going there. Even the spikes don't matter very much, because everyone they know lives on quite a short one. What matters is the diameter of the main ball in the middle.

What mass air travel did was to shrink that central ball enormously, from two months by sea to a single day by air. What used to be a much larger but less spiky porcupine of travel time became a much smaller but more spikey one.

With the current global network of air travel constantly readapting itself to the world's urban population distribution, travel time is scarcely a significant constraint for most of the Western world. This applies for leisure as well as business travel, and has driven the trend to so-called short break holidays, where wealthy individuals can fly to the far side of the world for a weekend. Even for the less wealthy, the cost of accommodation and activities at a holiday destination is commonly more than the cost of the airfare to get there.

At the moment, therefore, it is not the slowly-changing porcupine of travel time that determines travel patterns, but the rapidly-changing porcupine of travel costs. When the costs of air travel increase, the whole porcupine gets bigger. A more accurate analogy might be the porcupine fish, which can indeed puff itself up so that its body enlarges while its spines stay the same length.

**IN FACT, OVER** recent years the porcupine has indeed begun to inflate, mainly because of fuel costs, but also through the privatisation of airports and greatly increased airport taxes. This inflation is most obvious in the costs of business class travel, where demand is relatively inelastic, and prices climb with costs.

In economy class, cost increases have been hidden through two approaches. The low-cost carriers keep prices stable by giving the customer less and less for their money, and charging them separately for more and more components which used to be bundled into air-travel services. The flag carriers do it by cross-subsidising economy from business,

so as to fill ever-larger planes and maintain economies of scale. This is also the reason for code-sharing, where customers with different paper, i.e. tickets from different airlines, all travel on the same metal, i.e. the same physical aircraft. And it is the reason behind the dozens of different fare structures, which allow airlines to sell seats on a single plane, to customers with very different trade-offs between price, travel date, and flexibility.

All this sophistication, however, can only go so far in holding down prices. No matter how cunningly they compete and collude, in aggregate the world's airlines have an increasing investment in aircraft which they have to pay off. That means keeping the aircraft in the air, with bums on seats. Technological improvements in engine efficiency, fuselage design, and take-off and landing schedules continue to cut costs, but only a little. Increasing global population and wealth are keeping air travel volumes up, and prices down. Some national airlines are largely government owned, and are subsidised to keep flying. But airlines are on tight margins, and bankruptcies are not uncommon.

**ALL OF THESE** adjustments to date have been gradual, and global economic systems have stretched and bent to absorb the changes without any major ruptures. But what would happen if the costs of air travel increased either much more, or much faster? That is, if the porcupine puffed itself up to several times its current diameter?

To answer this we need two different approaches. The first one assumes that nothing changes except airfare prices. The travel-time porcupine stays unchanged, but the travel-cost porcupine swells up. As long as the changes in individuals' travel budgets stay relatively small, so that people can substitute travel against other items which they treat in a similar way, then standard microeconomic models can provide reasonable predictions. If travel gets a bit more expensive, people buy a bit less travel.

There have been several such studies, considering price increases of up to 100 per cent over current rates, but with conflicting results. A study in 2001 indicated that doubling airfares would reduce travel drastically, but a more sophisticated analysis in 2007 suggested that the reduction would be less than 1 per cent.<sup>1</sup> In fact, airfares have indeed fluctuated by about this amount over the past decades, and people are still travelling.

When something gets so expensive that people make large-scale lifestyle changes in what they do and buy, economic analysis gives way to broader social science approaches, which essentially just ask people what they think they would do. Research by the sustainable tourism group at Griffith University found that if airfares were to double suddenly, people are about equally divided between three different options. One third would not change their travel patterns; one third would travel less; and one third would redesign their holidays so as to use less air travel.

Intriguingly, although we asked them only about price increases, many people assumed we were concerned about climate change and carbon taxes, and they gave us a wide variety of reasons or excuses why they would continue to travel. For example, some said they had earned it, some said it was a family obligation, and some said they were doing it either for their partner or their children.

Air travel probably will get more and more expensive. The main reason is simply the price of oil used to make jet fuel. Given that oil is a globally traded commodity, largely in private hands, with increasing demand and decreasing supply, it does seem likely that oil prices may skyrocket. This, of course, is the pattern referred to as peak oil. This is the largest and least avoidable factor in the costs of air travel.

A second major factor relates to carbon trading or tax systems. This is much more complicated. Tradeable pollution rights are by no means new. In fact, they have quite a long history. In theory, they should be economically efficient. In practice, they fail because of strategic game-playing. Industries and individual corporations pressure government agencies to allocate initial rights free of charge, a process known as grandfathering. This creates an initial distortion so enormous that it is essentially fatal to the evolution of any free market subsequently.

Imagine if, instead of having to buy all the fuel to run your car, you were given an indefinite free supply equivalent to what you currently use each year, whether you drove a hybrid or a monster truck, and you only had to pay if you wanted extra fuel above your current consumption. Sounds ridiculous? Not really a good way to reduce total fuel consumption? But that is exactly what grandfathering carbon credits, or any other pollution rights, effectively does.

**THE POLITICAL CONTEXT** for carbon taxes is no less muddly. These taxes are supposedly set at rates which correspond to the costs of offsetting carbon dioxide emissions, but this is a political fiction. The prices used for current offset programmes are based on extremely dubious assumptions, related to marginal substitutions in land uses and energy generation technologies. If carbon tax rates reflected full environmental damage and restoration

costs, they would be very many orders of magnitude larger.

A recent press release by the World Travel and Tourism Council, the peak international lobby group for the commercial tourism industry, suggested that the entire world's air travel emissions could be offset for less than three billion euro a year. But we do not currently have technology capable of removing that much carbon dioxide from the atmosphere, at any price. So this is a fiction derived from extrapolating the current costs of carbon credits, which are set by politically generated shadow markets rather than technical costs of remediation.

The whole industrialised modern human economy, however, is based on consuming natural resources without paying damage or remediation costs. This situation has evolved gradually since the earliest days of humankind. As a result, it is politically impossible to impose large new environmental taxes, except very gradually. As with many environmental taxes, charges and levies, therefore,<sup>2</sup> carbon taxes raise revenue for governments, but do little to change industry or individual behaviour, including travel patterns.

The 2007 microeconomic analysis cited above, carried out by Richard Tol from the Free University of Amsterdam, found that a carbon tax at \$1,000 per ton of carbon dioxide would have negligible effect on travel patterns and associated carbon dioxide emissions. Carbon taxes actually imposed to date, e.g. by Australia, are 30 times smaller than this.

As instruments of policy rather than means to raise revenue, taxes are potentially powerful, since they send strong price signals; but always blunt, since to a purchaser all price signals look the same. From an economic perspective, a carbon tax is effectively identical to a tax on fuel, differentiated slightly by fuel type. At a national scale, most governments apply large taxes to individual domestic fuel consumption, especially for transport; even if they simultaneously subsidise fuel for farmers, or electricity for urban residents.

Because of the history of international trade and aviation agreements, however, jet fuel is not taxed. This point is well made in the 2009 book *Carbon Management*, by Stefan Gössling of the University of Lund in Norway. If jet fuel were subject to tax at the same rate as petrol and diesel for cars, this would completely dwarf any carbon taxes currently in effect.

And in fact, it seems likely that carbon taxes are really just backdoor fuel taxes, politically more palatable to the electorates of the countries concerned, and evading international agreements on tariffs.

This would not be a new strategy. A decade or so ago, for example, European nations belonging to the World Trade Organisation agreed to make large cuts in their agricultural subsidy programmes. But farmers relied on these subsidies, and the governments relied on the farmers' votes. So, European governments simply converted agricultural subsidies to environmental stewardship payments, earning votes from greenies as well as farmers. By the time anyone worked out what was happening, they had already been re-elected several times. Much the same seems to have happened in Australia, with billions of dollars paid to farmers in the name of the environment under the former National Heritage Trust, but little if any gains for conservation.

So, the bottom line on oil prices, fuel taxes and carbon taxes is that we cannot really predict how people will change their travel patterns, because we have a tangled mixture of economics and politics, with price signals which are complex and perverse.

**IF AIR TRAVEL** continues to get more and more expensive simply because we have run out of cheap oil, however, eventually we shall see a much more fundamental behavioural change, where people can no longer afford to travel by air and instead have to travel over land, by boat, or not at all. When this happens, it will take much longer to travel large distances. That is, the porcupine of travel time, rather than of travel cost, will swell up enormously – in fact, by a factor of 20 to 50 times.

This will certainly change our leisure patterns. But it won't be the end of the world, or of the tourism industry, or of people's holiday opportunities. It will just need some adjustments. Holiday travel, in particular, would switch from spur-of-the-moment short breaks, to a large-scale change in lifestyle. If it took 12 weeks at sea or over land to travel to Europe and back, one would want to stop off along the way, and spend the rest of the year there on arrival. Many people with time on their hands, such as backpackers and retirees, already plan their travel this way. For most people in steady employment, an international holiday might become something to do on one's long service leave, rather than annually.

Time on a ship need not be wasted. I was lucky enough, at the age of nine, to travel from England to New Zealand on a cargo boat with my mother and sisters, and then back again a year later. Thinking back to that experience, it

seems to me now that with improved telecommunications, there are many professional jobs which could be done just fine from a cabin mid-ocean. We'd get used to it.

At present, aircraft also carry a lot of cargo. If the travel-cost porcupine keeps inflating, then air freight, and just-in-time manufacturing and inventory management, will also suffer some fairly major changes. Most goods, however, even perishables, travel by truck and ship anyway. And for bulk commodities, what is needed is a steady flow from point of production to point of consumption. The speed of transport between those two points actually doesn't matter.

This, of course, was the principle behind the old systems of canals in the UK and Europe. It didn't matter how slowly the coal barges travelled, as long as coal was continually loaded on at one end and loaded off at the other. In the words of a traditional song: 'The engine was a one horsepower, propelled by a blackthorn stick. With the wind astern, and a feed of corn, the horse went a terrible lick.' OK, so I'm not suggesting that we will return to canals and horses, nor that travellers can be treated as commodities, no matter how hard low-cost air carriers may try.

What I'm saying is this. Global maps of travel time and travel costs are porcupines, not globes. Air travel costs will ultimately increase because of oil shortages. As a result, the travel-cost porcupine will inflate slowly, but without any major change in social structures. After a certain threshold, there will be a phase change in travel mode, and the travel-time porcupine will puff up suddenly and enormously. When that happens, social structures will indeed change. Get ready for it.

**1** Buckley, R.C. 1991. Green taxes: legal and policy issues in the use of economic instruments for environmental management. *Revenue Law J.* 2: 27-67.

**2** Buckley, R.C. 2011. Tourism under climate change: will slow travel supersede short breaks? *Ambio* 40(3): 328-331.