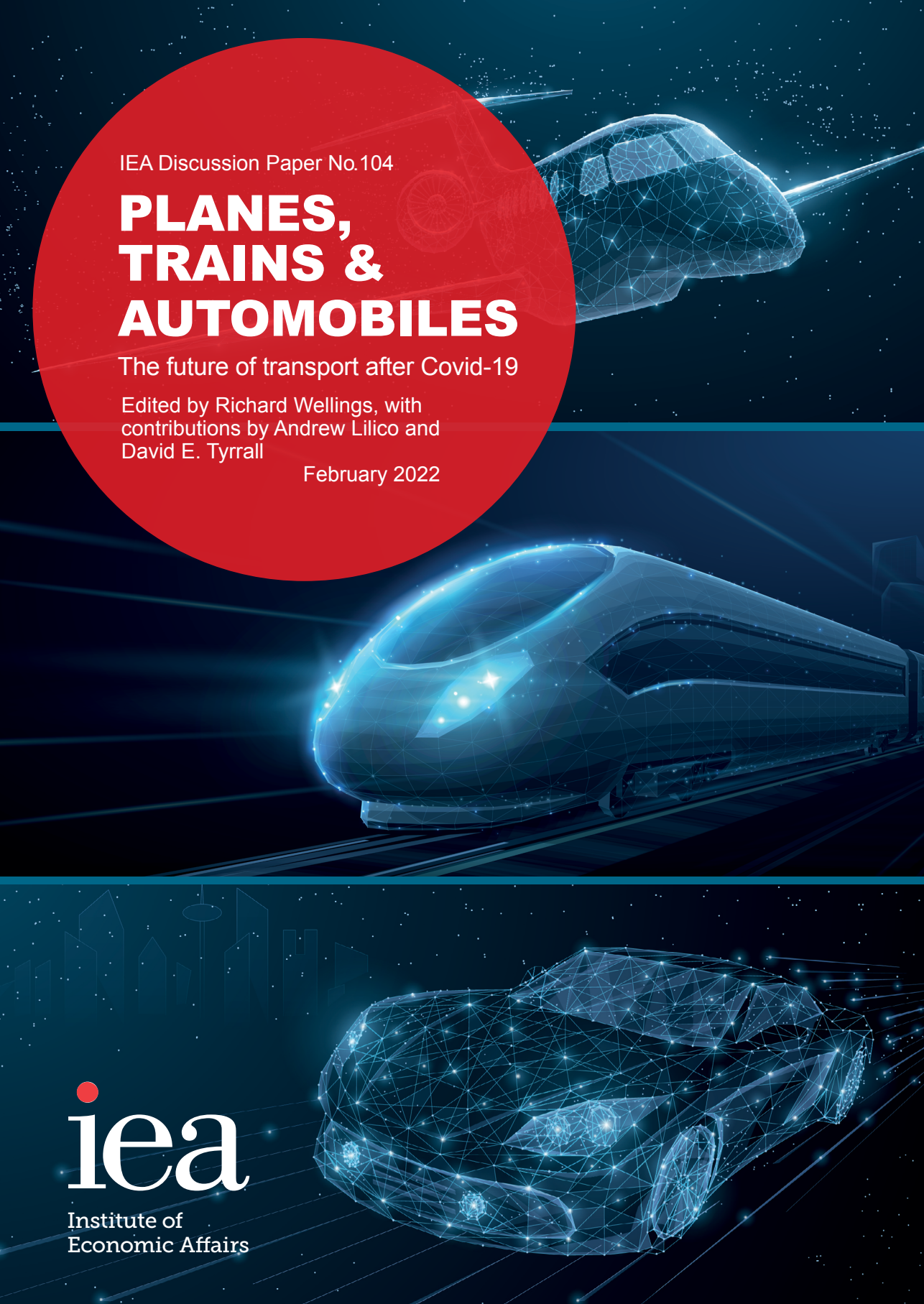

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The future of transport after Covid-19

Edited by Richard Wellings, with contributions by Andrew Lilico and David E. Tyrrall

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Summary

- Transport played a central role during the pandemic, with aviation facilitating the rapid global spread of Covid-19. The sector was targeted by governments that imposed draconian restrictions on mobility in an attempt to reduce transmission, but at the same time supported the aviation and rail industries with large bailouts.
- The pandemic and associated lockdown policies led to a steep change in the uptake of alternatives to travel. Improvements in technology have made it easier to work from home, shop online and hold virtual meetings. These developments have the potential to deliver significant cost savings and productivity gains by reducing transport costs and the need for retail and office spaces.
- The impact on transport markets could be dramatic. A significant fall in demand or even a decline in rates of growth mean expected revenues will not materialise. The economic case for many infrastructure projects is likely to be severely weakened.
- The shift to alternatives to travel is likely to vary significantly by sector, which will affect the impact on different transport modes. Working from home is only feasible for certain jobs, and virtual meetings are only possible for certain businesses.
- The rail sector is particularly vulnerable to upheaval. Many rail users – concentrated in high-income groups and white-collar jobs – have been able to shift to working from home and virtual meetings relatively easily. The sector is also heavily dependent on taxpayer support at a time when there are severe constraints on government spending.

- The level of rail subsidies is clearly out of any reasonable alignment with ridership and passenger income. Costs could be contained by reducing fragmentation in the industry and re-privatising the sector with a more efficient structure.
- Car travel may be an unexpected beneficiary of the Covid-19 crisis, especially in some regions of the country. Disease-driven restrictions on other modes of transport make car travel seem relatively more convenient, while increased working from home may speed up journeys by reducing peak-time congestion. Improvements in communications infrastructure, spurred in part by the pandemic, could facilitate more rapid adoption of autonomous vehicles.
- In contrast, Covid-19 is likely to have a negative long-term impact on aviation. The threat of future pandemics could encourage policymakers to adopt a more hostile stance towards air travel and long-distance connectivity more generally.

Introduction

Richard Wellings

Transport has interacted with the pandemic along several dimensions, raising profound questions about future policy. The sector is thought to have played a key role in the rapid spread of Covid-19, both by moving carriers across continents and enabling rapid spread through crowded public transport. Voluntary precautions in combination with state restrictions led to a sharp decline in passenger traffic on many modes, creating a financial crisis for an array of commercial and public-sector operators. There has also been a big shift to working from home, virtual meetings and online shopping. If these changes persist after the pandemic, then transport policy will face a period of major upheaval – its effects potentially amplified by severe constraints on government spending.

This collection of papers analyses the implications of Covid-19 for the transport sector, both in the short and long term. The contributions focus on aviation, rail and motoring in turn. Inevitably, any conclusions must be tentative. It is still not clear how the pandemic will evolve. Such uncertainty is, in itself, problematic when major transport projects can take decades to plan, approve and complete.

Before moving on to the discussion of specific modes, the remainder of this introduction will examine the impact of the pandemic on transport policy as a whole, focusing on the sector's relationship to 'public health', the environmental agenda, adoption of new practices and technology, and the role of the state more generally.

Transport and pandemics

The near-ubiquity of long-distance travel, particularly aviation, meant the virus could reach different continents very quickly, giving institutions little time to prepare (Davies 2020). The extension of transport infrastructure across the world and the associated economic interdependence have also made it more difficult and costly for individuals and communities to isolate to curb disease spread.

Global transport hubs such as New York City and London became infection hotspots during the first wave (Chechulin et al. 2020). Their size and high population density facilitated by mass transportation infrastructure made them particularly vulnerable. Moreover, some transport modes are thought to have been high-risk environments for disease transmission between individuals due to the large number of passengers packed into small, poorly ventilated spaces on planes, trains and buses (SAGE 2020).

The transport structures that facilitated contagion are very much creatures of the state, built on vast subsidies and compulsory purchase of land by governments, so this is not a clear-cut example of a market failure. The development of long-distance transport and associated economic integration was not the spontaneous result of voluntary exchange (Carson 2010). At the same time, governments have also imposed constraints on the transport sector, such as high taxes on particular modes, regulations that increase costs, and planning controls that prevent the development of new infrastructure. While current patterns reflect a high degree of central planning and intervention by the state, we cannot know for sure how the transport sector would have developed in a free economy.

In any case, the prospect of future pandemics that could be far worse than Covid-19 provides an additional argument against state subsidies and favours, particularly for aviation, and may also encourage policymakers to impose additional taxation and regulation on the modes that pose the highest risks. Increased awareness of these negative externalities is likely to change perceptions about policy trade-offs, even if quantifying the risks and costs is problematic. Davies (2020) outlines various reasons why current practices, including the growth in long-distance travel and transport, have increased fragility. A future virus could bring about severe hardship and perhaps catastrophic famines by breaking extended supply lines; for example, if the mortality rate among working age people was far higher than in Covid-19.

Long-distance infrastructure projects were poor value for money even before their potential role in spreading pandemics was considered, with low benefit–cost ratios according to standard economic analyses (e.g., Ansar et al. 2016). The implication is that the pandemic may lead to pushback against state-subsidised economic integration and the transport policies that facilitate it.

Government subsidies and compulsory purchase of land for airport expansion, as well as funding for connecting infrastructure such as rail and road spurs, may be less likely. State funding of airlines and the aircraft industry may be cut back. Seaports may face similar constraints on expansion, though on the grounds that artificially extended supply lines increase fragility rather than due to fears about the rapid spread of disease.

A withdrawal from policies that favour global connectivity and economic integration could also have a profound impact on 'command centres' such as London and New York. Their 'global city' status partly depends on their status as major air travel hubs (Renn 2012). Large cities are also particularly reliant on state-funded public transport, which presents a further problem in terms of their vulnerability to pandemics.

The green agenda

In recent decades, governments have imposed urban planning policies that encourage high-density 'compact cities', with apartments favoured over houses and public transport over cars (see, for example, European Commission 2007). The pandemic has exemplified the negative aspects of this agenda, with dispersed settlement patterns arguably offering safer and more tolerable living environments during the crisis.

While a subdued aviation sector would be in tune with environmentalist policies and climate change targets, the impact of the crisis on bus, train and subway networks – and thus urban planning policies – runs against it. The pandemic has undermined the finances of public transport operators, many of which have been bailed out through additional subsidies from the central government (Butcher et al. 2020). However, government finances that have been weakened by the financial crisis are likely to be heavily constrained in the medium term, suggesting that big increases in subsidies are unlikely to be sustainable.

The authorities have so far attempted to soldier on with the environmentalist agenda regardless. In the UK, the central government has funded council schemes to reduce road capacity for cars, vans and lorries to encourage walking and cycling and discourage motoring (DfT 2020). However, the durability of such policies remains to be seen given financial constraints, the desire for rapid economic recovery, and longer-term concerns about infection control. As discussed in the final section, the advantages of car travel have in many ways been amplified by the pandemic, creating a dilemma for policymakers – although one perhaps partly addressed by the shift to electric vehicles, albeit at a huge cost to taxpayers and consumers.

Home-working and new technologies

Changes in travel habits are likely to be critical to the future of different transport modes. If a significant proportion of workers continue to work from home and businesses favour virtual meetings post-pandemic, then public transport operators may face a major long-term decline in fare revenues. This could also undermine the economic case for new infrastructure projects.

These shifts are likely to affect some modes more than others. Evidence from the US suggests that high-income workers are far more likely to be able to work from home compared to low-income workers (Table 1). The proportion also varies by economic sector (Table 2). As discussed in the section on rail, train travel could be hit particularly hard by changes in travel habits induced or sped up by the pandemic. Its fare revenues are heavily dependent on high-income passengers (Table 3) concentrated in the London commuter belt, where many work in sectors that have found it relatively easy to shift to working from home. Moreover, as the final section explains, developments such as driverless vehicles could also transform travel habits, affecting the economics of public transport in the process.

Table 1: Percentage of workers able to work from home by income percentile

Income percentile	Home-workers or potential home-workers
Bottom 25	9.2%
25–50	20.1%
50–75	37.3%
Top 25	61.5%

Source: US Labour Statistics (cited by Bergamini 2020)

Table 2: Share of workers who can telework by industry, 2017–2018

Financial activities	57.4%
Professional and business services	53.4%
Information	53.3%
Manufacturing	30.3%
Public administration	29.8%
Other services	27.7%
Education and health services	25.9%
Construction	17.2%
Wholesale and retail trade	16.5%
Transportation and utilities	14.0%
Agriculture, forestry, fisheries and hunting	11.1%
Leisure and hospitality	8.8%

Source: US Bureau of Labor Statistics. Job Flexibilities and Work Schedules (collated in Gould and Shierholz 2020).

Table 3: UK weekly household expenditure on transport by gross income decile group, financial year 2018–19 (£).

	1st decile	2nd decile	3rd decile	4th decile	5th decile	6th decile	7th decile	8th decile	9th decile	Highest 10%	All
Purchase of vehicles	6.40	6.50	10.80	16.00	21.40	26.50	33.60	33.40	31.30	54.10	24.00
Operation of personal transport	9.30	15.60	20.20	25.60	32.20	40.00	41.10	45.60	58.50	62.40	35.00
Rail and Tube fares	0.80	0.80	1.30	1.70	2.40	3.30	3.90	7.00	8.80	16.30	4.60
Bus and coach fares	1.00	1.30	1.50	1.60	1.30	1.20	2.30	1.60	2.50	2.10	1.60
Combined fares	..	..	..	..	..	..	..	[0.80]	[1.60]	2.40	0.70
Other travel and transport	3.40	5.20	8.20	6.80	8.70	10.90	16.10	18.80	22.60	40.60	14.10

Source: ONS (2019: Table A6). Figures in square brackets should be treated with caution as they are based on a small sample size.

Conclusion

The Covid-19 pandemic has been a period of upheaval for the transport sector. The disruption is likely to continue as the crisis brings about long-term changes in travel habits, severe constraints on government spending, and concerns about fragility to future outbreaks. This in turn could undermine top-down policy agendas including the subsidisation and promotion of public transport, high-density urban forms, and global connectivity.

Government spending on long-term infrastructure risks misallocating resources on a grand scale as conditions change. This arguably strengthens the case for market-based provisions. Private investors typically have stronger incentives to reject projects with high risks and low returns. Greater respect for private property rights might also constrain the development of schemes with poor value for money.

Covid-19 and aviation

Richard Wellings

Introduction

There were just 5,800 passenger flights to and from UK airports in April 2020, compared with 201,000 in April 2019 – an astounding 97 per cent reduction (House of Commons 2020). Aviation was a major cause of the rapid global spread of Covid-19 and is among the worst-affected sectors. It was a key focus of government measures to control the pandemic and a major recipient of state bailouts. It also suffered losses as many individuals voluntarily decided to travel less to reduce their risk of catching the virus.

This section examines the economic effects of the pandemic on aviation and discusses the implications of government policies targeting the sector. The analysis concludes that the current aviation policy defies economic logic and is riddled with contradictions, both at the UK level and globally. This is plausibly explained by the influence of special interests.

The role of aviation in spreading Covid-19

In the pre-modern era, new infectious diseases typically took many months to spread across the world (Davies 2020). Some regions were unaffected due to their geographical isolation and lack of contact with other populations.

This changed dramatically with the onset of Western imperialism, industrialisation and globalisation. Viruses brought in by European invaders killed tens of millions of Native Americans, who had previously been isolated from the main 'world island' and thus lacked immunity (Koch et al. 2019).[1]

1 Also known as Afro-Eurasia, the landmass comprising the continents of Africa, Asia and Europe.

New transport technologies were central to trade and the empire, starting with shipping and later with the railways and then aviation. They increased both the speed and scope of contagion. As Rodrigue and Luke (2020) explain:

> One important factor why the Spanish Flu spread so quickly and so extensively was through modern transportation, which at the beginning of the 20th century offered global coverage. The virus was spread around the world by infected crews and passengers of ships and trains and severe epidemics occurred in shipyards and railway personnel.

The expansion of aviation meant that Covid-19 spread to almost every country in the world in a matter of weeks. Consequently, individuals and governments had relatively little time to prepare. There is also some evidence that people may have caught Covid-19 on flights due to the large number of passengers packed into a small space.[2] Aviation affected the pattern of spread with global hubs such as London and New York being particularly badly affected in the first wave of the pandemic (Chechulin et al. 2020).

Government responses to the pandemic

Given aviation's central role in the spread of Covid-19, it is unsurprising that the sector has been a major target of governmental action to contain the disease. Restrictions on travellers from China – the initial focus of the outbreak – were announced in early February 2020.[3] Several governments chartered special flights to repatriate their citizens from China as normal travel options became increasingly unavailable.[4]

These initial containment measures were patchy and inconsistent, however, and did not prevent the virus from spreading to the rest of the world. Even when direct flights from China were banned, infections would leapfrog from country to country; for example, from China to Italy and from there to the rest of Europe and the US. In an attempt to address this phenomenon, flights were banned from more and more countries. For example, on 16

2 Studies on in-flight transmission include Choi et al. (2020), Khanh et al. (2020) and Sun et al. (2021).

3 'Travel bans plunge China into deepening isolation over coronavirus', *Guardian*, 1 February 2020 (https://www.theguardian.com/world/2020/feb/01/coronavirus-travel-bans-plunge-china-into-deepening-isolation).

4 'Coronavirus: UK tells all Britons to leave China "if they can"', *BBC News*, 4 February 2020 (https://www.bbc.co.uk/news/uk-51374056).

March 2020, the US government blocked travel from most of Europe.[5] On 17 March 2020, the EU announced a ban on most travellers from outside the bloc.[6]

March 2020 also saw the widespread imposition of draconian lockdowns as infection, hospitalisation and mortality rates exploded.[7] Among other measures, non-essential travel was widely banned, with fines imposed for non-compliance. The scale of border closures around the world meant that the UK government had to charter a large number of flights to repatriate the 300,000 Britons stranded abroad.[8]

The relatively small number of people still travelling by plane faced an array of new costs and inconveniences. Some governments insisted on compulsory testing before and after journeys. Others imposed quarantine requirements on arrivals from overseas, which sometimes involved confinement in a dedicated hotel for up to 14 days with the traveller paying the bill for board and lodging. Additionally, while masks were widely discouraged at the start of the pandemic – to prioritise supplies for health workers – their use gradually became mandatory on flights in the latter part of the first wave.[9]

Policy also became highly unpredictable with travel bans, testing and quarantine measures imposed and changed at short notice. Air travellers frequently had their flights cancelled, faced huge extra bills, or even ended up stranded. They often had to wait long periods for refunds or even lost large amounts of money as travel firms went bust.[10] These new risks further eroded consumer confidence in flying.

5 'Coronavirus: Trump suspends travel from Europe to US', *BBC News*, 12 March 2020 (https://www.bbc.co.uk/news/world-us-canada-51846923).
6 'Coronavirus: Europe plans full border closure in virus battle', *BBC News*, 17 March 2020 (https://www.bbc.co.uk/news/world-europe-51918596).
7 For example: 'Timeline of UK coronavirus lockdowns, March 2020 to March 2021', Institute for Government (https://www.bbc.co.uk/news/world-europe-51918596).
8 'Dominic Raab announces £75m deal with British airlines to repatriate tens of thousands of travellers stranded abroad', *The Telegraph*, 30 March 2020 (https://www.telegraph.co.uk/politics/2020/03/30/dominic-raab-announces-75m-deal-british-airlines-repatriate/).
9 'The new rules of flying, from face masks to booze bans', *The Telegraph*, 19 June 2020 (https://www.telegraph.co.uk/travel/news/new-rules-of-flying-coronavirus/).
10 'Airline passengers "wait for refunds despite agents being repaid"', *The Guardian*, 5 October 2020 (https://www.theguardian.com/money/2020/oct/05/airline-refunds-agents-flights-easyjet-ryanair-opodo).

In Europe and North America, travel restrictions were loosened significantly in summer 2020 as infection rates plummeted at the end of the first wave. These steps were soon reversed, however, as the first signs of a second wave began to emerge. For example, as early as 25 July, the UK advised against all but essential travel to Spain and re-imposed a 14-day self-isolation rule for those returning from the country.[11]

The second wave of the pandemic in autumn and winter 2020 saw a return of many measures imposed during the first wave in spring, including lockdowns and bans on non-essential travel. The UK was relatively badly affected as it was the presumed source of the 'Kent' variant, with many governments implementing special restrictions on travellers from the UK in an attempt to keep the strain out.[12]

As the pandemic continued into 2021, additional measures were rolled out. Testing requirements before and after flights became commonplace, typically adding hundreds of pounds to the cost of a trip.[13] 'Vaccine passports' also became mandatory with the aim of filtering out those who do not require testing and/or quarantining (despite evidence that the vaccines do not prevent transmission). A high degree of policy uncertainty remained as the UK's 'green list' of safe countries was subject to changes at short notice, disrupting travellers' plans.[14]

At the time of writing, the aviation sector is far from returning to normality. Indeed, a host of new restrictions were introduced in response to the spread of the Indian or Delta variant and, more recently, the Omicron variant.[15] Since summer 2021, the UK has been experiencing a third wave of infections.

11 'Coronavirus: UK brings back 14-day quarantine for Spain', BBC News, 25 July (https://www.bbc.co.uk/news/uk-53540691).

12 'Covid: Nations impose UK travel bans over new variant', BBC News, 20 December 2020 (https://www.bbc.co.uk/news/world-europe-55385768).

13 'Covid tests could add extra £500 to price of holiday', *The Times*, 9 July 2021 (https://www.thetimes.co.uk/article/covid-tests-could-add-extra-500-to-price-of-holiday-9sskcds7d).

14 'Covid travel rules: Portugal removed from UK green list as seven others join red list', *BBC News*, 3 June 2020 (https://www.bbc.co.uk/news/uk-57346888).

15 'Delta variant prompts new travel restrictions across Europe', *Euronews*, 29 June 2020 (https://www.euronews.com/travel/2021/06/28/portugal-germany-tighten-travel-restrictions-to-curb-delta-variant-spread).

Bankruptcies and bailouts

The combination of government restrictions and voluntary changes in travel behaviour had a severe impact on airports and airlines; their revenues collapsed. Given the sector's high fixed costs, firms that were already struggling such as Flybe went out of business.[16] Others announced a large number of redundancies in order to cut costs, along with downgrades to the remaining employees' terms and conditions.[17]

There were also serious knock-on effects in the supply chain, including on manufacturers of planes and their components, with several orders cancelled or delayed. For example, jet-engine manufacturer Rolls-Royce reported a record £5.4 billion loss for the first half of 2020. It also began a major restructuring programme including plans to cut 15 per cent of its workforce and close several production facilities.[18]

Governments around the world attempted to help the industry with bailouts, often through direct, individual support for companies but also indirectly through state-backed loans, tax deferrals and subsidies offered to all sectors, such as furloughing schemes.

Firms such as British Airways, EasyJet, Gatwick Airport, Jet2, Ryanair and Wizz Air received hundreds of millions of pounds each from the Bank of England's Covid Corporate Financing Facility. This was 'designed to support liquidity among larger firms, helping them bridge coronavirus disruption to their cash flows through the purchase of short-term debt in the form of commercial paper'.[19] In addition, Rolls-Royce was propped up by a £2 billion loan backed by the UK government,[20] while at the end of

16 'Flybe: airline collapses two months after government announces rescue', *The Guardian*, 5 March 2020 (https://www.theguardian.com/business/2020/mar/05/flybe-collapses-two-months-after-government-announces-rescue).

17 For example: 'British Airways' behaviour puts "that of a Victorian mill owner to shame", says union', *Independent*, 20 August 2020 (https://www.independent.co.uk/travel/news-and-advice/british-airways-ba-unite-union-industrial-action-redundancies-pilots-cabin-crew-a9679336.html).

18 'Rolls-Royce reports record £5.4bn loss as Covid-19 hits aviation', *The Guardian*, 27 August 2020 (https://www.theguardian.com/business/2020/aug/27/rolls-royce-reports-record-loss-as-covid-19-hits-aviation).

19 'Covid Corporate Financing Facility', Bank of England (https://www.bankofengland.co.uk/markets/covid-corporate-financing-facility).

20 'Coronavirus: Rolls-Royce to raise billions in Covid-lifeline', *BBC News*, 1 October 2020 (https://www.bbc.co.uk/news/business-54367717).

2020, British Airways accepted another bailout in the form of a £2 billion state-backed loan.[21]

The European Commission relaxed its state-aid rules in March 2020, allowing large-scale government bailouts across the bloc.[22] For example, Air France received €8 billion, while Lufthansa got €6.8 billion. By April 2021, bailouts to European airlines totalled approximately €42 billion.[23]

Policy implications

The devastating impact of the first wave on the aviation sector and dependent industries such as tourism and aircraft production resulted in strong political pressure on governments to relax controls in summer 2020. However, this liberalisation contributed to the emergence of the second wave of the pandemic in the UK and other European countries in autumn 2020 (Hodcroft et al. 2020), in response to which governments issued draconian lockdowns and other measures.

Similarly, the relaxation of restrictions in spring 2021 as the second wave waned may have enabled the rapid spread of the Delta variant from India, which was initially the dominant strain during the UK's third wave of Covid-19.

Policymakers, therefore, faced a dilemma. If they reduced restrictions, then they risked nurturing new outbreaks of the disease, which in turn would create political pressure to levy further travel bans and lockdowns. Adding to the difficulties, new variants have the potential to reduce the effectiveness of governments' vaccination programmes.

There is also a contradiction at the heart of government policies. Vast amounts of taxpayers' money have been spent bailing out aviation when this sector was central to the spread of the virus. Effectively, governments have been subsidising the pandemic.

21 'British Airways secures state backing for £2bn loan', *Financial Times*, 31 December 2020 (https://www.ft.com/content/6a0d4cf0-f134-4f17-bc6b-88ef69ab6e00).

22 'State aid in the time of the coronavirus pandemic', European Commission (https://ec.europa.eu/competition-policy/consumers/state-aid-time-coronavirus-pandemic_en).

23 Including the EU, UK, Norway and Switzerland. See 'Bailout tracker', European Federation for Transport and Environment (https://www.transportenvironment.org/what-we-do/flying-and-climate-change/bailout-tracker).

Moreover, the vast bailouts have moved the sector further away from a level playing field and exacerbated the problem of unfair competition from state-backed 'national champions'. There is also a significant risk that taxpayers will be forced to pay the huge cost of debt write-offs given the difficulties still facing the industry.

In the absence of state intervention, it is plausible that vast swathes of the aviation sector – airlines, airports and suppliers – would have gone bust in the aftermath of the first wave. A significant proportion of consumers, including many high-value business travellers, stopped flying voluntarily due to the fear of catching and spreading the disease, leading to a major fall in revenue. In addition, the sector's long-term prospects have worsened with the adoption of virtual meetings and other alternatives to flying. The banks would have been in deep trouble themselves and hardly in a position to offer emergency loans.

Notwithstanding the negative impact on employees, shareholders, suppliers and so on, a 'natural' collapse of the aviation sector might have helped to contain the pandemic, which in turn may have benefitted other areas of the economy. In the longer term, there could have been gains for the sector as a whole as inefficient national champions failed, with resources reallocated to leaner and more efficient operators, including new entrants when the pandemic eventually subsides.

As mentioned in the introduction, the pandemic has raised serious concerns regarding government policies that support aviation despite its generation of substantial negative externalities, including facilitating the rapid spread of infectious diseases that, in the future, could be far more dangerous than Covid-19.

It should be noted that state support goes far beyond the recent bailouts. For example, major airports are typically constructed on land confiscated by governments, as in the case of Heathrow (Sherwood 2009). These airports are served by heavily subsidised public transport infrastructure, also built on compulsorily purchased land. Many major airlines are or were state-owned and owe their current size to vast subsidies or special privileges. The civilian aircraft industry piggybacked on vast government defence contracts such as the Cold War heavy bomber programme (Carson 2020).

Other government policies have, of course, hindered the growth of the aviation sector through taxation and regulation.[24] The industry would certainly be very different without high levels of state intervention, but it is far from clear how it would have evolved in an unhampered market economy. It should also be noted that there are positive externalities from aviation such as the 'agglomeration economies' created by hub airports. Nevertheless, the pandemic may change perceptions regarding the trade-offs and lead to a policy environment that is more hostile to aviation.

Along similar lines, environmentalists have raised concerns about state support for the aviation sector at a time when governments are imposing ambitious emission reduction targets as part of their policies to address 'climate change'.[25] One hand of the government is pushing in the opposite direction of the other hand.

Public choice theory offers insights into these policy contradictions.[26] The aviation sector represents concentrated special interests with strong economic incentives to engage in lobbying for government favours. For example, the benefits of bailouts and other special privileges are concentrated while the costs are dispersed across millions of taxpayers. Accordingly, the incentives for dispersed groups such as taxpayers to engage in lobbying are very weak (Olson 1965). The pressure on politicians to bail out the industry – despite its critical role in the pandemic – was always likely to be far stronger than any pressure against it from taxpayers.

24 For an overview of the regulatory framework, see Starkie (2008).
25 For example: 'Airline bailouts will not fly', Greenpeace UK, 26 June 2020 (https://www.greenpeace.org.uk/news/airline-bailouts-petition-government/).
26 Also known as the 'economic theory of politics', this school of thought examines the incentives facing actors involved in the policymaking process (see Butler 2012).

The future of the Great British Railways after Covid-19

David E. Tyrrall

Introduction

The title of this discussion raises the question of whether there will be an 'after Covid-19'. The discussion and proposals in the recent white paper 'Great British Railways' (Willams and Shapps 2021) suggest that both we and the railways are in for the long haul, i.e., we may simply have to adapt to a world in which (new) coronaviruses come round. Hence, two 'stylised facts' weigh heavily in considering the future of the railways:

- A successful railway is of necessity a high-volume operation, irrespective of whether it is a freight, commuter, long-distance or high-speed operation.
- Railway assets have long life cycles. It takes a long time to design, develop and build new rolling stock and infrastructure, and once in place, the assets have very long operating lives, measured in decades.

This suggests including coronavirus-type risk and management when assessing all new projects whether in terms of organisation, infrastructure or rolling stock.

Coronavirus risk for public transport

In pre-coronavirus UK, passenger crowding was prevalent across many urban railways, having worsened over recent years. The remedy has been to introduce new trains that accommodate more standing passengers (DfT 2019b), effectively encouraging increased crowding. Recent Department for Transport (DfT) planning sought to continue that trend (DfT 2016; 2018).

It was already known that public transport presented an exposure risk to coronavirus (Goscé and Johansson 2018) and this was confirmed by an early Chinese paper (Qiu et al. 2020) documenting a familial cluster of Covid-19 infection, in which the initial patient probably acquired the infection on a railway journey near Wuhan in China on 28 January 2020.

Unsurprisingly, UK rail passenger volumes slumped dramatically following the spring 2020 coronavirus lockdown. Rail journeys in Great Britain in 2020–21 Q1 fell to 35 million (8.1 per cent of the 439 million in 2019–20 Q1), which is the lowest level of passenger usage since the mid-nineteenth century (ORR 2020a; Figure 1). The figures in Table 1 are extracted from the Department for Transport statistics on the use of transport modes in Great Britain from 1 March to 9 November 2020. The figures are percentages of an equivalent day in pre-coronavirus UK.

Table 1: Use of transport modes in Great Britain, March–November 2020

Date	Cars	National Rail	London Tube	Bus (excl. London)	Cycling
09/03	101%	100%	90%	102%	105%
16/03	96%	78%	60%	88%	104%
LD 23/03	64%	25%	15%	27%	85%
30/03	33%	6%	5%	12%	72%
06/04	34%	5%	5%	11%	105%
13/04	23%	4%	5%	12%	122%
20/04	38%	6%	5%	12%	139%
27/04	40%	4%	5%	12%	159%
04/05	42%	5%	6%	12%	155%
LD 11/05	45%	5%	6%	12%	100%
18/05	53%	6%	7%	14%	164%
25/05	50%	7%	9%	19%	282%
01/06	65%	8%	10%	17%	182%
08/06	63%	13%	11%	18%	164%
15/06	70%	12%	14%	21%	168%
22/06	72%	15%	16%	23%	178%
29/06	72%	16%	16%	24%	93%

06/07	79%	19%	19%	29%	138%
13/07	80%	23%	21%	31%	110%
20/07	85%	27%	23%	33%	143%
27/07	80%	29%	24%	31%	66%
03/08	88%	32%	27%	37%	124%
10/08	90%	35%	28%	39%	122%
17/08	88%	33%	30%	41%	102%
24/08	92%	40%	32%	45%	114%
31/08	86%	32%	45%	54%	131%
07/09	90%	43%	34%	54%	99%
14/09	93%	40%	35%	58%	122%
21/09	92%	39%	35%	59%	125%
28/09	89%	35%	34%	57%	113%
05/10	86%	34%	33%	59%	95%
12/10	85%	36%	33%	56%	79%
19/10	85%	34%	32%	56%	92%
26/10	83%	32%	33%	45%	74%
02/11	87%	33%	37%	59%	70%
LD 09/11	70%	26%	24%	48%	76%
Overall Average	72%	27%	25%	36%	143%
Weekday Average	72%	28%	25%	35%	121%
Weekend Average	73%	26%	25%	33%	177%
Maximum	105%	100%	104%	102%	384%
Minimum	22%	4%	4%	10%	44%

Source: 'Transport use during the coronavirus (COVID-19) pandemic' (https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic). The days selected from the full series are all Mondays (bank holidays are shaded grey), based simply on the fact that the first announcement of a possible lockdown was Monday 16 March, formal lockdown on Monday 23 March (LD), and the first main easing of restrictions on Monday 11 May (LD). The second full lockdown commenced on Thursday 5 November 2020. The averages shown at the bottom of this table have been calculated from the full table provided on the above website.

Car transport continued at more or less normal levels until a full lockdown was announced on 23 March, at which point it dropped suddenly and dramatically, but levels immediately began to rebuild. Just before the second lockdown started, car usage had settled close to 'old normal' levels. By contrast, train and bus usage levels were already dropping even before the first announcement on 16 March, and they dropped very rapidly to very low (5 per cent) levels after the formal lockdown on 23 March, with little to no increase during the lockdown period and only gradual growth after restrictions began to be eased in May.

Comparisons of average weekday and weekend and bank holiday usage of all four modes suggests that while car and bicycle usage remained constant or increased during leisure time, train and bus usage remained constant at best or even fell in leisure time. People were consciously choosing to avoid public transport.

The above analysis suggests that people made their own risk assessments of their likely exposure to coronavirus infection on different modes of transport and concluded that public transport is less safe than other modes. Subsequent research suggests that airborne particles may be the main source of transmission, especially in transport environments. The well-documented high cost of Covid-19 to the UK economy implies a very high return to any investment that reduces epidemic risk. Given the life span of railway assets, this clearly implies that the industry should immediately start to factor in epidemic risk management if the railways are to (be allowed or encouraged to) attract high volumes of travellers again.

Railway fare income

Pre-coronavirus, rail trips in England were split approximately 60 per cent commuting, 30 per cent leisure and 10 per cent business (DfT 2019b). The new white paper, 'Great British Railways' (Williams and Shapps 2021), concurs with a steady series of recent surveys that suggest that it seems unlikely that post-Covid-19 commuters will continue to travel for 9-to-5 working days, 5 days per week. People will prefer to work from home more; in fact, the Government Equalities Office is already consulting on legislative change to facilitate this shift.

The price elasticities of demand for rail travel in the UK have been estimated at −0.5 for commuter travel and −1.3 for leisure travel (Worsley 2012), i.e., as the price rises, the number of tickets sold falls. The shift to more

flexible working suggests not only a step change reduction in ridership but also a major shift in the price elasticities of demand for future rail trips. A high proportion of what were compulsory commuter trips with a low elasticity of demand are likely to become discretionary trips with a higher elasticity of demand.

HM Treasury has successfully pressed for above inflation fare increases (+2.6 per cent), but Great British Railways promises to introduce new flexible season tickets later this year. The intention behind the 2.6 per cent increase is that the rail passenger bears at least some of the cost of supporting the post-Covid railway, but this hope is likely to prove ill-founded. An elasticity of −0.5 would still allow the railway to generate more total revenue from a ticket price rise, but elasticities of −1 and higher lead to an absolute loss of revenue. At the same time, the DfT has already asked train operating companies (TOCs) to submit proposals for reduced service levels to contain costs, a strategy that also entails reduced ridership and revenues.

The scale of the total costs and government subsidy of the railways is now clearly out of any reasonable alignment with ridership and passenger income and it is likely to stay that way for a considerable time. The implicit message of Great British Railways is that the dominant strategy for the government with respect to the railways is bound to be cost containment.

Railway costs

In March 2020, all franchises were suspended and replaced by emergency service contracts (EMAs)[27] in which revenue risk and service specification were made the responsibility of the government while the TOCs provided the specified service for a fixed management fee (2 per cent). The government's 2020 Spending Review estimated that the additional cost to the government of supporting the railway industry in this way would amount to £8 billion for 2020–2021 and £2 billion for 2021–2022. Put differently, £11 billion of passenger fares disappeared with the disappearing passengers and had to be replaced with taxpayer support.

These EMAs were renewed in September 2020 as emergency recovery measures agreements (ERMAs) but at a reduced level of built-in profit, in that management fees will become a maximum of 1.5 per cent of the

27 'Taxpayer may prop up train firms until 2022', *The Times*, 6 July 2020.

cost base of the franchise before the pandemic began. These ERMAs contained provisions to bring current franchises to an end when the ERMAs expire to 'pave the way for wider rail industry reforms' (Shapps 2020).

Hence, the question of the optimal form of railway organisation for efficient cost containment arises yet again. It is partially addressed in Great British Railways, but in a rather fearful 'new normal' world of coronavirus.

Railway organisation and performance

The history of the railway industry around the world, including where rail was developed within the private sector, is dominated by vertically integrated operations in which the infrastructure (track) and operations (trains) are managed within the same organisation (Wolmar 2009). Historically, the market preferred form of railway organisation has been the vertically integrated form, so the UK policy for separation of track and trains into different organisations was a proposal for a novel experiment in railway management.

The argument for fragmentation came largely from an application of transaction cost economics to previous privatisations in the UK:

> (T)he time has come to replace command relationships within British Rail by contractual relationships between freestanding autonomous bodies. The relevant economics derive from Coase principally through Williamson' (Foster 1994: 5). These BR command relationships were characterised as 'complicated, inefficient, ineffective and bureaucratic (ibid: 7).

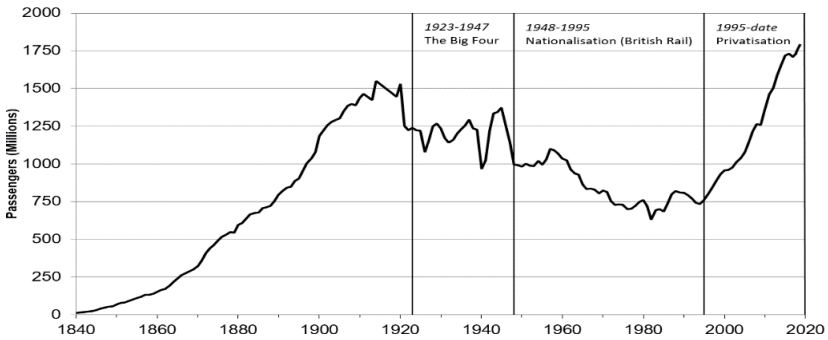
Since the privatisation of the UK railway in 1996, there have been several comparative studies on the effects of fragmentation upon transaction costs in railways, both publicly and privately owned, around the world. Most studies find a small increase in transaction costs upon disintegration (Andersson and Hultén 2016; Jensen and Stelling 2007; Merkert 2012; Merkert et al. 2012; Preston 2002) but suggest that gains from increased competition within the sector could offset the additional transaction costs. In addition, gains from competition must also outweigh losses of economies of scope from vertical integration (Growitsch and Wetzel 2009; Preston 1996) if the fragmentation is to succeed.

The overall cost effects of fragmentation seem to vary with how densely the system is operated (i.e., the size and complexity of the rail system,

frequency of service, etc.). While vertical separation reduces the cost of operations in low-density rail systems, it appears to increase operational costs in high-density systems (Mizutani et al. 2013; 2015; 2020; Nash et al. 2014). Competition can overcome the disadvantageous transaction cost effects of vertical disintegration when the system is not densely operated, but it cannot do so when the system is densely operated because the greater levels of coordination required in a complex system are better handled within organisations than between organisations (Andersson and Hultén 2016; Merkert and Nash 2013; Preston 1996).

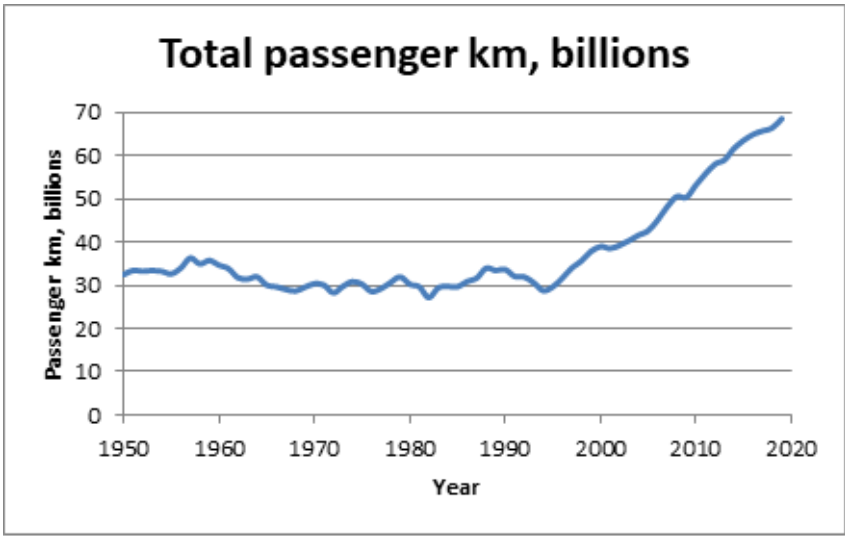
Pre-coronavirus, even before privatisation in 1996, the UK had one of the most densely operated railway systems in the world, so it is perhaps unsurprising that fragmentation had deleterious effects upon operating costs. In 2019, pre-coronavirus, the UK railway system cost approximately £20 billion per annum to run, of which just over half came from passenger fares (£11 billion) and most of the rest (£8 billion) from the government, with a further £1 billion from freight income (ORR 2020b). The volume of passengers (Figures 1–2), the total cost of the system, and the level of government subsidy approximately doubled in real terms since privatisation (DfT 2019b), but the rise in costs has somewhat outpaced the rise in ridership. Given that rail is a high-volume industry, one would naturally expect falling unit costs as volume rises rather than an increase. This suggests that the disintegration of the system may have led to the loss of economies of scale or scope or the incurrence of new costs.

Figure 1: Number of UK railway passenger journeys (millions)



Source: Office of Rail Regulation

Figure 2: Rail traffic in passenger kilometres, 1950–2019



Source: Office of Rail Regulation

The increased number of actors in the system has not led to a competitive reduction in costs. Indeed, the major participants have been able to ratchet up their remuneration and hence the cost base of the system. This is most obvious with respect to major infrastructure projects and the provision of rolling stock, but it is also noticeable in the increased employee costs of unionised, managerial and executive staff (Wellings 2014; McCartney and Stittle 2017).

The increased number of actors has, however, increased problems of coordination within the system. It was and is easy to observe continued calls from industry participants for greater levels of coordination and cooperation across the system (for example, ATOC 2011; DfT 2018). Pre-Covid, such calls were made within the context of the then-current railway structure, i.e., they were, in effect, calls for more intra-railway meetings, but it was and is not difficult to see that vertical integration might be more effective, efficient and economical in achieving the desired coordination.

Ridership at 35 per cent of the levels seen in the UK immediately pre-coronavirus is calamitous in terms of revenue and costs for the newly restructured industry. However, this ridership is not so different from the levels seen in the final years of British Rail, which British Rail was able to

service successfully on much lower and declining (rather than higher and rising) levels of subsidy.

The nettle of restructuring the railway industry is being somewhat cautiously grasped by the government. A new organisation, Great British Railways, will begin to reunite the management of track and train operations within one organisation. However, it appears that a rather larger number of organisational parts will remain than are optimal. The number of train operating companies (TOCs) even under the proposed cost-plus contracts could be dramatically reduced (i.e., fewer, larger cost-plus contracts) to facilitate improved coordination across the network, garner economies of scale, and negotiate better terms – for example, from rolling stock leasing companies. Steady reintegration of infrastructure management and operations can also be undertaken. Eventually, a fully re-integrated organisation can be achieved but on a lower cost base than pre-coronavirus, and effective re-privatisation would then become possible.

High-speed rail and the 'new normal'

The other railway debate affected by the coronavirus epidemic is what to do about High Speed 2 (HS2). The Oakervee Review (2020), published just a month before the coronavirus lockdown, concluded that the original rationale for HS2 still holds:

> There is a need for greater capacity and reliability on the GB rail network as a whole. The primary need is for capacity; speed although an important factor in economic benefits should not be in and of itself the primary driver of decision making.

In the 'new normal' of recurring pandemics, the capacity rationale is severely weakened. If a significant proportion of rail travellers largely work from home, making only occasional journeys for face-to-face meetings, then employees need no longer live particularly close to their offices or other meeting places. In other words, the 'new normal' person might value increased speed over increased capacity, both for work and leisure purposes.

Could one be bold and contemplate ultra-high-speed rail as a genuinely transformational development in the economy, with a target of one hour for the London to Glasgow journey, for example? Experiments are taking place with various hyperloop and magnetic levitation (maglev) technologies that offer the promise of speeds of up to 700 mph (Knowles 2020). Tackling

these problems would require intense cooperative effort by the public and private sectors to put the UK right at the forefront of railway technology. Such cooperation seems (to date) to have been notably successful in developing, producing and administering the UK vaccination programme. Other case studies, such as that of the tilting train (Advanced Passenger Train) fiasco in the event of failures and cost over-runs might point to a different outcome, but if successful, such a project could dramatically change the geography of travel in the UK.

The implications of Covid-19 for roads

Andrew Lilico

The Covid-19 pandemic has several implications for roads. Some are effects that have been triggered early that may have occurred eventually anyway. Others are potentially new.

Let us focus upon four key such effects: changes relating to

- the volume and timing of transport,
- geographic shifts,
- shifts in transport mode,
- technological shifts.

First, the volume and timing effects. Covid-19 has triggered an exceptionally large surge in the number of people working from home much of the time. Even when they do travel to their offices, many no longer do so at peak hours. Some of this effect may reverse if and when the pandemic ends, but to some extent, it is a (rapid) acceleration of a process that was already underway, facilitated by technology and by business organisation changes (for example, contracting out of certain services and increased use of consultants and temporary staff or zero-hour contractors for certain tasks).

Many transport systems are configured to allow only an acceptable level of congestion and delay at peak commuting use. Without people needing to travel to work, peak loads will be much lower, due to which existing transport systems may face a degree of redundancy. As seen in the

following, there may be geographic and transport mode curlicues to this overarching point, but at a high level, it remains valid.

The second point is geographical. The effects of the pandemic upon travel are not evenly spread across the country. That is partly because the shift to working from home is not evenly spread and partly because in some areas, the role of commuting in transport was a less significant part of total travel and a less important driver of transport infrastructure than elsewhere. Further, the shift to working from home has not been geographically even. Regions with more desk work that can be done at home will experience a greater impact than regions where a larger share of work is, say, construction or manufacturing.

Similarly, commuting to major metropolitan areas such as London was a particularly strong driver for certain transport systems, whereas in more rural areas (or even in the case of some motorways and major rail connections), the significance of facilitating peak commuting demand – relative to general connectivity – is less. That means that in some areas, the reduction in commuting leaves certain transport systems appearing to have much more over-capacity than in others.

Indeed, in some areas, at some times of day, travel may be higher as a result of the pandemic on a long-term basis. Think of a small town in one of the counties surrounding London from which people would have commuted in the past. Now, far more people work from home than before. That may mean that at, for example, lunchtime, there may be far more cars driving into that small town's shopping area (and attempting to park) so that those working from home can get their sandwiches, bacon rolls or pasties for lunch.

Another kind of effect with a geographical element is the possibility that foreign leisure travel becomes less common (for example, because travelling by planes becomes less pleasant or less rapid as mask-wearing or disease-related checks at airports slow down the process, or simply because low-cost airlines go bankrupt in a pandemic-related depression) and there is instead some substitution with domestic tourism or cross-border tourism by car. If a long weekend break takes the form of a few hours' drive instead of a few hours' flight, this could increase car use in certain regions that are attractive as locations for such tourism.

Our third point pertains to the shift in transport mode. In areas where commuting was a significant driver of peak demand and where commuting has fallen back materially, the relative advantages of car travel versus other transport modes is likely to have shifted – perhaps on a long-term basis. One reason people travelled by train or tube was that the roads were so busy that car travel was very slow. A second was that cars could be difficult to park. With far fewer people travelling in general and other transportations being equally challenging, travelling by car to work may become quicker than before and parking availability more guaranteed. This means that, at the margin, more people are likely to shift to using cars (because of their intrinsically greater convenience and flexibility). This effect may also (at least in some areas) favour road freight (for the simple reason that it will arrive more quickly if it is needed at times of day when there is now less congestion).

This effect could increase with greater disease awareness. Even after the current pandemic is over, those travelling may well see public transport as carrying an intrinsic risk of disease transmission – putting themselves and others in danger. A car offers people more control over whom they come into contact with and more control of their own environment. In due course, car manufacturers may even put in systems that play to this point – perhaps ways of putting something into car air conditioners that kill airborne diseases or pathogens lying on the car's internal surfaces.

A further related effect here could be that restrictions to curb disease spread in other modes of transport that would not apply to cars may make car travel seem relatively more convenient. Above, we referred to the intrinsic convenience of cars – for example, that they go to precisely the location to which one seeks to travel to and that they set off and arrive at a time of one's own choosing. Here, the point is that other modes of transport are made more inconvenient by disease-related restrictions such as mask-wearing, slower security checks because of disease protocols – for example, at airports; or other disease protocols such as antigen or antibody tests in order to have permission to travel.

One implication here is that people who might otherwise have preferred to travel by plane or train might instead shift to driving for commuting or tourism; they may be people who will be particularly early adopters of autonomous vehicle technologies. If I used to work on the train on the way to the office but now travel there by car, I might be particularly keen

on having the car drive me there so I can work. This might be particularly so of the minority of people who have switched to commuting by taxi.

Fourthly, the pandemic may well trigger more rapid uptake of various connectivity infrastructures that could ultimately have significant implications for cars. As more homes have higher-speed broadband demands, expansions in general network infrastructure may be required. Shops have shifted to contactless payments. Our smartphones are automatically interrogated by test-and-trace systems that may become more and more pervasive, allowing these systems to track precisely where we are at all times, so that if we come into contact with infected individuals, we can be rapidly isolated.

Such a general expansion in connectivity systems could lead to changes in cars. The most obvious way this could happen is that they may facilitate the shift to autonomous vehicles. This may not necessarily mean an earlier transition to autonomous vehicles (other factors sketched above may be more powerful drivers for the earlier emergence of such vehicles). However, it may mean that once autonomous vehicles start to operate, they achieve certain of their potential more rapidly.

Part of that could be the transport technologies themselves – perhaps more seamless navigation (through more exact local information meaning higher safe speeds on motorways or better ability to avoid congestion, for example) or perhaps the more rapid development of autonomous vehicle's ability to cross-communicate reliably, allowing interleaving at junctions without traffic lights.

Alternatively, it might mean that entertainment systems in autonomous vehicles will be of a higher standard because of higher bandwidth and more reliable connections, allowing passengers to, say, engage in various kinds of gaming; or perhaps, with greater connectivity, our autonomous vehicles will carry fuller versions of our AI 'butlers' (a kind of next-generation Alexa that is specific to each of us or our families).

There are many possibilities here, from the relatively mundane to the exotically speculative. The general message, however, is that car travel may be an unexpected beneficiary of the Covid-19 crisis, especially in some regions of the country.

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