The Economic Case for a Curfew at Brisbane Airport

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About Prof. John Quiggin

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He is a Fellow of the Econometric Society, a Fellow of the Academy of the Social Sciences in Australia, and a Distinguished Fellow of the Australian Agricultural and Resource Economics Society. He has also held visiting appointments at leading institutions including Harvard University, the University of Maryland, and the London School of Economics.

Professor Quiggin has authored more than 1,500 publications, including over 200 refereed journal articles and multiple books. His work spans decision theory, environmental and resource economics, production economics, climate change economics, and the economics of innovation and growth. He is widely cited in both academic and policy debates.

In addition to his academic research, Professor Quiggin is a leading commentator on Australian and international economic policy. He has written extensively on climate policy, privatisation and microeconomic reform, financial regulation, infrastructure economics, public ownership, employment policy, and water reform in the Murray–Darling Basin.

His recent books include:

- *Economics in Two Lessons: Why Markets Work So Well and Why They Can Fail So Badly* (Princeton University Press, 2019), which offers a concise framework for understanding both the strengths and limitations of markets; and,
- *After Neoliberalism* (ANU Press, 2024), which examines the evolution and future of economic policy in the post-neoliberal era.

He is also a regular contributor to public debate through columns, essays, and media commentary, including for *The Conversation*.

About BFPCA

With the launch of Brisbane Airport's New Parallel Runway on 12 July 2020 came a new airspace design and flight paths that concentrate aircraft noise over densely populated residential areas.

Brisbane Airport and Airservices Australia sold this project to Brisbane communities suggesting the New Parallel Runway will enable them to prioritise "over water" operations that direct planes away from residential areas. The CEO Gert-Jan de Graaff is on the record saying, "the net effect of aircraft flying over the city will decrease."

Brisbane families and communities are suffering from excessive noise pollution and associated health and related impacts from Brisbane Airport's new flight paths launched in July 2020. The Aircraft Noise Ombudsman report, the Brisbane Airport PIR Advisory Forum (BAPAF) and flight path design consultants TRAX International have all confirmed that Brisbane communities were misled using flawed noise modelling, deceiving community engagement, and offered inadequate noise abatements.

Brisbane Flight Path Community Alliance (BFPCA) came together in 2020 to fight back on behalf of all Brisbane families and communities experiencing this noise pollution.

For more information about BFPCA and our community advocacy work, visit: https://bfpca.org.au/

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Summary

This report presents an economic analysis of the case for a legislated night curfew on aircraft operations at Brisbane Airport. The assessment focuses on the external costs imposed by night-time aviation activity – most notably noise-related health impacts, diminished wellbeing, and reductions in residential property values – and compares these to the modest benefits derived from continued unrestricted operations during curfew hours.

The findings are unambiguous: the costs to the community from late-night and early-morning flights vastly exceed the economic value of the services they provide.

On conservative estimates, Brisbane residents are collectively losing up to **$100 million per year** in the form of sleep disruption, elevated health risks, reduced quality of life, and depressed land values. These burdens fall disproportionately on households under key flight paths – many of which are located in lower socio-economic areas and have limited means to adapt or relocate. As Brisbane Airport Corporation itself conceded in its 2007 Major Development Plan / Environmental Impact Statement (MDP/EIS):

> *"It is considered likely that those residents with a lower socio-economic status will be more susceptible to the effects of the NPR, such as aircraft noise. Lower socio-economic groups also have fewer resources (be they financial, educational, or social support networks) available to them with which to adapt to social impacts (for example, the ability to move home)."*
>
> (p. D9-365)

In contrast, the cost of implementing a curfew – defined here as the restriction of scheduled operations between 10pm and 6am – is likely in the order of **$5 – 10 million per year** in foregone airline and freight activity. This loss is small, concentrated, and manageable. It can be further reduced through reallocation of flights to lower-demand daytime slots and use of alternative infrastructure, including dedicated freight airports such as Wellcamp.

To date, Brisbane Airport operates 24/7 without operational restrictions such as a legislated curfew or a cap on flight movements. Other airports, including Sydney, Melbourne/Essendon, Gold Coast and Adelaide, have long operated within night-flight restrictions, with no material impact on economic performance. A curfew would not ground the economy but it would finally let Brisbane residents sleep.

The persistent suggestion that aviation should be exempt from regulatory constraint because it is an "essential service" is analytically unsound. Industries that generate externalities – whether transport, manufacturing, or energy – are commonly subject to operating limits, particularly during sensitive night hours. It is time to bring Brisbane Airport into line with the rest of the country. A curfew is standard policy, not radical reform.

Brisbane Airport Corporation's economic case against a curfew rests on long-term passenger growth projections that have already failed to materialise. The anticipated post-pandemic recovery has not occurred, and business travel remains structurally depressed. In contrast, the public costs of continued 24-hour operations are borne daily, in the form of fragmented sleep, elevated health risks, declining neighbourhood amenity, and deepening social inequity. The economic cost of a curfew is modest and manageable. The cost of inaction is borne every night by the public – and it's far higher.

In short, the implementation of a curfew would deliver a substantial and ongoing net public benefit. It would align Brisbane with established national practice, reduce harmful externalities, and restore a fairer balance between commercial activity and community wellbeing.

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Supplementary Analysis:
Brisbane Airport Draft Master Plan 2026

Unrealistic projections make a weak case for exemption from noise controls

Projections of rapid future growth are a central part of BAC resistance to measures that would reduce the harm done to Brisbane residents by aircraft noise. The assumption is that, even if restrictions such as a curfew are feasible now, they would represent an unsustainable constraint on future expansion. The Master Plan predicts a doubling of the number of passengers using Brisbane Airport between 2026 and 2046, an implied growth rate of around 3.5% per year.

These predictions are in sharp contrast to the experience of the decade from 2014 to 2024, during which both domestic and international passenger numbers barely changed, despite substantial growth in Australia's population and particularly in Brisbane. Passenger numbers have barely regained the levels observed before the Covid pandemic, even though all relevant restrictions were removed in 2022.

The evidence shows that the number of flights per person has been falling. Yet the Master Plan predicts that growth in passenger numbers will substantially exceed population growth, estimated at about 1.5% per year. These estimates apparently assume a return to the rapid growth in numbers experienced between the advent of airline deregulation in 1990, which greatly reduce the cost of leisure travel, and the global financial crisis in 2008, after which growth in household incomes declined.

The most obvious reason for the slowdown after 2008 and particularly after 2014 is market saturation. Before the 1990s even domestic air travel was widely perceived as an expensive luxury. International travel was rare enough that is was often seen as, at most, a "once in a lifetime" event. By the 2010s, air travel was entrenched as the primary mode of transport for travel between Australia's capital cities, accounting for 90% of travel between Melbourne and Brisbane and 60% of travel between Sydney and Brisbane. The three city pairs, Sydney-Melbourne, Sydney-Brisbane and Melbourne-Brisbane were among the busiest in the word.

There is, then, no significant room for further growth in the market share of air travel relative to other. Growth in passenger travel, relative to population can only arise if the number of trips increases. There is little reason to expect substantial growth in leisure travel. The primary constraint at this point is the limited availability of leisure time. Full-time workers receive only four weeks leave each year and this is unlikely to change.

As regards business travel, the availability of videoconferencing has enabled a substantial increase in the number of interstate meetings with the same or less travel. Prior to the Covid pandemic, unfamiliarity with the technology limited its use. Following forced adoption during lockdowns, businesses have integrated videoconferencing into their operations. However, as continuing debates over remote work have shown, this process is far from complete. Such gradual adaptation is characteristic of new technologies, such as electric motors and personal computers.

The projections are even more implausible with respect to freight, the primary justification for 24/7 operation of the airport (with the exception of subsidised international passenger flights). According to BITRE,[1]

> "Between 2010–11 and 2018–19 (prior to COVID-19), total domestic air freight fell from around 251,400 tonnes in 2010–11 to around 229,900 tonnes in 2018–19. Domestic air freight volumes declined further during the pandemic and are yet to show any sign of return to pre-pandemic levels." (p. 8)

[1] https://www.bitre.gov.au/sites/default/files/documents/bitre-rr157-summary.pdf

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BITRE also predicts declining air freight volumes over the period to 2050.

In summary, it is highly unlikely that the projections of the Master Plan will be realised. Measures taken now to limit noise impacts could be adjusted over time to manage the relatively modest growth in air transport that is likely over the period to 2046.

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Introduction

The construction of the second runway at Brisbane Airport cost an estimated $1.1 billion. Such a large piece of public infrastructure should have been the subject of careful economic and social analysis.

Unfortunately this has not been the case. Estimates of the economic benefits of the projects have been exaggerated and reflect a variety of misconceptions. The economic cost of noise associated with airport operations, reflected in health impacts and changes in land values, has not been properly analysed. As a result, substantial health and economic costs have been imposed on Brisbane residents with no serious attempt at economic justification.

The purpose of this report is to analyse the costs and benefits of the most direct option for reducing noise impacts: a curfew on operations. It will be shown that the costs of a curfew are modest, of the order of $10 million/ year, or even less. By contrast, the potential health and economic benefits of a curfew are valued at $50 million or more.

Such a curfew is similar to that in place in Sydney, Adelaide Essendon and Gold Coast airports. These curfews have not been subject to a comprehensive benefit-cost tests. However, proposals to relax the curfews have been rejected, as at Essendon. The opening of the 24 hour Western Sydney airport is expected to result in the tightening of the Sydney Airport curfew. In both cases, airport operators and airlines, like most firms in polluting industries have resisted restrictions (Hepworth 2017, O'Sullivan 2024).

Economic background

The debate over how to manage noise at Brisbane Airport can be better understood if a few basic economic principles are taken into account. The central principles are described in this section.

Efficiency, equity and benefit cost analysis

The central idea of efficiency is that society should not take actions for which the total costs exceed the benefits, or refrain from actions where benefits exceed costs. This idea is formalised in benefit-cost analysis.

All major public projects should be subject to a benefit-cost analysis. In practice, however, project proponents frequently offer overstated estimates of benefits while taking little account of costs.

An analysis based on efficiency should not be taken as conclusive. It is frequently the case that actions generate benefits to one group but the costs are borne by another. In this case, it is necessary to take account of considerations of equity, over which there is a good deal of disagreement.

Two main criteria of equity are relevant in a wide variety of contexts. First, there are notions of equity based on aversion to inequality. A policy is considered inequitable if it benefits people with high income or wealth at the expense of those with lower income or wealth. In the case of Brisbane airport the losers from unrestricted flights are Brisbane residents in a wide range of suburbs of varying income levels. The beneficiaries are the shareholders of Brisbane Airport Corporation and the airlines that use it, along with air travellers. While most people travel by air occasionally, high income earners and people in senior business positions travel much more frequently than the average Brisbane resident.[2]

[2] In this context, the 2023 remark by Steven Miles, then Deputy Premier and now leader of the Opposition that complaints about aircraft noise came from "wealthy inner city" elites is not only offensive but based on spurious factual assumptions.

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Conflicts between efficiency and equity may be resolved if it is possible for gainers to compensate losers. For example, equity concerns about the compulsory acquisition of property for public purposes may be assuaged by an appropriately generous interpretation of the requirement (made famous by the 1997 Australian movie *The Castle*) that such acquisition be 'on just terms'. Here it is important to distinguish actual compensation from the hypothetical compensation which is possible, in principle, whenever aggregate benefits exceed aggregate costs.

Those who generate negative externalities should bear the cost

A particularly important application of the benefit-cost principle arises in relation to negative externalities such as air, water and noise pollution. The technical term "externalities" refers to costs generated in the process of producing a good or service that are borne, not by the producer, by people or other firms external to the business. Since these costs are not part of the producers expenses, production may be profitable even when the total costs to society exceed the benefits.

Externalities may be addressed either by price measures or by direct controls. Direct controls specify requirements to eliminate or reduce the externality, for example by installing scrubbers on factory smokestacks to reduce air pollution. Alternatively, price based measures may be used. In particular, polluters may be charged fees that can be used to mitigate the adverse effects of pollution.

In the context of Brisbane airport, the implication of this principle is that the costs of rearranging flights to accommodate a curfew should be borne by those who generate the externality, namely the airport and its users.

Curfews are a fair and economically sound way to internalise external costs

Since the neoliberal adoption of privatisation and public-private partnership models for infrastructure from the 1990s onwards, many major infrastructure investments are made by private firms.

These policies have been advocated on the basis that private firms have a stronger incentive to work efficiently and to deliver innovative solutions.

However, problems emerge when crucial investment decisions turn out badly. Unlike the case with firms operating in competitive markets, failure is not an option. Infrastructure is necessary and therefore must be kept in operation, whether or not the investment covers its costs.

In principle, this does not protect private investors from the costs associated with bad investment decisions. The firm in question can go bankrupt, allowing someone else to acquire and operate the assets. In practice, however, it may be difficult to operate a going concern while removing one group of owners and replacing another.[3]

It is important therefore that owners of public infrastructure should not be bailed out for the costs of bad investment decisions, even if those costs take the form of negative externalities rather than direct financial losses. This point applies, in particular to the decision of the Brisbane Airport Corporation to construct its New Parallel Runway (NPR) launched on 12 July 2020 with the result of increased noise pollution.

Miles is a member of the invitation-only Qantas Chairman's Lounge, and part of a class whose members travel by air far more frequently than the Brisbane residents he is deriding or the outer-suburban non-elites whose interests he purports to defend.

[3] The recent difficulties of Star casinos illustrate the point. The casino industry, while having many pernicious social effects, is effectively a kind of public-private partnership, operating under a strictly limited set of licenses to reduce competition and allow the extraction of tax revenue. Although the Star enterprise is evidently insolvent, the continued operation of the group's casinos is considered essential by political actors, so that bankruptcy and liquidation are regarded as unacceptable. As a result, there have been strenuous efforts to organise a rescue.

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In the case of Brisbane Airport, the decision to construct the NPR was based, in part, on the claim that it would be possible to manage the airport on the basis of "Simultaneous opposite direction parallel runway operations' (SODPROPS) and that noise problems could therefore be minimised. This claim has turned out to be mistaken. The cost of measures to remediate the resulting extra noise, including restrictions on airport operations, should be borne by the airport owners.

Policy changes should be analysed in terms of marginal effects

In considering tax and regulation policies that affect a particular industry, the fact that the industry is, in some sense, essential, is generally irrelevant. Housing is essential, but this does not mean that there should be no limits on the construction of housing, or no policies that reduce the profitability of the housing industry.

The crucial concept here is that of declining marginal value, or in the consumer context, diminishing marginal utility

For example, water is essential to life, so for someone who has very little access to water, an additional litre of drinking water is immensely valuable. As we have access to more water it is used for less critical, but still important activities such as cooking and washing. When these needs are met, water may be used for gardens. And when water is cheap and abundant it may be used for activities with low marginal value, such as hosing down driveways. When water use is restricted, or made more costly, it is these low-value uses that are reduced first.

The concept of price elasticity is relevant here. For goods and services with steeply declining marginal value, a small proportional increase in price will result in a large reduction in consumer demand, as low-value marginal uses are avoided. By contrast, for an essential commodity like food, marginal value will remain high until nutritional needs are met. Hence, changes in price will have relatively little effect on the quantity demanded.

The ratio of the proportionate change in demand to a given proportionate increase in price is referred to as the price elasticity of demand. This ratio is equal to 1 if, for example, a 10% increase results in a 10% reduction in demand. Demand is described as elastic or inelastic if the price elasticity is greater than/less than 1 in absolute value.

Demand is elastic for goods and services that are luxuries rather than necessities and where substitutes are readily available. As will be discussed in this report, both of these conditions apply to air travel.

Consumer surplus and economic impacts

No city of any size can function without an airport. Hence, there is little point in attempting to evaluate the operations of BAC with reference to a counterfactual where no airport existed. Rather, it is necessary to evaluate costs and benefits at the margin, with reference to, say, a 10% increase or decrease in the number of flights.

For a good or service which is in elastic demand, a small price increase will result in a large reduction in the quantity demanded. The resulting economic loss to consumers will be small, because the consumer value of the marginal units was only slightly greater than the price already being paid. The 'consumer surplus' for these users is the difference between the maximum price they would be willing to pay and the price actually paid.

The marginal benefits of additional flights may be estimated using standard economic techniques based on the concept of consumer surplus. For example, if an airline passenger is paying $100 for a ticket, but would be willing to pay $110 (and no more) for the same ticket, the passenger has a consumer surplus of $10.

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As an illustration, suppose that the fare for an airline journey is initially $100, and that there are 1000 passengers per day, yielding revenue of $100 000. Consider a $10 charge on all airfares, used to compensate households for the impact of aircraft noise and suppose that this 10% increase in price results in a 10% reduction in demand.

The 100 consumers who chose not to travel after the price increase must have valued the trip at more than $100 (since they were willing to pay that price) and less than $110. For a consumer whose value was in the middle of this range at $105, their consumer surplus at the lower price was $5. After the price increase, the consumer does not travel and receives zero surplus, a loss of $5. Taking this average value across the 100 consumers who do not fly yields a loss of $500 or 0.5% of the total revenue. Travellers who continue to fly are worse off by $10, but this loss is cancelled out by the benefit to those receiving compensation.

This example illustrates a standard calculation of the loss of consumer surplus associated with a tax or charge. Using the concept of elasticity of demand, we can estimate the loss (or gain) of consumer surplus associated with an increase (or reduction) in the cost of airline tickets. Most estimates of the elasticity of demand are around -1. This implies that the increase in consumer surplus associated with a 10% increase in supply is of the order of 1% of total expenditure. Applying this estimate to total airport revenue of $850 million yields a consumer welfare benefit of $8.5 million a year. This is substantially less than the marginal costs of even a small increase in aircraft noise.

An essentially identical analysis applies in the case where the number of available flights is restricted and airfares are raised to the point where the demand equals the restricted supply.

Health effects of night-time aircraft noise

There is a large literature on the health effects of environmental noise, including aircraft noise. The EnHealth section of the Commonwealth Department of Health (2018) provides a summary covering effects on sleep disturbance and cardiovascular disease among other effects. The key findings are summarised in the following quotations (results from observational and experimental studies are combined for convenience).

> Eight observational studies and nine experimental studies examined the associations between aircraft noise exposure and sleep disturbances. All indicated that aircraft noise was associated with poorer sleep. (p29 and p31)
>
> 15 of 19 studies indicate that average day-evening-night noise levels are associated with adverse cardiovascular outcomes: ≥ 50 dB Lden (Franssen et al., 2004), > 55 dB(A) Lden (Correia et al., 2013; Rosenlund et al., 2001), ≥ 55 dB(A) LAeq (Eriksson et al., 2007), ≥ 60 dB(A) Lden (Huss et al., 2010), or > 70 dB(A) Lden (Matsui et al., 2001). In terms of specific periods, daytime levels above 63 dB(A) have been linked with adverse cardiovascular outcomes (Hansell et al., 2013). Focusing specifically on the period from 3am to 5am, Greiser et al. (2007) found that noise levels ≥ 40 dB(A) were linked with adverse cardiovascular health. In addition to averaged noise events, Rosenlund et al. (2001) found that maximum noise levels > 72 dB(A) were linked with poor cardiovascular health (p 44)
>
> Six of eight observational studies indicated a significant relationship between aircraft noise exposure and cognitive outcomes. For example, they reported that exposure to aircraft noise was cross-sectionally associated with poorer reading comprehension (Evans et al., 1995, Evans et al., 1997; Seabi et al., 2010; Seabi et al., 2012, RANCH study and Haines et al., 2001a, b). The RANCH study and Haines (2001a, b) study found that the relationship did not maintain significance when explored through a prospective cohort study. Mixed results were found for memory and attention with four studies finding a significant relationship (Evans et al., 1995; Haines et al., 2001; Seabi et al., 2010 and the RANCH Study). The remaining two indicated aircraft noise exposure was not associated with reading comprehension, memory, attention and academic achievement (Haines et al., 2001c, 2002).

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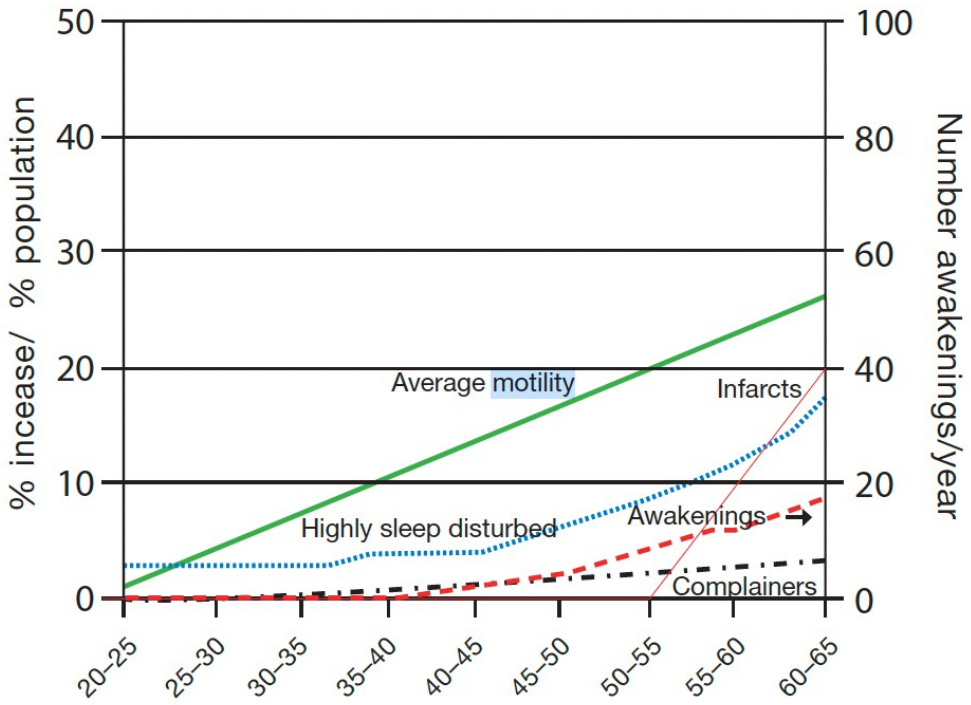
EnHealth briefly considered annoyance as a mediator for adverse health effects, but not as an adverse effect in itself. However, annoyance can reasonably be regarded as an adverse mental health effect, even in the absence of observable physical effects.

WHO (2009) focuses specifically on night noise. Focusing on aircraft noise, WHO reports the percentage increase in adverse health outcomes (LHS) and the number of awakenings per year as functions of the outdoor noise level in dB. In this table "motility" refers to measured excess movements; in ordinary language, "tossing and turning." "Infarct" refers to heart attacks, strokes and related outcomes.

Fig. 4
Effects of aircraft noise at night*



*Average motility and infarcts are expressed in percent increase (compared to baseline number); the number of highly sleep disturbed people is expressed as a percent of the population; complainers are expressed as a % of the neighbourhood population; awakenings are expressed in number of additional awakenings per year.

Figure 1: World Health Organization (2009). Night Noise Guidelines for Europe. Copenhagen: WHO Regional Office for Europe. https://www.who.int/europe/publications/i/item/9789289041737

Specific health issues addressed in the literature include: heart disease, sleep disturbance, cognitive effects and mental distress. Although these effects are inter-related it is useful to consider them separately.

Heart disease

International studies have found a linear relationship between excessive noise exposure and ischemic heart disease, the primary cause of heart attack. Each 10 dB of additional noise increases the rate of ischemic heart disease by around 9% (ENVISA 2023, see also Foley 2024, and Lawton & Fujiwara 2016).

Based on average prevalence for Australia, around 55 people living in severely affected suburbs would experience a fatal heart attack in any given year. A 10% increase in that risk would imply 5 to 6 additional premature deaths each year. This is a lower bound estimate and is confined to the most severely affected suburbs.

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Aircraft noise is a major public health problem, contributing to a substantial increase in the risk of heart attacks, including fatalities, in areas with high noise exposure, as well as many other adverse effects.

Sleep disturbance

Sleep disturbance is a major health problem in Australia and elsewhere, with significant economic consequences. The SleepHealth Foundation (2021) found:

> "In the last financial year (2019-20) their estimated overall cost was $14.4 billion in financial costs with a further $36.6 billion in non-financial costs related to lack of well-being. The financial component is equivalent to 0.73% of Australian gross domestic product. The nonfinancial cost represents 3.2% of total Australian burden of disease for the year.
>
> The financial costs are dominated by productivity losses of $11 billion and costs associated with increased accident risk."

In large parts of Brisbane, aircraft are a more significant source of sleep disturbance than road traffic, even though the economic importance of road traffic is massively greater than that of nighttime air traffic (a handful of international flights and some air freight).

Mental distress and annoyance

Advocates of unrestricted airport operations tend to dismiss mental distress and annoyance as the concerns of "rich, inner city elites," unworthy of serious consideration. However, the benefits of unrestricted night operations consist largely of more convenient scheduling for international travellers, a group among whom wealthy elites are over-represented, and for freight deliveries, which would otherwise be delayed by a few hours at most. It is therefore entirely appropriate to weigh the distress of noise against the convenience benefits of unrestricted operations.

The costs of mental distress may be severe. A number of studies (Diaz et al, Min and Min, Rudolph et al, Wicki et al) have found links between nighttime noise and suicide.

DALYs Lost

Because health systems need to allocate resources between treatments of different conditions, a large literature has developed on the valuation of risks to life and health. The central idea is that of a Disability Adjusted Life Year (DALY), also known as a Quality Adjusted Life Year (QALY). The simplest case of DALY analysis arises when a patient must choose whether to undergo a procedure that would alleviate a chronic disability but carries some risk of death. As an example, suppose that in the absence of treatment the patient would live for 20 years with the disability. The treatment, if successful, would give 20 years of life in full health, but carries a 10% risk of death, implying an expectation of 18 years in good health. If the treatment is accepted, this choice implies that 20 years of life with the disability is worth less than 18 years in good health. That is, the patient living 20 years with disability expects no more than 18 Disability Adjusted Life Years. Equivalently, a year of life with the disability is equal to less than 0.9 DALYs.

WHO (2011) estimates that environmental noise leads to the loss of 1 million Disability Adjusted Life Years in the EU and Western Europe each year. Adjusting for population size, this would correspond to 10 000 DALYs in Brisbane. For large numbers of Brisbane residents in affected suburbs, night time aircraft operation is the most damaging single source of environmental noise. If we conservatively assume that night-time aircraft noise accounts for 10% of health effects, we obtain an annual loss of 1000 DALYs. This is a lower bound estimate. The loss of DALYs from 50 additional heart attacks (assuming 20 DALYs lost per attack), as estimated above, would account for this, without considering other health effects.

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Risk: perception and reality

Fears about the perceived risks of air travel are widespread, and routinely reinforced by media reporting. Although fatal crashes in commercial aviation are vanishingly rare, minor equipment failures, involving no loss of life or even injury, receive extensive coverage. Crashes involving substantial loss of life, such as the recent crash of Air India Flight 171, with the loss of 260 lives, are extensively reported over multiple days.

By contrast, loss of life associated with other modes of transport receives limited attention, if any. The World Health Organization estimates that around 1.2 million people every year (more than 3000 every day) die as a result of road crashes. But even crashes involving dozens of deaths receive only brief coverage.

Invisible dangers such as heart attacks caused by noise related stress receive even less notice. Over the five years since the opening of the second runway, the estimates above suggest an additional 250 heart attacks caused by aircraft noise in Brisbane alone.

This imbalance has been reflected in public policy. Despite the increased death and illness associated with aircraft noise, CASA declines to consider this as a relevant consideration in deciding whether to permit parallel runway operations.

Risks associated with air travel are minimal

There are few human activities less dangerous than taking off in a commercial airliner. In the period since March 2019), there have been only eight commercial airline crashes involving more than 50 fatalities, none of which occurred in an OECD country. These are

- 2025 Air India 171 crashed shortly after takeoff
- 2023 Yeti Airlines Flight 691: A turbo-prop airplane crashed on landing in Nepal apparently due
- 2022 China Eastern Airlines Flight 5735: A Boeing 737. believed to have been deliberately crashed by the pilot
- 2021 Sirijawa Air Flight 182: A Boeing 737 crashed in Indonesia, caused by a combination of a faulty autothrottle and pilot error 2020 Pakistan International Airlines Flight 8303 An Airbus A320 crashed on attempted landing, caused by pilot error
- 2019 Two Boeing 737-Max crashes caused by faulty control systems

With the exception of planes deliberately crashed by pilots or shot down by military forces, there have been no large-scale fatal crashes in any OECD country for well over a decade.

Estimating the risk of a fatal jet airline crash in Brisbane

Although there have been no fatal crashes involving Australian commercial airliners, in many decades it is impossible to say with certainty that such a crash will never occur. However, it is possible, using standard statistical techniques to put an upper bound on the probability that such a crash will occur.

To illustrate, suppose that a coin is tossed 20 times and comes up heads every time. It is highly unlikely (less than 1/1,000,000) that such a result would occur with a fair coin. A simple calculation shows even a biased coin, which comes up heads 80% of time, is highly unlikely to produce such an outcome. In statistical terms, we can reject the hypothesis that the coin has a bias of 80% or less with a confidence level of 99%. On the other hand, in this case, a bias of 90% can't be ruled out in the same way. So, if we are unwilling to accept a 10% risk of being wrong, we might not conclude that the coin is double-headed.

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The same reasoning applies to airline crashes. Over the last five years, there have been approximately 150 million commercial airline takeoffs around the world with only five crashes involving major loss of life. Using the same reasoning as in the example above, we can reject, with 95% confidence, they hypothesis that the risk of a crash on take-off is greater than 0.00001%, or 1 in 10 million. With around 100 000 departures from Brisbane airport per year we can be highly confident that we are unlikely to see a crash more than once every 100 years. A best estimate, taking account of longer term trends, would be closer to once every 1000 years.

Economic benefits of a curfew

There are two main approaches to the analysis of the economic loss associated with aircraft noise, or, equivalently the benefits of restrictions such as curfew. The first draws on the health economics literature where estimated values have been derived for DALYs lost or saved for a wide variety of medical and public health interventions.

The second approach uses the fact that disamenity associated with a given location results in lower home values. Hedonic valuation techniques make it possible to disentangle environmental disamenity from the myriad of other factors that affect house prices. This provides an estimate of the increase in home values that would be generated by a curfew

Ideally, studies of this kind, using evidence from Brisbane, should have been undertaken before decisions were made on the design and operation of the second runway. Since this has not been done, it is necessary to estimate effects for Brisbane on the basis of parameters derived from the global literature.

Valuation of health effects

The aim of cost-effectiveness in health and public safety is to allocate resources to save as many DALYs as possible within a given budget, which implies that, at the margin all DALYs saved should have the same value. The Australian government (2021) recommended a value of $222,000 per DALY lost, regardless of who is affected.

By contrast, willingness to pay (WTP) measures generally vary with income. Those with higher incomes are willing to pay more to mitigate a health risk. The inequity of this cost distribution is not incidental; it was anticipated and effectively accepted in Brisbane Airport Corporation's own documentation. The 2007 Major Development Plan (MDP) / Environmental Impact Statement (EIS) stated:

> "In addition, there is also an accepted relationship between the health of individuals and their socio-economic status. It is considered likely that those residents with a lower socio-economic status will be more susceptible to the effects of the NPR, such as aircraft noise. Lower socio-economic groups also have fewer resources (be they financial, educational, or social support networks) available to them with which to adapt to social impacts (for example, the ability to move home)."
>
> (BAC 2007, MDP/EIS, p. D9-365)

This statement – frank in its admission that noise burdens would fall most heavily on those with the least capacity to respond – epitomises a disregard for the principles of equity and just environmental governance. Rather than motivating stronger protections for vulnerable communities, the acknowledgement seems to have served as justification for inaction. It reinforces the argument for a curfew not only on economic grounds but as a basic matter of distributive justice.

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Land values

A large body of international literature shows that the disamenity of aircraft noise is capitalized into land values. Based on international estimates, each additional dB of noise reduces land values by between 0.5 and 0.9%.

The standard economic approach to the measurement of the economic impact of local pollutants such as noise is the hedonic price estimation of house values. The underlying theory, tracing back to the work of Pigou (1920) and Coase (1960) was developed by Polinsky and Shavell (1976).

The following summary of the hedonic price method is taken from the meta-analysis of Nelson (2004):

> "Consider two residential properties that are identical in all respects, except that one house is located close to or under an aircraft flight path, and the other is not. A "but for analysis" establishes that the adverse environment for the first house will result in a market value that is lower than the market value of the second house. This occurs because potential buyers reduce their demand for the first house relative to the second house, reflecting the discounted present value of the costs of annoyance, loss of tranquillity, and possible health effects. A measure of the noise-induced damages is the difference between the market-determined value of the two houses. The analysis can be extended to analyse different levels of noise exposure because annoyance and other adverse effects of noise rise predictably with increased exposure levels (EPA, 1982; FAA, 1985; FICON, 1992a, 1992b). Hence, while there is a missing market for tranquillity, a complementary market exists wherein individuals register their willingness to pay to avoid different levels of aircraft noise exposure. Consumers thus reveal the implicit value that they place on quietness by the explicit choices that they make in the housing market. The willingness to pay for quietness and other amenities are part of the asset price of the "housing bundle," and econometric techniques are available that unbundle complex products and thereby reveal the implicit or hedonic price. As indicated above, a large empirical literature has developed using the hedonic method." (p. 5)

Nelson goes on to explain the statistical procedures required to implement the hedonic price method, and to make results comparable using consistent measures of noise exposure. Wadud (2009) reaches similar conclusions.

Most studies of the economic impacts of aircraft noise use the hedonic price approach (see for example, Cohen & Coughlin 2008; De Wit, et al., 2006; Dekkers, & Straaten 2009, Kaur et al. 2021, McMillen, D.P. 2004) and virtually all yield the unsurprising conclusion that the costs of living under a flight path are reflected in substantially lower prices compared to homes which are similar in other respects but do not suffer aircraft noise.

A summary of results follows:

Study (Location)	Noise Metric / Scenario	Estimated Impact on Property Value
Nelson (2004) Meta-analysis (Global)	Hedonic review of 20+ airports (U.S., Europe, etc.)	NDI ~0.6–0.7% per 1 dB (median); up to ~2.3% in extreme cases
Salvi (2008) (Zurich, Switzerland)	Hedonic spatial regression near Zurich Airport	0.97% reduction per 1 dB; typical discounts ranged ~2–8% in high-noise zones

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Dekkers & Van der Straaten (2009) (Amsterdam, NL)	Hedonic model (noise contours) around Schiphol Airport	€1,459 increase in price per 1 dB *reduction* (i.e. about €1,459 lost per +1 dB) per house This implies a similar on the order of ~0.8% per dB for average home prices.
Cohen & Coughlin (2008) (Atlanta, USA)	Spatial hedonic models for noise around ATL airport	Homes in areas exceeding "normal" day-night noise levels sold for 21% less than those in acceptable noise zones Conversely, being in a quieter contour added significant value.
Affuso et al. (2019) (Memphis, USA)	Spatial hedonic (directional) near Memphis Int'l	Noise perceived purely as disamenity; ~$4,795 loss per dB per house on average (external cost per household per decibel).
Rahmatian & Cockerill (2004) (S. California, USA)	Hedonic, distance bands around airports	Houses very close to airports saw large absolute discounts: about $16,600–$17,400 lower (on average) for homes within 150–300 m of an airport, and over $21,000 lower for homes in some high-noise zones compared to quieter areas.
Tsao & Lu (2022) (Taoyuan, Taiwan)	Hedonic models (multi-zone noise contours)	US$2,356 per dB decrease in 60–64 dB noise zone; $3,623 per dB in areas >65 dB Higher noise levels thus exact a larger penalty per dB in this case.

These results align with an Australian study by Jones Lang LaSalle (JLL, 2016), commissioned for the 2016 Environmental Impact Statement for the Western Sydney associated with **a 10.67% devaluation of property prices in Brisbane** – a city that, at the time, operated with only a single runway. The JLL study provided one of the first official acknowledgements of aircraft noise as a quantifiable factor in property price suppression in Queensland.

More recently, a new study integrated detailed aircraft noise data into Australia's leading automated valuation model (AVM), finding an average decrease in property value of 6–9% for every 10 dB(A) increase in aircraft noise exposure across Melbourne and regional Victoria (Hinze & Ward, 2025). Their findings confirm that "aircraft noise was associated with an average decrease of 6-9% for every 10 dB(A) increase in aircraft noise," (p. 11) and reinforce the need to incorporate environmental noise modelling into contemporary valuation practice. Collectively, these three Australian studies demonstrate that aircraft noise imposes a consistent and measurable negative impact on land and property values in Australia, particularly under high-density flight paths such as those experienced at Boulevarde Apartments.

While methodologies vary – ranging from hedonic pricing and willingness-to-pay surveys to capitalised damage models – every study reviewed reports a statistically significant negative impact of aircraft noise on property value. As noted by Feitelson, Hurd and Mudge (1996), even when accounting for noise insulation, "all forms of noise reduced the basic residence value," (p. 8) and beyond a certain threshold of disturbance, "households are not willing to consider the residence, and thus their WTP [willingness to pay] drops to zero" (p. 12).

The evidence base clearly establishes that aircraft noise is a market-recognised disamenity, and that its effects are both quantifiable and persistent. In areas with intensified or newly introduced flight

paths – such as those surrounding Brisbane's New Parallel Runway – the likelihood of property devaluation due to noise exposure is not hypothetical but demonstrable.

These results can be used to estimate the effects of increased noise on residential land values in Brisbane. For each suburb identified by Brisbane Flight Path Community Alliance as severely affected, 2021 census yield the number of houses and units, sorted by number of bedrooms. Median house and unit prices for each suburb were derived from realestate.com. The implied reduction from land values can be estimated using the meta- analysis of Nelson (2004), which are expressed in terms of the percentage change in house prices per additional decibel of noise. Nelson gives a range of 0.5 to 0.9% reduction in value for each additional decibel of noise. The corresponding range of effects on house values is $400-$700 million per decibel. This cost may be compared to the cost of constructing the NPR, estimated in the range $1.1-1.3 billion. The implication is that the primary cost of the airport is not the capital cost of construction but the disamenity costs capitalised into land values. These costs may also be converted into annualised disamenity costs using the present value method. For a discount rate of 5% and a noise increase of 5 dB, the annual disamenity ranges from $95 million to $170 million, equal to between $600 and $1000 annually per person in the affected area.

The costs do not apply only to existing land users. Brisbane Airport Corporation has proposed restricting new development on land underneath its flight paths. As well as contributing to Australia's housing crisis, this demand amounts to an expropriation of the value of the land, which would be much higher in the absence of the airport. BAC should have been required to buy this land at the market price that would have prevailed in the absence of the airport.

Noting that estimated by WHO do not take account of annoyance, these estimates are consistent with the valuations of lost DALYs considered above. Night-time airline operation invariably involves higher noise costs and lower benefits than daytime operations when ambient noise levels

Further evidence on the impact of aircraft noise on property values may be obtained from "**natural experiments**" arising when there is a sudden change in noise exposure, for example, because of the opening or closing of a runway. Studies of this kind have become increasingly popular in economic analysis as a result of the development of "difference-in-differences" techniques. Impacts have shown substantial increases in land value associated with airport closure. For example, Zheng et al (2020) found a 24% increase in property values where noise was reduced following the relocation of Hong Kong Kai Tak Airport in 1998.

The opening of the second runway constitutes a natural experiment of this kind, but no systematic comparative study has been undertaken. However, suburbs such as Cannon Hill where new flight paths reduced noise, experienced a substantial increase in property values relative to previously more desirable areas such as Bulimba where noise increased. This contradicts the preliminary conclusion of Blake and Eves (2021), which showed no such increase in 2020, a period affected by Covid lockdowns which greatly reduced air travel.

Subsidy

The Queensland government subsidises international flights over Brisbane through the Attracting Aviation Investment Fund 2022-2025, described as a "war chest" of $200 million, of which the government supples $100 million The metaphor is apt, since the government is effectively making war on the sleepless residents of Brisbane.

The description of the fund implies an annual cost of $25 million, borne by Queenslanders throughout the state, largely to the benefit of foreign airlines. Such subsidies should be scrapped as part of the process of imposing a curfew.

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Summary

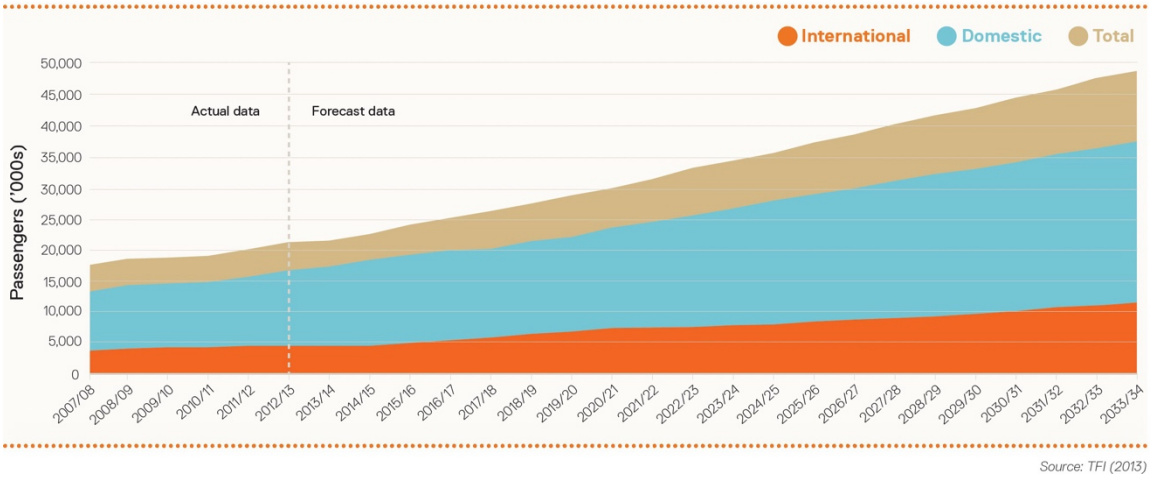
The imposition of a curfew would yield health benefits from reduced coronary attacks and other severe effects of around $100 million per year. Hedonic land valuations, which incorporate less severe effects such as annoyance, yield much higher values, ranging from $200 million to $350 million. A curfew would also yield benefits in the form of reduced public subsidies.

Economic cost of a curfew

Before examining the economic cost of a curfew it is important to establish whether a curfew is feasible without reducing existing flight numbers or sharply curtailing necessary growth.

The BAC case for rejecting any restrictions on flights rests heavily on the projection that passenger numbers will reach 50 million by 2035. This projection was put forward in the 2013 Airport Master Plan, and has been repeated consistently since then. The projection implied an annual growth rate of 5.4% in passenger numbers, well in excess of population growth.

FIGURE 5.2: DOMESTIC AND INTERNATIONAL PASSENGER GROWTH FORECAST



Source: TFI (2013)

Figure 2: BAC Forecasts 2012 – 2033

The reality has been far different. Passenger numbers have been essentially static in the 10 years since the Master Plan was released. The graph below, from the latest BAC Annual Report shows that growth had fallen far below the projected path by 2017-18 (23 million against a projection of 27 million). Passenger numbers have yet to regain pre-pandemic levels. There were 22.6 million passengers in 2023-24, compared to a projection of 30 million. The rate of recovery from the pandemic has also slowed.

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OVERALL PASSENGER RESULTS

FY24 was a year of passenger growth at Brisbane Airport with 22.6 million passengers, an increase of 2.5 million passengers (+12.5%) compared to the prior year. In terms of pre-COVID recovery, Brisbane reached 95% of FY19 passenger levels in FY24.

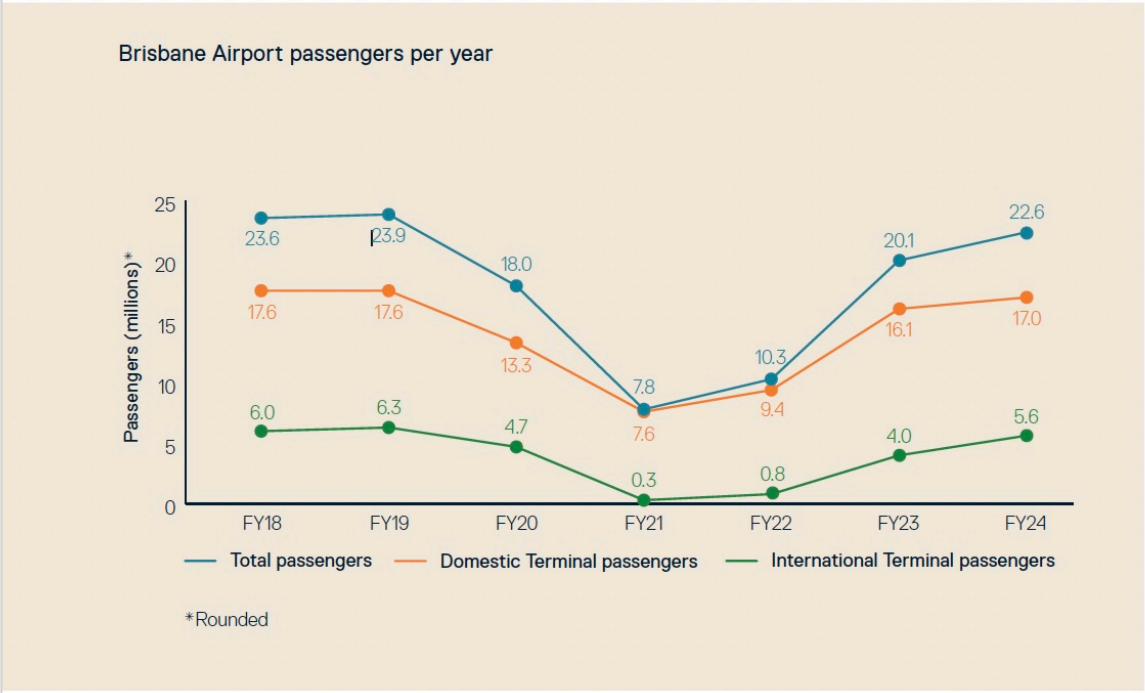

Figure 3: BAC Actual FY18 to FY24

Travel restrictions associated with the Covid-19 pandemic depressed passenger numbers for several years. However, most restrictions were removed by early 2022, and none applied in 2022-23. Hence, there is no reason to believe that travel in 2022-23 was adversely affected by Covid restrictions. If anything (as noted in the BAC report) we might expect some 'catch-up' as people undertook journeys that had been deferred because of Covid restrictions.

The experience of the Covid pandemic has had some durable effects on demand for air travel. Of necessity during the lockdown period, people found ways of managing their lives that did not involve travel. Most notably, in-person business meetings were replaced by online alternatives. Although the adjustment was painful, online meetings are easier to organise and essentially costless. The resulting reduction in business travel is likely to prove permanent.

An obvious implication is that the massive increase in aircraft noise associated with the introduction of the second runway has so far been unnecessary. The old runway was capable of handling a larger volume of passengers than are using the airport at present. The capacity constraints led to some delays and inconvenience for air travellers. However, the same is true of traffic calming and other measures which reduce the costs imposed by road users on residents of the areas through which they travel.

Taking account of the increase in the average size of aircraft, it seems unlikely that the number of flights to and from the airport will return to the FY19 level for some years. It follows that passenger flights currently operating at night could be rescheduled to daytime without exceeding current airport capacity.

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Are night operations essential

It is regularly claimed that aviation is an essential service, with the implication that the industry should be exempt from normal rules regarding pollution and environmental disamenity (for example, Brisbane Airport Corporation 2024). This claim was routinely made by industries, seeking relief from controls on water and air pollution, and has been correctly dismissed.

A wide range of industries are essential, in the sense that society could not function well if those industries did not exist at all. However, that does not imply that environmental restrictions are unjustified. As was observed above, what matters are marginal effects, in this case limitations on the hours of operations of the airport.

There is a direct comparator. The provision of food and groceries is more immediately essential than the availability of air travel, and requires truck deliveries to stores. Such deliveries are routinely subject to curfews to limit noise in residential areas.

Truck curfews are not costless. In the emergency circumstances of pandemic lockdowns, the costs of curfews were seen to outweigh the benefits and they were temporarily removed.

It is notable that, apart from subsidised international flights, the main justification for 24-hour operation of Brisbane Airport is the need for rapid delivery of freight. Yet the most essential form of freight delivery (groceries) is subject to restrictions while the just-in-time delivery of purchases from Amazon and Temu is represented as an essential.

International passenger travel

The ratio of costs to benefits for late-night flights from Brisbane Airport is exceptionally high. On a typical night, there are around 10 international departures between 10am and 6pm, roughly one per hour. Each such departure provides a marginal convenience benefit to international airline operators and their passengers (say 300 per plane) relative to a daytime departure. Each departure also represents a potential sleep disturbance for 300 000 people living under the flight path. Assuming passenger convenience gets the same weight as sleep disturbance, the ratio of costs to benefits is around 1000 to 1.

No other source of comparably avoidable noise is tolerated. Most noise sources are prohibited absolutely between 10pm and 7am. Drivers of noisy cars are routinely prosecuted. Queensland Rail makes strenuous efforts to minimise noise from rail operations. Truck deliveries are subject to curfew.

Currently around 10 international flights per day take off and 5 flights land between 9pm and 5am, when no domestic passenger services are scheduled. During the main operating hours between 5am and 9pm, there are around 300 departures and an equal number of landings. That is, nighttime international flights account for around 2.5% of aircraft movements at Brisbane Airport.

There are two main economic costs of a curfew. First, there is a loss of convenience for international passengers and airlines. This loss of convenience is a subjective factor comparable to the annoyance caused by disrupted sleep. Assuming 300 passengers per plane, the convenience benefits accrue to around 4500 passengers per night. To gain this benefit, approximately 300 000 people are subjected to multiple sleep disruptions. Assuming the cost per person of disrupted sleep is at least 1/50th of the benefit of convenient airline scheduling, the net cost of the curfew is negative in this respect.

Second, there is a potential welfare loss if shifting night-time international flights into daytime results in the displacement of domestic flights. Reduction in the number of domestic flights would imply either a price increase to bring demand for slots into line with supply or some form of rationing which amounts to an increase in price.

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Suppose that, initially, the price and quantity of domestic slots are given by ($P1$, $Q1$) and that, after allocating some slots to international flights, the new equilibrium has $P2 > P1$, $Q2 < Q1$, This is illustrated in Figure 1.

A standard welfare analysis shows that the net reduction in economic welfare is given by the red triangle ABC, by 0.5 ($P1 - P2$)($Q1 - Q2$). To explain this, observe that the consumers deterred from flying will be those for whom the benefit of the flight is less than $P2$ (otherwise they would still fly) and greater than P1 (otherwise they would not fly even in the absence of restrictions). There are $Q1 - Q2$ such passengers, and their average value for the flight is 0.5 ($P2 - P1$).

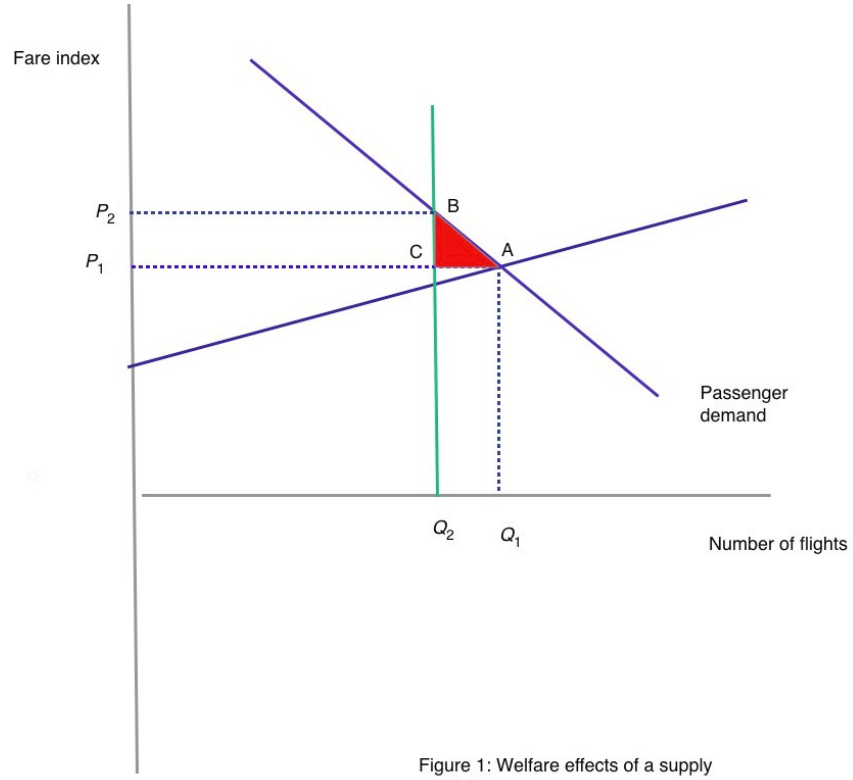

Figure 1: Welfare effects of a supply restriction

Figure 4: Welfare effects of a supply restriction

We can quantify this for the case when the number of flights is reduced by 2.5%. That is ($Q1 - Q2$) = 0.025 $Q2$. The associated difference in willingness to pay, given by ($P1 - P2$), depends on the elasticity of demand. Typical estimates are close to 1, that is a 2.5% price change is associated with a 2.5% quantity change.

The standard formula then shows that the loss in economic welfare is approximately equal to 0.03% of the initial revenue $P1$ $Q1$.

Overnight freight operations

Given the inability of BAC to manage noise associated with its operations, it would be preferable for freight operations to use other airports in SEQ, such as Wellcamp, which is a dedicated cargo airport with 24-hour operations. The additional cost of such a shift would be maximised in the case where freight delivered to or from Wellcamp was sent by truck to or from Brisbane Airport before going on to its final destination. Most freight sources and destinations are likely to be located at points intermediate between Wellcamp and BAC implying a lower cost.

The distance between Wellcamp and BAC is 160km. At a freight cost of 10c/tonne-kilometre, the extra cost of transhipping from Wellcamp to BAC is $16/tonne or $0.16/kg. BAC (2024) reports

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handling approximately 80 000 tonnes of international air freight per year, implying a cost of no more than $1.2 million a year if freight were delivered to Wellcamp.

The additional time involved in delivering overnight freight to or from Wellcamp rather than BAC is also modest, only a couple of hours.

In summary, the economic loss from shifting night freight operations to Wellcamp would be very small. However, there is a substantial loss to BAC with a corresponding gain to Wellcamp from 24-hour operations on a capital-intensive facility. It is, therefore, unsurprising that BAC is lobbying strongly against a curfew.

These effects will increase over time. However, the growth projections on which BAC relies take no account of the very weak growth in air transport observed in recent years. More importantly, they imply no role for democratic decision-making about transport policy. The view implicit in the BAC position is that demand for the services of Brisbane Airport should be met at all costs, regardless of disamenity and health impacts on Brisbane residents. **Transport infrastructure policy is not preordained by demand**, but must balance public interest and amenity.

Critique of BAC material

Throughout this process, there has been no independent study of the costs and benefits of this major infrastructure investment. Such studies are routinely undertaken for road projects, taking account of benefits such as time savings and costs such as air and noise pollution. Although these studies can be problematic, notably in relation to estimated benefits of time savings (Bureau of Infrastructure, Transport and Regional Economics 2018) they provide a starting point for policy analysis. By contrast, no such studies have been undertaken in relation to the construction and siting of the second runway. The public justification for these investments consists of low quality consulting reports commissioned by BAC and better described as advocacy than analysis.

The position of Brisbane Airport Corporation and the consultants it employs has been to assume that the operations of the airport are so essential that no restriction can be justified, and that the economic and health impacts on Brisbane residents should be disregarded. This is no different from the position taken by other polluting industries prior to the passage of Clean Air and Clean Water acts.

In opposing the idea of a curfew BAC has relied on a consultant's report from Queensland Economic Advocacy Services (QEAS) and a series of analyses of changes in land values (Eves and Blake 2014, 2021, 2024). Neither of these represent an economic analysis suitable for an objective analysis of costs and benefits of a major public investment.

As the name implies, the work of QEAS is a piece of advocacy, seeking to present the strongest possible case against restrictions on airport operations. To achieve this goal, QEAS ignores contrary evidence, adopts outdated and discredited modelling techniques and fails to quantify the implications of its own model where they would show that the costs of restrictions are likely to be modest.

Eves and Blake similarly disregard the standard economic approach, based on hedonic pricing, to assessing the implications of pollution for land values. Instead they present an impressionistic survey of suburb-level changes over time. As Eves and Blake (2024) concede, this approach is not a serious economic analysis. Rather it is presented as information for home buyers and sellers, pitched at a level designed to be easily comprehensible for a broad audience.

A critique of these two studies follows.

Queensland Economic Advocacy Services

Although QEAS purports to analyse both curfews and caps, the two policies are not discussed separately. Rather QEAS offers an extreme and speculative analysis of the impact of caps. Even combining the two, the estimated impacts over the period to 2032 are modest. The obvious implication is that resistance to a curfew now is not based on an assessment of current costs and benefits. Rather the aim is to ensure that the current *status quo* of unrestricted flights is maintained, in order to make future expansions politically easier.

The data present in the QEAS submission is consistent with the conclusion that the imposition of a curfew on Brisbane Airport would yield benefits to Brisbane residents substantially in excess of the costs imposed on air travellers.

Figure 9 in the QEAS report is identical to Figure 1 in this report, and provides a standard economic analysis. Unsurprisingly, QEAS does not provide the associated welfare calculation, yielding the conclusion that the costs of a curfew would be minimal.

Eves and Blake

Eves and Blake (2014, 2021), commissioned by BAC, reach the conclusion that house prices in Brisbane, unlike everywhere else in the world, are unaffected by aircraft noise. However, responding to previous criticism Eves and Blake (2024) concede that their work should be considered as advice to Brisbane homebuyers about the various factors that affect land values rather than as a serious piece of economic analysis.

As Eves and Blake (2014) summarise the existing literature:

> "A review of literature showed that the majority of academic studies in this area have been undertaken in the USA or The Netherlands with significantly less attention in the UK and Australia. Predominantly these studies have been based on econometric modeling using hedonic price models. Most commonly these studies found that there was some negative impact on residential properties. However, this was not the case for commercial and industrial property. Academic studies showed the impact of aircraft noise on residential property was only evident beyond 60 dB and had no impact up to this level."

This summary is consistent with that given above.

Despite summarising the literature, and noting that "the overall theme in the literature studied was that the impact on residential property affected by noise from a national or international airport was 'universally negative'", Eves and Blake (2014) show no evidence of understanding the hedonic price model. First, they repeatedly object to the fact that most studies are undertaken over relatively short time periods. But this is entirely appropriate, since the hedonic pricing model describes the determinants of prices at a given point in time. Using a long time period would necessitate introducing the time of sale as a complicating factor.

Second, they observe (2014, p 16) that

> "This shows that the impact of noise factors is only one of many factors that buyers take into consideration when they purchase a residential property and other factors may actually drive the market for individual property purchasers."

The whole point of the hedonic pricing model is to disentangle these 'many factors' and isolate the impact of noise. The standard econometric technique of multiple regression is designed to isolate the impacts of multiple factors in an explanatory model. Eves and Blake mention regression only twice (in passing) and appear to have no understanding of the technique.

Finally, Eves and Blake (2014, p 19) observe that:

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> "A further issue that is raised in these studies, but not actually tested in any of the models, is the fact that individuals have different levels of tolerance to noise and that people who are really adverse to high levels of noise will not purchase residential property in high noise locations."

But if there were sufficiently many buyers insensitive to noise, prices would not be affected. The observed market price reflects the fact that buyers who are choosing between locations affected and unaffected by noise are in fact willing to pay a premium to avoid noise.

The method used by Eves and Blake is to consider changes in prices in suburbs with varying degrees of exposure to noise over the period from 1988 to 2013. The use of suburb-level data is crude by the standards of the hedonic pricing literature, which had ceased using such aggregated data by the 1980s, and instead used house-level data which captured relevant characteristics such as land area, number of bedrooms, construction data and so on.

A more fundamental problem is that the airport was already in its current location in 1988. The disamenity of aircraft noise would already have been reflected in house prices in 1988. So, in the absence of information on changes in noise after 1988, the change in prices between 1988 and 2013 tells us nothing. The finding that price movements have been similar across suburbs with different levels of noise exposure is exactly what would be expected.

An updated report extends the analysis to 2020, and therefore includes a brief period after the opening of the second runway in July 2020. However, as Eves and Blake (2021) concede "the number of flights was reduced in 2020 as a result of the closure of international and at times the domestic borders due to the COVID-19 pandemic."

House prices have been highly volatile since 2020, so it is difficult to draw inferences from casual inspection of suburb-level movements in this period. Moreover, it is unclear when the impact of increased noise would have become evident to potential buyers. A proper hedonic analysis is required.

Given the magnitude of the investment in the NPR, and of the potential economic costs to residents of the affected areas, it is disappointing that BAC has chosen to rely on such a casual and technically inadequate piece of research to defend its position.

In response to earlier criticism of their work, Eves and Blake (2024) acknowledge the fact that the vast majority of economic analysis uses the hedonic pricing model. In response, they cite an obscure critique by Chau and Chin (2003). Despite being listed on the SSRN website for more than 20 years, this paper has been cited only four times. The criticisms it offers are not specific to hedonic price theory; rather, they are generic criticisms of economic analysis.

Eves and Blake further suggest that the objective of the study was:

> "to provide Brisbane homeowners and investors with objective information on the performance of the Brisbane housing market considering aircraft noise to inform their buying and investment decisions. The methodology was selected to be understandable to the target market."

This description suggests that the study should not have been presented by the Brisbane Airport Corporation as an economic analysis of the impact of aircraft noise on land values.

Concluding comments

Unlike other measures such as varying flight paths, a curfew is a simple, well-defined measure for which the costs and benefits are easy to specify and therefore relatively easy to evaluate in economic terms. As this study has shown, the economic costs of a curfew would be very modest. A small number of subsidised international flights would have to take off at less convenient times. Overnight freight could be shifted to the dedicated freight airport at Wellcamp.

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By contrast, the health benefits of a curfew would exceed $100 million a year. Estimated increases in land values, based on hedonic pricing models are substantially higher.

The economic costs of a curfew would be borne primarily by the owners of Brisbane Airport Corporation. Smaller costs would be borne by freight forwarders and their customers, and by international air travellers. None of these groups have any claim in equity to impose external costs on ordinary Brisbane residents.

The other major trade-off is between the subjective convenience of a relative handful of international travellers and the nuisance imposed on hundreds of thousands of Brisbane residents. At this point, it should be clear that nothing other than a curfew will suffice in reducing nighttime aircraft noise to reasonable levels.

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