



## **Videoconferencing and business air travel**

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### **Abstract:**

Forecasting future demand for air travel is vital for aviation infrastructure planning. Current forecasts of demand take into account the usual determinants such as incomes, business activity, prices and so forth, but a new factor is emerging as a result of advances in telecommunications technology, that is, the potential to substitute business air travel with high quality videoconferencing. This paper examines the extent to which new and emerging telecommunications technologies are likely to substitute and/or complement business air travel within Australia. The paper reviews literature from around the world, and in making concluding remarks takes into account factors such as: advances in telecommunications technology; reductions in cost; factors in the business environment affecting inter and intra business communications; and other business and social factors that affect both telecommunications usage and business air travel demand.

*The views expressed in this paper are those of the authors and do not necessarily represent those of the Bureau of Transport Economics.*

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## Introduction

Forecasts of future air travel demand are important to many different players within the aviation, and associated, industries. Airlines require estimates of future travel demand, preferably on a route-by-route basis, in order to plan aircraft purchases and make efficient network expansion (or contraction) decisions. Airport planners need to appropriately time infrastructure works, and tourism operators need a framework within which to best focus their marketing activities.

The usual approach to forecasting air travel demand is to combine quantitative and qualitative techniques. Quantitative models predict travel demand based on past relationships with a range of explanatory variables, such as disposable income, real exchange rates, and air fares. Unfortunately one common problem associated with models of this type is that they do not account for the emergence of new factors influencing travel demand. Hence, quantitative model outputs are usually 'adjusted' by applying a set of qualitative judgements of the effect(s) of emerging events or forces. Examples might include one-off events such as the Sydney Olympics, or even more significantly, longer term influences such as the use of emerging telecommunications technologies.

In particular, there is a strong potential for high quality videoconferencing to replace face-to-face business meetings, which would otherwise have involved air travel. There is not currently a great deal of evidence to suggest that airline or airport planners are taking this last factor into account in their longer term demand forecasts. The failure to do so has the potential to result in over-inflated estimates of future air travel demand.

There are a number of reasons to assume both that videoconferencing *will* become a significant and integral part of business communications, *and* that in doing so it will inevitably lead to some diversion away from face-to-face meetings that would otherwise have involved air travel. These reasons include: trends toward globalisation of business and the associated requirement for more communication over large distances (within and between geographically dispersed companies); continued pressures on business to find more timely and cost effective means of communicating; and generally, a growing acceptance of technology and its role in business. This view is supported by a growing body of international literature, which is referred to in the following discussion.

## Videoconferencing

Videoconferencing is when two or more people use a combination of video, audio and data for the purpose of interactive, real-time communication over a distance. It allows people to work on a document or hold discussions as they would across a desk, in effect providing a close simulation of the interactions of a face-to-face meeting.

A simple example might be two engineers, one at head office and one at a regional factory, discussing the final design of a new product. They both have cameras,

microphones and speakers mounted on their computers. They both have access to ISDN connections<sup>1</sup> which they use to transmit the information, sound and images for the videoconference. Their computer screens show two windows, one which allows each engineer to see his colleague, the other which allows either engineer to make real-time interactive modifications to the engineering drawing. After trying a few design changes they are able to conclude the meeting with an agreed product specification and a manufacturing timetable. Previously this interaction would have required the head office engineer to visit the factory or vice versa.

A more complex example might involve the biannual regional managers meeting within a large corporation. Instead of the regional managers all flying to head office for the day, they each use their meeting room videoconferencing equipment to connect to the other meeting rooms in a multi-point videoconference. They use multiple ISDN lines or a broadband connection over a private ATM<sup>2</sup> network for transmission. Each participant presents his or her divisional report using document conferencing equipment and shared whiteboards — during which the other managers can interactively ask questions. The managers can bring in as many support staff as, and when, required by the meeting, and use data directly from their local computing networks, two advantages that travelling to a meeting at head office would have precluded.

These two examples make sense, but clearly not *all* face-to-face meetings can be replaced by videoconferences. Some types of business communication have more potential for substitution by videoconferencing than others. In some situations videoconferencing offers a closer alternative than others. Examining the attributes of different types of meetings reveals those with the most and the least potential for substitution.

*Intra-company meetings:* One of the primary reasons for intra-company travel is due to the need for remotely dispersed sections of an organisation to meet periodically. Intra-company meetings are moderately susceptible to substitution by videoconferencing because participants are generally familiar with one another and more people can be involved in each meeting without a significant additional travel cost.

*Inter-company meetings:* In order to secure a new supplier, client, customer, or business associate, business people tend to 'travel and meet' to discuss the business relationship and negotiate deals. When forming new business relationships or negotiating important or complex deals, the physical presence of participants remains important. The handshake is still a vital part of business, and people can often regard face-to-face

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<sup>1</sup> Integrated Services Digital Network (ISDN) is the most commonly used infrastructure for videoconferencing transmission. This allows large volumes of information, which is necessary to transmit audio, video and data simultaneously, over ordinary copper telephone lines.

<sup>2</sup> Broadband connections, such as ATM (Asynchronous Transfer Mode), provide very high capacity dedicated connections over specialised infrastructure. At present this kind of transmission medium is likely to be available only when an organisation has specific need for high volume data transmission in their daily business. Banks which transmit transaction records to a central data store are a good example.

communication as a sign of willingness and commitment to the business relationship. For these reasons inter-company dealings have *less*, but still significant, potential for substitution by videoconferencing, at least until the business culture changes as a generation more comfortable with new communications technologies joins the workforce.

*Internal training and development:* Some potential exists for substitution to videoconferencing-based training where company training courses are presented in a traditional classroom forum. This can be seen in the fact that many educational institutions now have distance learning programs which make use of videoconferencing. However, not all training is substitutable. In general, hands-on practical or interactive training has a greater requirement for attendance in person.

*Conferences/forums:* Attendance in person at conferences and business fora is often seen as necessary to facilitate personal interaction, build and reinforce business networks, and of course, for presenters to speak in front of the audience. For this reason, the potential for substitution is relatively minor. However, with the improving quality of videoconferencing and the integration of remote electronic presentation equipment, some decline in the perceived need for physical attendance might be expected. While current perceptions (and cultural expectations) are the main inhibiting constraint on substitution to videoconferencing presence at such forums, for future generations this may well not be such an issue.

The potential for substitution away from meetings of different types has been indicated by research carried out in the United States. Hughes (1993b) reports the results of research by Arthur D Little Inc, a US consulting firm, studying the effects of videoconferencing on twelve New England airports. The following table shows estimated reductions in US domestic business air travel by 2010 (due to replacement by videoconferencing).

**Table 1 Replacement of US domestic air travel by videoconferencing (source: Hughes, 1993b, p39)**

Non-discretionary trip purposes	Per cent distribution by trip purpose	Per cent reduction in domestic air travel for trips in this category	Weighted average reduction in business trips (%)
Intra-company	14	30	4.20
Inter-company	40	15	6.00
Conferences	15	5	0.75
Training	15	15	2.25
Other	16	5	0.80
Total	100	n/a	14.00

Corroborating findings are reported in Stephenson and Bender (1996), who also found that the *purpose* of the trip is important in the decision to substitute telecommunications

for face-to-face meetings. Their 1994 survey of over 800 US corporate travel managers found that:

- 92 per cent of respondents had substituted telecommunications for *some* trips concerning *internal* company business;
- 53 per cent of respondents had substituted telecommunications for some trips concerning *company group* meetings; and
- only 29 per cent of respondents had substituted telecommunications for some trips concerning *company-to-company* business.

### **Factors influencing substitution**

While the *potential* might exist for videoconferencing to substitute for business air travel, there are many factors that will ultimately influence the choice of which communications mechanism is actually used. Among these are: the relative costs of the different options; the relative quality of the alternatives; potential productivity and time savings; and the cultural acceptance of videoconferencing as a form of business communication

### **Costs**

Stephenson and Bender (1996) report the results of a survey of corporate travel managers in which 96 per cent of respondents said pressure to reduce travel costs was a factor contributing to the decline in business air travel at that time in the US. When asked whether their company had plans to increase its use of any telecommunications services as a substitute for business air travel in the following ten years (~ to 2004), 50 per cent of respondents said *yes*, and when asked whether they thought telecommunications would replace a major part of the United States' business air travel within the next ten years 36 per cent answered *yes*. The most common response to the question of what conditions would accelerate telecommunications substitution for business air travel was *reduced telecommunications equipment costs*, eliciting a response of 71 per cent.

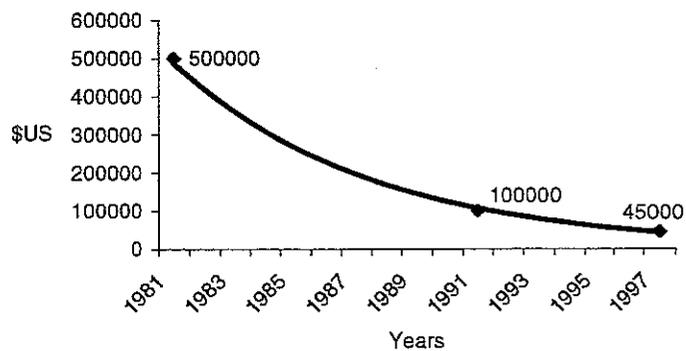
This supports the premise that the primary factor for choice between close substitutes such as these is that of cost. Firms try to maximise profits, and in doing so they will rationally chose the least cost alternative to adequately meet their communications needs. Therefore, to determine which alternative will be chosen we need to examine the relative costs to a firm of using videoconferencing and business air travel

### **Videoconferencing costs**

A variety of different types of videoconferencing equipment and transmission infrastructure are available. These vary significantly in the cost and the quality they provide. The cheapest systems involve the addition of a camera (costing as little as \$US100 (Videoconference.com, 1997a)) to an ordinary PC, the use of free software,

and an Internet connection. The most expensive systems can cost up to \$US150 000 (Videoconference.com, 1997b), and involve installing multiple cameras, microphones, a sound system and a wall projector for life sized images in a company's boardroom. On top of this a high bandwidth connection is needed. While the cheapest options are of course not currently of an acceptable quality to offer a viable business solution, it is worth noting that the costs of the more sophisticated (high-end business) systems are falling.

*Equipment:* Feldman (1993) states that, in 1981, a dedicated boardroom videoconferencing facility cost \$US500 000 to set up. In 1991, Salomon, Schneider and Schofer reported that a dedicated videoconferencing room cost \$US100 000 to set up. In 1997 Telstra Corporation (1997b) indicated the cost of a middle of the range boardroom system was in the order of \$A70 000 (roughly \$US45 000). Figure 1 below uses these numbers to illustrate the historically declining cost of videoconferencing equipment.



**Figure 1 Declining cost of videoconferencing equipment. (Sources: Feldman (1993); Salomon, Schneider and Schofer (1991); Telstra Corporation (1997b))**

The drop in price over time can be explained largely by improvements in, and falls in the price of, component technology. As technology has advanced microprocessor speeds have improved and compression/decompression has become more sophisticated, contributing to falls in component and production costs.

An additional factor contributing to unit cost reductions is the increase in uptake of videoconferencing equipment. Videoconferencing equipment, as a product, is in the early phase of its lifecycle. Theory tells us that at the start of a product's life it has a high unit cost as development costs are recouped from a low volume of sales. Gradually, as more people become familiar with the new technology, sales increase and production economies of scale and, to a lesser extent, scope lead to a decrease in unit costs. A good example, and one closely related to videoconferencing equipment, is that of personal computers.

With no apparent slow down in the pace of technological development, and a predicted increase in demand for videoconferencing, the cost of equipment can be expected to continue to fall.

**Transmission:** Transmission infrastructure requirements present a cost for videoconferencing over and above the cost of the equipment. Integrated Services Digital Network (ISDN) connections, operating over ordinary phone lines, offer the network capacity required for good quality operation of most videoconferencing equipment and are currently the most common type of connection used for videoconferencing. ISDN connection fees range up from \$A295. Monthly rental charges range up from \$A60, and time- and distance-based usage charges range up from approximately \$A13 per hour for a connection between capital cities (Telstra Corporation, 1997a). Although it is uncertain if ISDN prices will fall substantially in the near future, they are unlikely to rise, especially as better alternatives become available in the future.

Overall then, we can expect the *combined* costs of videoconferencing equipment and access to transmission infrastructure will continue to fall in the foreseeable future.

**Air travel costs**

In comparison, the cost of doing business over distance, via face-to-face meetings, includes the air fare, taxi fares, car parking or rental fees, and the cost of meals and accommodation (if the trip involves an overnight stay). In the majority of cases the biggest component of these costs will be the air fare.

Real Australian domestic air fares over the last five years have been moderately flat, in the case of economy, and in the case of business have even shown a trend increase in price. Current economic conditions are not forecast to change for the better in the short term, and as airline business is typically pro-cyclical it is apparent that there is limited (if any) scope for airlines to reduce air fares.

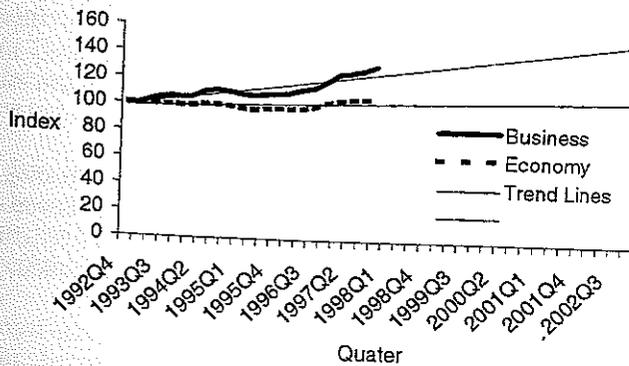


Figure 3 BTE indices of real domestic air fares in Australia (Source: BTE Indicators, May 1998)

Figure 3 illustrates the recent history of Australian domestic air fares, via a real price index of the weighted average top 100 routes. Trend line extrapolations of these data illustrate a, not unlikely, picture of the cost of air fares over the next five years

#### Relative costs of videoconferencing and air travel

The preceding discussion has illustrated that, in absolute terms, videoconferencing costs are likely to fall, and that air travel costs will at best remain static, or even rise. Therefore, in relative terms, videoconferencing will continue to become cheaper in comparison to the cost of air travel.

#### Quality

One of the primary arguments against videoconferencing as a substitute for business air travel is that videoconferencing is not of an acceptable quality to provide a realistic alternative to a face-to-face meeting. To provide a mechanism to allow for a 'natural' interaction there are certain attributes that the videoconferencing experience must have. Many of the issues, intrinsically referring to the *quality* of videoconferencing, are of a technical nature.

*High resolution images*, providing clear pictures, are required so as to allow easy interpretation of body language. Images also need to be large — they must be of a size which shows enough detail to easily make out facial features and the nuances of facial expressions. Without reasonably sized high resolution images the benefits of videoconferencing, over and above mere convenience, which is also offered by the telephone, can be lost.

A *high frame rate* is required to achieve what is often termed 'television quality' images. In simple terms this means the on-screen image is updated fast enough so that movements do not seem jerky. High frame rates require advanced compression/decompression algorithms to be used and/or a lot of capacity for transmission. Information can be lost when using low frame rates, especially in terms of the body language of animated conversations, or when people gesture to indicate presentation material.

Without *synchronisation* between voice and images videoconferencing can be ineffective. Problems also arise when there are transmission delays between the time one person speaks or moves and when the people at the other end of the videoconference hear or see them, especially in highly interactive applications.

Finally, videoconferencing must be *easy to use*. Historically, technicians were required to set up connections and deal with any problems experienced during the videoconference. This meant additional expense and organisation for every videoconference undertaken.

In the past, these technical quality concerns have all been valid. However, videoconferencing quality has improved significantly in recent years. Improved compression/decompression, better synchronisation between audio and video, increased image resolution, and increased ease of use have made videoconferencing a more acceptable form of everyday business communication. Continued research and development leading to advances in technology will drive continuous improvements in videoconferencing into the future. As the quality of videoconferencing improves, even if the improvements are offered at a constant market price, the extent to which videoconferencing and face-to-face meetings will be substitutable can only increase.

### **Productivity gains and time savings**

There are several other costs and benefits of both videoconferencing and business air travel which will, to some extent, influence the degree to which, and when, videoconferencing will substitute for business air travel.

Cook and Haver (1994) report that videoconferencing may not be purely set up with the goal of travel cost savings. They suggest that, whether or not an objective of implementing the technology, videoconferencing results in significant productivity and efficiency gains. Benefits cited include quicker decision-making time frames and the ability to call on the spur of the moment.

Mokhtarian (1997) points out that benefits are also achievable in the areas of work effort, development and training, as well as in decision making. Ritter and Thompson (1994) report that videoconferencing represents a source of potentially huge time savings as opposed to conventional travel. Instead of staff spending significant time in transit, videoconferencing can allow instantaneous virtual transportation to almost anywhere. Another advantage of videoconferencing is that more staff can cheaply participate in the meeting, whereas one physical attendee (note the high marginal cost of extras) requires briefing and debriefing.

Other benefits of videoconferencing include the elimination of indirect costs of business air travel. These include the opportunity cost of the employee's time spent travelling (that is, forgone productivity while out of the office), and any additional losses of this nature due to time spent in land transit on the way to and from the airport.

Costs of disruption to the business working schedule resulting from travel requirements can also be considered as an indirect cost of business air travel. Furthermore, some individuals just do not like travelling, especially if it involves being away from family overnight, if they travel often or if they are prone to air sickness.

### **Cultural acceptance**

Cultural acceptance of videoconferencing as an effective form of communication remains an issue. It has been suggested that electronic communication leads to a loss of some of the important social and psychological aspects of the communication. One of these is that videoconferencing meetings tend to take on a more result-oriented focus and a more formal structure than a face-to-face meeting. These characteristics are seen as detrimental for group bonding and as a consequence, the effectiveness of communication within the team.

The ability of cultural factors to influence the cost and quality forces for substitution is not estimated. However, it is worth noting the research of Svenning, Ruchinskas and Hart (1993), reported in Mette (1995). This looked at regular users of videoconferencing and focused on communications behaviours, attitudes, preferences and communication needs. The study found that regular users of videoconferencing assessed video meetings favourably when compared with face-to-face meetings.

### **Factors inhibiting substitution**

Some factors, of course, inhibit the use of videoconferencing to replace business air travel. Some people are not comfortable being on camera and videoconferencing is likely to cause these people a significant amount of stress. Further, business travel, when used as a reward for hard work and commitment, can boost productivity.

Cook and Haver (1994) emphasise the importance of the physical handshake in terms of securing a business contract or a new supplier/customer. The handshake is paramount to the current accepted means of conducting and establishing business. Personal contact is also of particular importance in doing business internationally. Overcoming cultural barriers can be sensitive and require experience and close reading of situations to be effective. These situations are often best handled in person.

Also, it's been argued that getting out of the office, a change of scenery, and having time to relax during transit can improve the productivity of employees. However, it's interesting to note that a field trial of videoconferencing in the UK reported by Bennison (1988) found an overwhelming view that a *decrease* in business travel was personally beneficial.

### **How much substitution?**

Videoconferencing clearly has the potential to substitute for *some* types of face-to-face meetings and hence *some* business air travel, but how much and in what time frame? These questions have been asked by a number of researchers, and their conclusions are discussed below. Of the papers reviewed that made any kind of predictions about the effects of videoconferencing on business air travel, opinions fell into one of three categories:

- no effect;
- some substitution but the level is not estimated; and
- some substitution, with an estimate of the magnitude.

#### No effect

Greenslet (1996) is the only paper we reviewed which predicted that there will be no effect at all. Greenslet, in evaluating the prospects for US major airlines from 1995 to 1999, believes that videoconferencing (as a possible cause for concern to airlines) is really a replay of the complaint that new technology will destroy our jobs and businesses.

He makes two points that summarise his opinions on the net effects of telecommunications. One, that the question is not relevant to the five year forecast frame (1995-1999), that is, the effect if any, will be negligible. Two, that much of the same technology being discussed as a threat to the airlines will be used by them to reduce their own internal costs (for example, the costs of ticketing) presumably offsetting any reductions in profits.

It is worth noting the time frame in which Greenslet's conclusions are focused (to 1999). Other researchers, particularly those who have made estimates of substitution, have used longer time frames.

#### Some effect - how much is not estimated

Much of the research currently available reported findings which support the conclusion that there will be some substitution but do not quantify the effect. A sample of the research highlights the authors' conclusions and their reasons why the level of substitution was not estimated.

Feldman (1993) reports anecdotal information on the replacement of travel by videoconferencing. A survey of Fortune 1000 telecommunications and information technology professionals reported by Feldman revealed that one third reported *little impact* on business air travel, 16 percent replaced *a lot* and 51 percent replaced air travel *somewhat*. This article details the productivity gains and improvements in communications from the use of videoconferencing, highlighting that this is not just a tool used as a replacement for travel. Differing opinions on the level of use of videoconferencing for travel replacement and for new communications leads Feldman to conclude that there is already some replacement of air travel by videoconferencing, but the ultimate level of substitution remains to be seen.

Stephenson and Bender (1996), referred to earlier in this paper, report the results of two surveys, one of corporate travel managers and one of business travellers. Both surveys provided evidence that videoconferencing has the potential to replace some business air

travel, but the information collected did not allow them to draw any conclusions as to the level of the substitution.

Button (1992) examines the potential transport impacts of a fall in the costs of videoconferencing. Evidence from users and non-users of videoconferencing in the UK suggests that the falling cost of videoconferencing coupled with increased costs and frustration with travel could lead to a greater use of videoconferencing as a substitute. Button states that, overall, it is almost impossible to quantify the impact with the amount of data he had available at the time.

#### Estimates of the magnitude of substitution

A survey of 128 companies in the UK and Ireland, carried out by Cook and Haver (1994), showed that in the short term videoconferencing would result in a reduction of less than 1 per cent in expenditure on international air travel. Cook and Haver conclude that the extent of the impact of videoconferencing on business air travel in the longer term will only become apparent when videoconferencing usage becomes an established part of corporate culture around the globe.

Research by Apogee Research Inc, reported in Mudge (1996), looks at technological trends in the telecommunications industry and then examines more closely those that seem most likely to affect business air travel demand. Econometric models were used to forecast business air travel demand, and the impacts of videoconferencing were included through estimates of substitution potential for specific business travel purposes. Mudge concludes that interactions between the telecommunications industry and business make it difficult to foresee the net effect on business air travel. However, estimates of substitution ranging from 2 to 11 per cent by the year 2005 are made by Apogee Research Inc.

Research by Arthur D. Little Inc, reported in Hughes (1993a and 1993b), to determine the impact of videoconferencing on twelve New England airports — based on European research — estimated that videoconferencing would result in a 14 per cent reduction in business air travel in the US domestic market by 2010. Also reported by Hughes is a 1992 European study which estimated that future trip reductions due to telecommunications could be as much as 13 to 23 per cent by 2010.

Arvai (1994) forecasts the most dramatic impact of videoconferencing on business air travel. This impact is expected to become apparent as *desktop videoconferencing* becomes affordable and commonplace. Projections for the substitution of business trips were made based on surveys of US businesses operating domestically and internationally as well as market penetration data and forecasts for telecommunications technology. Arvai projects a 25 per cent substitution for business travel by air by 2010, and potentially a 35 per cent substitution by 2020.

**Table 2** Projections of the effect of videoconferencing on air travel

<i>No effect</i>			
Greenslet (1996)	Nil effect in the time frame of 1995-1999.		
<i>Some substitution - but the level is not estimated</i>			
Stephenson and Bender (1996)	Net substitution effect concluded from survey of corporate travel managers and business travellers.		
Button and Maggi (1995)	Greater use of videoconferencing likely in near future (some substitution of air travel but also some stimulation). <i>Net</i> effect not quantified.		
Czeck (1995)	Some (but not <i>all</i> ) businesses have experienced a reduction in business travel, but videoconferencing <i>may</i> increase the <i>need for and desire to</i> travel		
Feldman (1993)	Although focus is on potential improvements in productivity and efficiency due to videoconferencing, a net substitution effect is predicted in the medium term.		
Button (1992)	Greater use of videoconferencing likely in the future (but actual impact not quantified)		
<i>Quantifications</i>			
		<i>%</i>	<i>Time</i>
Cook and Haver (1994)	Less than 1% substitution in the short term, in the longer term results were less clear.	<1%	Short term
Boeing (1996)	3% substitution of air travel by 2015, however there's the <i>potential</i> for offsetting of this by a stimulatory effect of improved economic and social communications.	3%	2015
Mudge (1996)	Business travel substitution of 2-11% over the next decade, however <i>net</i> effect <i>may</i> be zero when accounting for <i>stimulation</i> of travel.	2-11%	2005
Hughes (1993a)	By 2010, 13-23% of US business air trips will be replaced by videoconferencing — mostly being longer distance trips.	13-23%	2010
Hughes (1993b)	By 2010, 14% of US domestic business trips replaced by videoconferencing By 2030, 8-12% of <i>global</i> air travel replaced by videoconferencing	14% 8-12% (global)	2010 2030
Arvai (1994)	25% substitution of business air travel by 2010. Impact greater for short trips over long distance	25% 35%	2010 2020

### Future research

Videoconferencing and its potential to negatively impact on future air travel demand is clearly an issue for forecasters. Overseas research by and large concludes that there will be some substitution in particular markets, although the level and timing of the predicted substitution varies. While there is a lack of empirical research into the effects of high quality videoconferencing on business air travel within Australia it seems reasonable to assume the overseas findings are broadly applicable.

However, this hypothesis should be tested. Case studies of particular Australian industries could make a valuable contribution to information on different ways in which videoconferencing is being used, especially in those sectors with particular characteristics which might enhance the potential for videoconferencing, such as intensive communications needs or highly dispersed staff.

Overseas research has so far been based primarily on surveys — largely because of the absence of historical data for what is a relatively new phenomenon. Similar surveys could be undertaken in Australia as an initial attempt to gather information on the current use of videoconferencing and the potential for substitution more specifically in Australia. Or even more easily, Australian industry could be asked whether the types of projections being mooted in overseas studies could be considered as transferable to Australia, at least in terms of broad magnitude.

In conclusion, we believe that it is important that forecasters are aware of the emerging phenomenon of videoconferencing and its potential to substitute for business air travel. As further research is undertaken, the effects of videoconferencing on Australian business air travel can be included, as appropriate, in forecasts of air travel demand, thus assisting the efforts of airlines, airport planners and tourism operators.

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