

**The Effects of Air Transportation on Economic Development: The Potential
Impacts on the Europe Economy of Further Liberalization of the Transatlantic Air
Market**

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ABSTRACT

There has been a large body of work completed looking at the implications of surface transportation on location patterns of industry. With the exception of a number of local impact studies rather less has been done on air transportation impacts on industrial behavior. Air transport, however, carries a significant amount of trade by value, is an important input into attracting and retaining the "creative classes" in locations, and is extremely spatially flexible. This paper looks at the work that has been completed on the role of air transport in affecting local economic performance, and offers a critical assessment of what is actually known and the extent to which many of the studies conducted have been excessively narrow in their orientation. It also seeks to add to the body of knowledge by looking at the potential implications of further freeing the economic regulations governing transatlantic air travel. The recent provisional agreement involving the European Union Commission to move towards greater liberalization of the transatlantic aviation market by late 2006 represents a continuation of the regulatory reforms in the sector. While considerable effort has gone into looking at the implications of the regulatory changes to-date, much of this work has looked at the implications of 'deregulation' on the air transport sector rather than on the wider economic benefits to the national and regional economies involved. This paper examines the potential effects of the opening-up of the transatlantic market in a wider economic context.

INTRODUCTION

The aim here is to look at the role that air transportation can play in stimulating economic development. To make the discussion manageable a particular sub-set of issues is taken, namely those concerning the economic impacts of deregulating international air transportation markets with a particular focus on the North Atlantic market and the European component of that market. This has been the basis of considerable policy debate in recent years but largely in terms of the implications for the airlines and other actors in the air transportation supply chain; the economic development effects have received less attention.

International air transportation has until recently been one of the most regulated of industries. The Chicago Convention of 1944 laid down a basis upon which a system of international bilateral air service agreements (ASA) was founded¹. This was a compromise arrangement that attempted to reconcile the very liberal, free market ideas of the US on the one hand and the more restrictive ones of countries such as Australia (that wanted a single global carrier) on the other. There were particular fears in some countries that the US, that had the largest fleet of commercial aircraft at the time and the potential of adding to this by converting

* I would like to acknowledge the assistance of Jonathan Drexler in the preparation of this paper.

¹ The Convention also established the United Nations' International Civil Aviation Organization (ICAO) to oversee international agreements. Importantly, the ICAO also has remits that cover a range of safety and security oversight matters that has largely allowed these to be treated separately to issues of economic regulation.

surplus military hardware, would dominate any largely market based outcome and thus an institutional structure emerged that led to piecemeal, and restrictive, practical arrangements.

The Convention did not stipulate any particular form of international service structure but rather established national sovereignty over airspace and an institutional framework within which nations could essentially trade these rights (“freedoms of the skies”) amongst themselves. The outcome was a mass of bilateral agreements between countries that, in general, stipulated which airlines that could fly between them, the capacity of each airline, the fares to be charged, and, often, how the revenues generated were to be shared between the carriers. Similarly, air navigation services were sovereign responsibilities and a patchwork of systems emerged that impinged upon any notion of seamless air travel.

These restrictive bilateral ASA regimes were, at the time, seem as a step forward from the *ad hoc* and often opaque institutional structures that existed before and came at a time when international air transportation was still relatively new with many markets small and embryonic after the devastation of the Second World War. Because of this, they probably did little to impede the development of the sector for some time. Additionally, domestic markets were normally regulated although the structured differed between countries. In some countries there were single state owned monopoly carriers whereas in others, such as the US, there were private airlines, but competition was highly regulated. In many cases, institutional barriers prevented domestic and international carriers of a country operating in each other’s markets.

The macro-economic conditions of the late 1970s (“Stagflation”), combined with background pressures generated by a series of academic studies, led to a sea-change in policy thinking. The US initially legally removed most economic regulation from its domestic market in 1978 and other countries, either through *de jure* reforms or *de facto* actions, gradually loosened theirs. The move towards greater economic and, to a lesser degree political, integration in Europe in the 1990s brought with it the creation of a Single European Market, including that for air services. This embraces not simply the ability of airlines that meet safety and environmental criteria and do not violate European Union (EU)² competition policy from operating anywhere within Europe, but it also removed any ownership restrictions for airlines offering purely domestic or intra-Union services.

International air transportation deregulation was generally slower to emerge than domestic reform because of the need for a double coincidence of interests. US policy makers first mooted the general idea of bilateral “Open Skies” policies to replace the highly restrictive air service agreements as early as 1979, but it took another dozen or so years before the first major one, with the Netherlands, was signed. Since that time, a further 50 or so liberal agreements, of varying importance, have been signed between the US and partners, including many European states. The emergence of the large free trade area in air transportation service within Europe from the mid-1990s was another element in freeing-up other international markets by having both knock-on and demonstration effects for regions outside of the European area.³

The paper proceeds by initially reviewing the literature dealing with the potential economic development effects of air transportation to give some general context, although most of this relates to infrastructure investments rather than institutional reforms. It then provides some details of the nature of the institutional reforms that have occurred in air transportation and their impacts, albeit mainly on the airline industry, prior to looking at the specific development effects of liberalizing the North Atlantic market.

ANALYSIS OF ECONOMIC DEVELOPMENT

The last 20 years have seen renewed interest in the factors that influence regional economic growth. Some of this interest stems from timely academic work; in particular the work of Aschauer (1989) on the importance of public expenditure on infrastructure and Romer (1990) on the role of research and development on differential spatial economic performance. But institutional changes have also been

² For ease of drafting, the title European Union is used throughout although legally it has changed over time.

³ Organization for Economic Cooperation and Development (1997) provides an account of wider trends in international air transportation, and offers some alternatives for moving forward with market liberalization.

important with, for example, the problems of integrating poorer regions of the EU into the core. In the US, the seemingly never ending public debate over the role of public expenditure in macro-economic management has played its role. Much of the emphasis in Europe, however, has been on transfers between regions and, in particular, on the improvement of access for peripheral states.

The Trans-European Networks (TENS), initiated in 1996, are at the core of this policy of EU spatial integration. A number of key modal and intermodal networks have been defined with the European Commission having earmarked funds for network improvement and development. Of immediate interest, these networks include airports, air traffic management network and satellite positioning and navigation networks; in air transport the development of the Single Skies initiative is intended to enhance the efficiency of aviation infrastructure within the Union. The analysis and prioritization of these large infrastructure initiatives have called for a better understanding of what leads to economic growth.

Despite the widespread importance that is attached to having optimal transportation service provisions – it regularly emerges as the second most important factor, after the availability of suitable labor, cited by business men in influencing their industrial location and expansion plans – its role is far from fully understood. Much of what is known about air transportation largely comes from local, one off impact, studies of airport investment. Although the impacts of infrastructure investments are unlikely to have exactly the same impact as changes in international airline market access and pricing rules, they do offer some very important preliminary insights.

Local development effects of transportation infrastructure investments

While the debates over the macro significance of transportation infrastructure still need final resolution, the local geographical implications for locations adjacent to new airport facilities is less murky. This body of analysis is also important because many policy questions ride at least as much on who benefits from an action as on the overall net effect of that action. This is so in the case of any market liberalization.

Economic impact studies are often mandatory when investments are made in air transportation infrastructure and essentially seek to assess the income and employment of the action. The techniques vary, which in turn influence the results, but quantitatively, the economic impacts of an investment in transportation infrastructure depend primarily both on the time frame examined and on the geographical space under review; indeed very much like that for regulatory reforms. In broad terms, infrastructure enhancements have four potential economic impacts of varying duration and spatial coverage:

- *Primary effects.* These are the benefits to a region derived from the construction or expansion of the transportation infrastructure such as the design of the facility, its construction, the installation of supplementary hard and software, etc. These effects represent once-for-all injections of expenditure into the local economy with associated employment in industries involved in infrastructure planning, construction and development. These types of effect are transient, lasting no longer than the construction itself, and should be seen to act more as Keynesian stimuli than as development factors. Insights on these types of effect have limited relevance for consideration of market liberalization measures.
- *Secondary effects.* These are on-going local economic benefits of running and operating the transportation infrastructure such as employment in maintaining and repairing the facility, handling traffic, policing, etc. These secondary effects can be extremely important to some local economies in terms of employment, income and, for local government, additions to taxation revenue. While important, and accepting that they can generate important multiplier effects, they are not the main development rationale for infrastructure investments nor are they for any regulatory changes.
- *Tertiary effects.* These stem from the stimulus to a local economy resulting from firms and individuals having improved air transportation services at their disposal. A large part of modern industry relies on good quality transportation to support just-in-time supply chain production. The importance of the air transportation, international access in particular, varies according to location

and the type of production involved; access to high-quality and appropriate transportation infrastructure can act as catalysts to attract mobile industry, to nurture the growth of local firms, and to attract foreign investment. Technically, it can push output up the local production function and, through resultant economies of scale and scope, create, expand, and retain centers of employment.

- *Perpetuity effects.* These reflect the fact that new forms of economic growth, once started in a region, become self-sustaining and may even accelerate. Availability of good transportation links can change the entire economic structure of a region as it can shift its aggregate production function rather than just bring about a movement similar to the tertiary effects. The change from Florida, being primarily an agricultural based economy to one with a large and profitable international tourist sector, is an example as are some of the mega high-technology clusters that have emerged around places such as Heathrow Airport in the UK or Washington Dulles International Airport in the US. These changes would have been very unlikely without good international and domestic air transportation services.

While it is interesting to isolate these beneficial effects in theory, there remains the practical questions of how large they are and whether they are affected by measures to reduce distortions in the international airline markets. It is also often challenging to isolate the individual components that may be important when looking at specific sectors of the economy. There are basically three ways of getting a handle on these issues:

- It can be done through questioning those involved in the provision of the air transportation services in the area or who are involved in local industry as consumers via so-called expert opinion analysis, or “stated quantitative analysis”. This method does, however, pose problems of ensuring appropriate views are elicited and that there is objectivity in the responses obtained. It can become a basis for lobbying rather than one of analysis if due caution is not taken.
- It can be done using local Keynesian multipliers or input-output analysis by tracing through the implications of local expenditure on air transportation either in aggregate (multipliers) or by sectors (input-output analysis). It is a technique often deployed in transportation impact assessments and is the mainstay of many consultancy studies. However, there are issues of the geographical coverage of the analysis and the time frame to consider (e.g., which type of effect is actually being captured), as well as the values of the multipliers that are used and their stability in situations where there may be supply constraints – e.g., airport or air navigation capacity limits.
- Finally, there are econometric methods that make use of statistical techniques. These can be highly complex and can be structured to determine the specific implications of airline services for an economy when a variety of other developments are taking place in parallel. But while offering the ability to isolate the effects of changes in air transportation policy on local development, they do pose problems of ensuring an appropriate model specification and in using correct estimation procedures. They can also prove to be highly data intensive and have a poor track record for including less quantifiable effects.

Quantification of development effects

Irrespective of the analytical methodology used, the body of evidence on the potential scale of positive local secondary, and tertiary effects of most air transportation provision on economic growth is compelling.⁴ Pulling all the information that we have of standard impacts is not practically possible, but some general impressions can be gleaned on the importance of air transport infrastructure from the selection of results seen in Table 1.

⁴ That does not mean that all air transportation initiatives have positive economic growth effects as the history of Canada’s Mirabel Airport demonstrates.

Table 1
Micro-studies of the benefits of enhanced air services

Survey Techniques

- The Atlanta Chamber of Commerce found from a survey 264 foreign-based firms, that availability of direct international services was the third most important factor in location decisions. Subsequent study showed that the number of foreign firms locating in the region from a particular country grew significantly after the introduction of a non-stop service.
- Ernst and Young, looking at location decisions of 57 companies in Europe making decisions regarding the location of a manufacturing plant found that the air transportation network was the third most important factor in the decision process. Air services were much more important for service sector companies.
- The Amsterdam Chamber of Commerce found that the availability of an airport was one of five key factors considered in company relocation decisions.
- A survey of firms around Zurich found that 34% considered the airport as ‘very important’ and 38% as important as a location factor.
- Loudoun Chamber of Commerce (Virginia) found that airport/freeway access was important to 68% of firms.
- A study of small business firms in the Washington area that were engaged in export activities found the availability of easy access to international air transportation one of the six most important factors in their success.

Multipliers

- An academic study by Rietveld estimated that Schiphol Airport (Netherlands) generates about 85,000 jobs for the country.
- A study of Vienna International Airport by Industriewissenschaftliches Institute in 1998 indicated that on a turnover of ATS25 billion in 1996, there was an impact of ATS11.2 billion on the local economy.
- The Institute of Social and Economic Research found that the total annual economic importance of the air transportation services offered from Anchorage International Airport on local payrolls was \$130 million above the \$316 million for on-site activities.

Econometric

- Analysis by George Mason University taking variations in high-technology employment across all US Metropolitan Standard Areas, found that an airline hub in a region increases that region’s new economy employment by over 12,000.
- Brueckner looking at possible expansion of Chicago O’Hare airport found that an increase of airline passenger traffic of 50% would increase service related employment in the region by 185,000 jobs.
- An econometric study by Science Applications International of the implications of the Open Skies agreement between Germany and the US on the regional economy around Hamburg Airport found annual gains for the regional economy of \$783,318 in 1994 prices.

Source: adapted from Button (2004)

These studies are in no way atypical. Their detailed findings differ as may be expected given the geographical coverage they embrace, the variety of techniques used, and differences in the forms of air transportation infrastructure investments considered. They all, however, offer fairly strong support for the notion that appropriate infrastructure investment in airports and air navigation systems can generate significant local economic benefits.⁵ Some caveats must be attached to a number of these studies, however, that only look at a single facility. Airport development inevitably leads to some transfer of passenger, and *ipso facto* economic benefits, from other facilities reducing the overall net gain. The more congested the overall system of airports is, the less severe this effect in most cases; the aggregate demand for airport use is strong. Given the congested airport situation in Europe (Reynolds-Feighan and Button, 1999), intuitively there would seem little potential for over estimation of benefits.

Studies of the implications of enhanced international air transportation on the economic performance of an area are much less numerous. Button and Taylor (2000) examined of impact on large US metropolitan areas

⁵ A less tangible measure of the importance that industry places on having freer international air transport markets can be found in the “voice” that has often been exercised for reform (e.g. International Chamber of Commerce, 2000).

of having European services and found that employment was systematically positively related to both the scale of services offered by the supplying airlines and the range of destinations served. In an hypothetical example of a US city, an increase in international destinations served in Europe from 3 to 4 would mean some additional permanent high-technology jobs in that metropolitan area, and if enplaned passengers rise from 120,000 to 160,000 (as a proxy for additional capacity) this adds another 2,900 such jobs; no attempt was made to allow for any effects on the larger labor market.⁶

ANALYSIS OF REGULATORY CHANGE

While airport and air navigation investments may have important economic development effects, the institutional structure within which airline services are provided also play. Much of the inevitable analysis of the effects of market change has focused on domestic liberalizations, with a particular focus on the post-1978 US market (Morrison and Winston, 1995). Not only is this the world's largest air transport market, and one where, because of the 10% sampling of tickets, there is an abundance of information and data, but it is also one that until comparatively recently, because of the relatively small amount of external traffic, is closely geographically bounded. Added to this the geography of the country makes air transportation the only viable mode for long distance travel, and as such stimulates public interest.

The emphasis, however, has largely been on the direct effects of deregulation on the airlines and their customers with rather less on the implications for overall employment, other than narrowly for airline personnel. The broader economic impacts on industrial structure and regional economic development have largely been assessed indirectly through impact studies of the airports that handle the larger traffic volumes. The evidence from this, combined with the few studies that have directly sought to link airline deregulation to economic development, is that more commercial sensitive domestic airline markets do facilitate economic growth in regions.

Analysis of international airline market deregulation is sparser. From the studies that have been completed, it is clear that more open air transportation markets foster trade and stimulate the growth of major industries such as tourism. Air transportation, and international air transportation in particular, is a key input to the location and production product positioning decisions of many multi-national corporations. This is not surprising given that air transport carries about 40% the world's trade by value and its importance is growing as structural economic changes take place. While excessive transportation will always be wasteful, optimal transportation supply as determined by market forces can be a major facilitator of economic development and allows countries and regions to exploit their comparative advantages more fully.

Open Skies air service agreements have not only removed restrictions governing rates and fares, market entry, and the ways revenues are allocated, but have also permitted the emergence of various forms of business alliances. Strategic alliances now dominate international air transportation: Although not all have been successful, in a commercial world there are inevitably failures, they have allowed wider network economies of scope, and density on the costs side, and economies of market presence on the demand side to be exploited. They also provide a degree of protection for airlines that would otherwise, in excessively competitive conditions that can emerge in aviation, find it difficult to recover their full costs even if they are highly efficient. This is confirmed in a variety of previous studies that have looked at some of these alliances. Although the links have seldom been explicitly drawn, the enhanced efficiency of international airlines, given the derived nature of the demands for their services, would seem inevitably to have improved the vitality and economic performances of the regions they serve.

The case for continually reviewing the nature of the institutional structure within which air transportation services are delivered becomes stronger when taken in the context of changes in the global market. Air transportation is growing in many relative new markets in Asia, particularly China and India, but it is also

⁶ Technically this analysis used a non-linear regression framework and found that the variations in high-technology metropolitan areas around US airports in the mid-1990s rose as they added additional European destinations but at a diminishing rate, as one might expect, as airlines will initially offer flights to the most lucrative places first; this is the diminishing marginal efficiency of investment effect.

forecasted to expand in some more traditional markets such as the North Atlantic; Boeing Commercial Airplane (2005) suggests a growth rate of about 4.6% over the next two decades, if current relationships continue. But even if the long-term projections prove excessive, there is a strong case for ensuring that the full comparative economic advantages of the EU economy are exploited. While there have been short term disruptions to the growth in US/EU passenger movements, the evidence is that the downturn in international trade in air services across the Atlantic that followed the events of September 11th, 2001 has passed and there is once again an outward shift in the demand for air transportation (Figure 1).

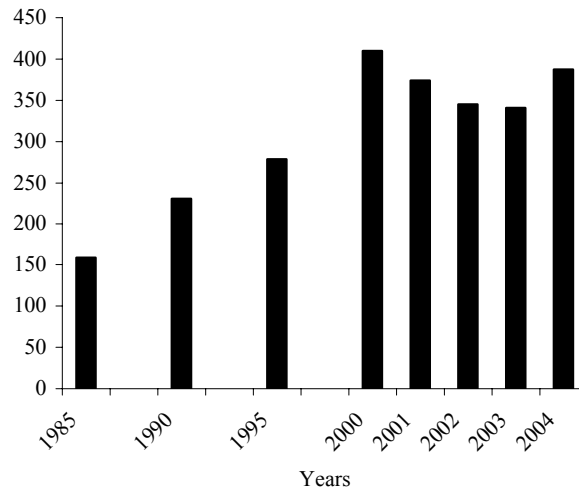


Figure 1
Trends in the transatlantic air services market

The matter is effectively one of balance. Although it would be economically inefficient to over invest, or otherwise seek to artificially stimulate this market, impeding market driven international transportation with inappropriate institutional barriers equally stymies the economic performances of the macro economies of both the US and countries within the EU. Air transportation is a matter of public concern, especially regarding safety matters, but the evidence is that market liberalization has produced net benefits.

Although there is evidence that regulatory reforms in the international air transportation market have largely been beneficial, there are groups that are, for a variety of reasons and quite understandably, at the micro-level, opposed to further reform. In the US, for example, there are military concerns about losing the lift capabilities under the Civil Reserve Air Force program that are made available at time of national emergency; US carriers provide equipment and crew at such times and there is a fear this will not be available if US carriers become foreign owned. There have been traditional concerns expressed by employees about erosion of their higher pay scales should EU workers be able to work in the US, although this argument seems rather mute in 2005 given the state of US airlines finances and the pay and job cuts employees have been taking. Equally, in the UK and other countries where restrictive ASAs still exist, there are those that would lose out should there be a regime change; for example, it would affect the relative competitive position of airlines and airports.⁷

TRANSATLANTIC AIR SERVICE BILATERALS

The nature of many of the air service agreements (ASA) governing the global international air transportation market since the 1940s have changed considerably over the past twenty-five years. They

⁷ Some of the challenges facing the authorities in Europe regarding further efforts to liberalize North Atlantic services are summarized in UK House of Lords Select Committee (2003).

have largely moved from being highly restrictive on the fares that can be charged and the capacity that is provided to become a relatively liberal regime of agreements under which trade in air transportation services is comparatively free in many parts of the world. There are also increasing numbers of very liberal multilateral agreements, as for example within Europe. There is even some very limited involvement of the World Trade Organization to remove some “soft rights” technical limitations to trade in air transportation services.

Different regions and countries have moved at their own paces, and change has not been continuous. Countries whose airlines have benefited under restrictive bilateral agreements (bilaterals) have often encountered pressures to resist reforms from their carriers and their labor forces. There have been three major developments as far as transatlantic air transportation is concerned.

The traditional ASA bilaterals

Traditional ASAs that grew up from the immediate post Second World War period varied somewhat between the country pairs involved, but had many common features. The changes that have taken place have also not been entirely consistent across country pairs. Table 2, however, provides details of the general characteristics of US bilaterals prior to the move to Open Market and Open Skies initiatives or more liberal arrangements. A major difference between bilateral ASA involving the US prior to the 1980s was that charter traffic was regulated in addition to scheduled services. In Europe, while international scheduled services were subjected to fare and entry controls, the charter market was somewhat more liberal although still encumbered by restrictions that sought to limit its use to leisure travelers.

“Open Skies” agreements

The US initiated liberal international air service agreements as a logical extension of the regulatory reforms of its domestic market; the term “Open Skies” was first used by Alfred Kahn, the chairman of the Civil Aeronautics Board, in 1979 when discussing objectives to be pursued after the enactment of the 1978 Airline Deregulation Act. Initially the response of European governments was tepid, in part because the focus of the EU at the time was more on internal transportation matters, especially surface transportation, and because the dominance of US carriers induced many European airlines to believe that they would be at a significant competitive disadvantage⁸.

The outcome was a series of “Open Market” agreements with a number of European states (the Netherlands, Belgium, Germany and Luxemburg) in the 1980s. These did not however represent a full market liberalization; government intervention was potentially significant, but rather they were a relaxation of the older regimes. They gave much more flexibility to the routes that could be served, removed capacity and service level constraints on these routes, and moved away from the double approval of fares to one based upon double disapproval. The nature of the European industry at the time, and the domination of state owned “flag carriers”, still generally limited them to one airline per route, but in many cases more than one US carrier served the same route.

The growth in air traffic as incomes grew and trade expanded, coupled with the generally favorable views on domestic reforms and the extension of hub-and-spoke operations to international markets, resulted in pressures emerging in many countries for the removal of further constraints on air transportation provisions. In Europe, the move to commercialize air transportation, as well as removing institutional barriers to trade, resulted in flag carriers seeking to develop their networks as they were weaned off long-standing regimes of state subsidies and turned over to private ownership.

⁸ In particular the domestic reforms in the US had considerably improved the efficiency of the US airlines; see Good et al (1993) for an empirical examination of the relative efficiency of US and European airlines between 1976 and 1986.

Table 2
Main features of US bilateral air service agreements

	Pre-1978 bilaterals	1978-1991 Open Market bilaterals		Post-1991 Open Skies bilateral
		US airlines	Foreign airlines	
Market access	Only to specified Points Limited 5 th freedom rights granted to US carriers Charter rights not included	From any point in the US to specified points in foreign countries Extensive 5 th freedom rights granted 7 th freedom rights not granted Domestic cabotage not allowed	Access limited to a number of US points Unlimited charter rights	Unlimited Unlimited 5 th freedom rights
Designation	Single § some multiple Airlines must be §	substantially and effectively controlled		Multiple by nationals of designated state
Capacity	Capacity agreed or shared 50:50. No capacity/frequency controls in liberal bilaterals, but subject to review	No frequency or capacity controls		
Tariffs	Approval by both governments (double-approval) or as agreed by IATA	Break of gauge permitted in some agreements	Double-disapproval (filed tariffs operative unless both governments disapproval) or country of origin rules	Break-of-gauge rights granted Free pricing
Code-sharing		Not part of bilateral		Code-sharing permitted

The outcome, from 1992, was a series of bilateral “Open Skies” agreements between EU states and the US. These first involved the Netherlands but then extended to other EU member countries (Table 3). These “open Skies” agreements go beyond the Open Market agreements by allowing flights to any two points in the signatory countries, with no restriction on fares, service level, or fifth freedom operations. They also, through parallel measures in the realm of antitrust and competition policy, allow code sharing and other strategic alliance activities. The US at this time also facilitated the process by offering a relative simple template Open Skies agreement with standard clauses in it.

Not all European countries, however, have Open Skies agreements with the US, and in some case they are not fully operational. In particular, the important US/UK air services market still operates under the “Bermuda II” agreement originally signed in 1977, although amended periodically since its inception. This limits, besides other things, the number of carriers that can serve London Heathrow Airport to two from each country (currently American Airlines and United Airlines, and British Airways and Virgin Atlantic respectively from the US and UK) and the number of US gateways served. Greece, Ireland, and Spain also have restrictions; e.g., Ireland requires one US flight through Shannon for every one to Dublin, and limits fifth freedom rights, and Greece, besides limiting fifth freedom rights also limits the gateways served, the number of airlines on some routes, and freedom of fare setting. Others have similar deviations from a market based agreement.

Table 3
The European based “Open Skies” initiatives (passenger services)

Netherlands	In Force	10/14/92
Belgium	Provisional	3/1/95
Finland	In Force	3/24/95
Denmark	In Force	4/26/95
Norway	In Force	4/26/95
Sweden	In Force	4/26/95
Luxembourg	In Force	6/6/95
Austria	In Force	6/14/95
Czech Repub.	In Force	12/8/95
Germany	Provisional	2/29/96
Italy	Comity and Reciprocity	11/11/98
Portugal	In Force	12/22/99
Malta	In Force	10/12/00
Poland	In Force	5/31/01
France	In Force	10/19/01

Additionally, Open Skies bilateral agreements do not mean entirely open markets in the conventional economic sense. There are “nationality clauses” that affects the carriers that may enter markets; they must be “substantially and effectively controlled” by nationals of the designated state or by its nationals. While outwardly aimed at preventing third parties entering the bilateral, *de facto* nationality clauses act to impede the full functioning of international air transportation capital markets. Linked with this, foreign ownership of carriers operating in US and the European market is also limited, both in terms of the share ownership permitted and the voting power of these shares. For example, in the US, although there have been exceptions made, non-US share holding is limited to 25% of the stock, and if exceeded to 25% of the voting stock. This makes mergers and cross investment impossible outside of the limits set and, because of the lack of control over its use, is not an incentive for foreign investors.

There are also rules regarding cabotage; or eighth freedom rights. In the US, domestic services can only be provided by an airline “established” in the country. This, because of the inability to create optimal feeder services, may limit the capability of a non-US carrier to develop a full double hub-market across the North Atlantic. The initial emergence of strategic alliances may be seen as a second-best attempt to circumvent the restriction.

Within Europe, because of the sovereignty of each nation, US carriers can fly where they can obtain appropriate fifth and sixth freedom rights carry passengers between states, although not within them. The US also prohibits “wet leasing” – the leasing of a plane and crew – although this practice is legal in European countries, and this constrains the efficient movement of physical capital by airlines between international markets to meet exceptional needs. In addition, the Fly America requirement means that US government and military personnel must normally use a US carrier or one that is part of an approved strategic alliance with relevant anti-trust immunity for international air travel.

EU/US negotiations on Open Skies

The EU in the late 1950s had set the creation of a Common Transport Policy as one of its two major goals under the founding Treaty of Rome. Air transportation was, mainly because of its relative small size and the magnitude of the task of tackling distortions in other transport markets, explicitly excluded until it was felt a Union-wide approach was needed. Progress on the Common Transport Policy was snail-like until the creation of the Single European Market in 1992. By this time, air transportation had grown in importance, and, in part stimulated by a series of legal judgment and proactive initiatives from the European Commission. A number of “Packages”, three in all, liberalized and standardized exiting ASAs, liberalized the market for intra-European international traffic, and, finally, liberalized the entire internal market.

The US effectively developed and spread its Open Market and Open Skies strategies by stimulating beggar-thy-neighbor policies in Europe as the Common Transport Policy evolved.⁹ Initially, some EU airlines found that their domestic and EU markets were constrained by regulation and sought outside expansion; hence, the adoption of Holland and others of Open Market agreements at a fairly early stage¹⁰. This in turn put pressure on other to follow suit.

The growth in demand for transatlantic travel from the mid-1990s stimulated significant numbers of larger European airlines to seek even reforms in extra-EU markets to allow them to exploit their scale economies and extra-EU service networks (Association of European Airlines, 1999). From the late 1990s, and after the liberalization of internal air transportation market, legal issues also emerged regarding extra-Union authorities; specifically matters of the respective responsibilities of the Union and of the individual member states that transcend narrow aviation considerations. The European Commission questioned the legality of the existing Open Skies agreements that effectively gave preferential treatment, through the nationality rules, to the European national carriers involved. The ruling of the European Court of Justice, although not precluding strategic alliances and revised Open Market agreements, effectively resulted in the Commission gaining power in June 2003 over extra-EU air services involving relations with the US.

Negotiations subsequently took place with some initial progress in a number of technical areas,¹¹ little substantive agreement emerging regarding the key and fundamental economic issues. The interests of the domestic coalitions that influence the US stance strongly favors a US/EU Open Skies arrangement, whilst the Union favors a much more free market approach that allows for cabotage and flexible movement of capital, as is the case within Europe via an Open Aviation Area. In 2005, a compromise was reached that, with ratification by the relevant governments, would open the market for airlines across the Atlantic with the right of US carriers to fly on. The US is also moving to allow more flexible ownership rules for stakeholders in its airlines.

The economics of the subject

The restrictive bilateral ASAs that typified the institutional structure of international airline markets before the advent of Open Skies had a number of adverse effects on the efficiency of supply and, specifically, on the levels of benefits society could reap from air travel. These effects are not easy to isolate in a simple way but Figure 2 offers a general representation of the issues that are involved. In particular, it highlights the potential fare and output implications of the various types of transatlantic regulatory regimes.

The initial position of the demand curve for transatlantic services under the pre-1980s regulatory regime is shown as D_1 in the figure and the average cost curve per passenger, which for simplicity is assumed to rise with quantity, as C_1 . Market forces, however, because of the institutional interventions in place, did not determine fares and capacity across the Atlantic. Capacity under this system was limited (seen as the “capacity constraint” in the figure) and fares regulated. If we assume that the terms reached under the bilateral agreement regarding fares allowed for cost recovery by the partners’ airlines this implies a fare levels of F_1 .¹² The removal of this capacity constraint, as happened under the Open Market arrangements, but with the continuation of a cost recovery pricing strategy by the partners, would reduce fares to F^*_1 . Although price controls largely went with the advent of Open Markets, this gives some idea of the potential economic effects of market entry controls.

⁹ A similar strategy was used at the early phase of the initiative in Asia with little success, in part because of the nature of the Asian airline industry, but has proved to be more powerful in recent years as market in Asia have in general become more liberalized.

¹⁰ These countries were also the first to seek more liberal bilateral ASAs within the EU (Button, 2004)

¹¹ Common ground for example has been reached regarding wet leasing, competition rules, the EU nationality clause, and market access (with the exception of cabotage).

¹² In practice, fares tended to reflect the bargaining power of the parties and the objectives of the countries’ overall approaches to the airlines market. Continental European airlines have had a long tradition of supporting their flag carriers for a variety of reasons that are linked to their perceptions of their national interest. In some cases, the fares may have been below the level required for cost recovery whilst in others it may have been higher if, for example, one partner sought to cross-subsidize domestic services.

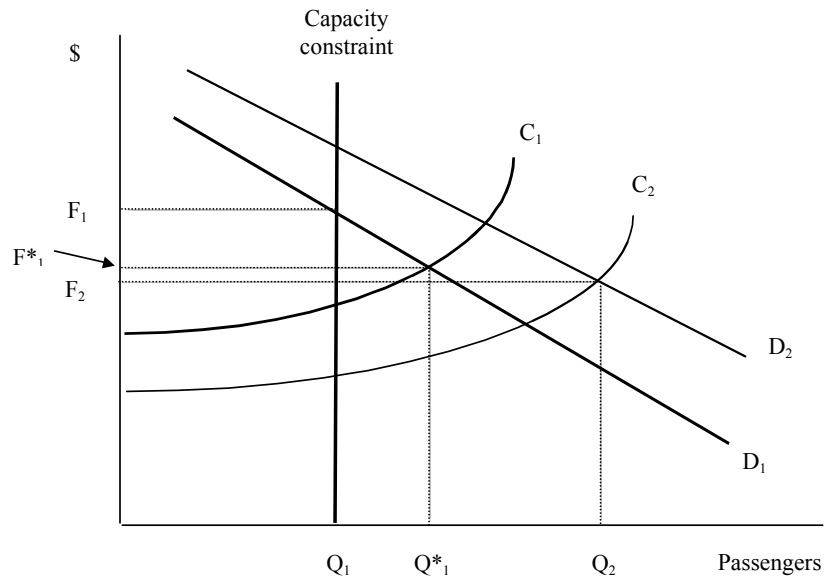


Figure 2
The simple economics of Open Skies policies

An Open Skies policies, coupled with the permitting of strategic alliances, not only removes the capacity constraint but also affects both the demand and supply curves for transatlantic air travel. The ability of airlines to more effectively feed their transatlantic routes and coordinate their activities, thus, through the restructuring of their business and networks, will reduce the average cost of carriage to C_1 in Figure 2. The effect is often reinforced due to pressure on costs to also fall because, although not strictly part of the Open Skies framework, the wider competitive environment within Europe, and the privatization of many carriers, by heightening commercial pressures, reduces the amount of both static and dynamic X-inefficiency.

The Open Skies policy also has stimulation effects on the demand side. By allowing more effective feed to the long-haul stage of transatlantic services through the concentration of traffic at international hub airports, it increases the geographical market being serviced and also generates economies of scope and scale. The larger physical market demand, combined usually with more integrated services such as code sharing, interchangeable frequent flier programs, common lounges, through baggage checking, etc., pushes out the demand for international air services; to D_1 in the figure.

The outcome of the lowering of costs and the outward shift in demand is that the number of passengers traveling increases to Q_2 and, because Open Markets allow price flexibility, the fare falls to F_2 in our example. It should be noted that fares might not actually fall; indeed they may rise as the result of the freer market conditions. (In Figure 2, the shift out in demand may counteract the fall in costs resulting in $F^*_1 < F_2$) The reason for this is that the outward shift in demand reflects a better “quality” of service – e.g., more convenient flights, transferability of frequent flier miles, and seamless ticketing – and that, on average, potential travelers are willing to pay more for this than the generic portfolio of features that were found under the old bilateral ASA structure.¹³

What does become pertinent, however, is the extent to which the fare structure is influenced by the market power of the airlines. The analysis presented in Figure 2 assumes that, in the Open Skies environment, fares are set to recover costs; in other words, competition and mergers policy can effectively fulfill the role of

¹³ If there are economies of scope or density from offering air services in this market, as is often the case, the cost curve would be downward sloping and in this case the outward shift in demand reinforces the cost curve more and fares will always fall.

regulation. This raises issues as to the nature of a market served by a relatively small number of network carriers. A degree of competition exists between the various alliances for the trunk hauls market, and there is also competition at either end of routes with many other, including low cost, carriers competing for passengers in overlapping feeder and origin-destination traffic to international hub airports. There are also theoretical reasons derived from game theory suggesting that the outcome in a market with three players approaches that of competition. Nevertheless, each alliance by dint of product differentiation (e.g., they serve different airports) inevitably enjoys some degree of monopoly power. This could lead to fares higher than F_2 and a smaller output than Q_2 with consequential reductions in consumer surplus.¹⁴

The effects of a full Open Aviation Area can be seen as an extension of this framework. Free capital markets together with the ability to have more flexible feeder networks would further lower costs and may generate additional economies of market presence, although this latter effect is unlikely to be large. The ability to invest across national boundaries provides for short term support in situations of local market fluctuations and more integrated long-term planning of infrastructure; it would in effect produce air networks akin to those enjoyed by US railroads that can move investment funds across states rather than have separate rail companies each limited intra-state operations. In terms of Figure 2, it would mean lower fares and larger air traffic volumes with concomitant increases in society benefits.

THE EFFECTS OF TRANSATLANTIC AIR TRANSPORT LIBERALISATION

The changes that have taken place in the regulation of transatlantic air transportation have not gone unresearched. Much of what has been done, though, has stemmed from interests in industrial organization rather than economic development; although there are clear links between the two. The industrial organization interest is understandable; it often concerns the airlines that are most immediately affected by institutional change and, for lobbying purposes, they have vested interests in knowing the effects on their businesses. There are additional interests from anti-trust authorities that are responsible for the institutional environment in which this business takes place. Insights on some of the potential effects of the opening up further the transatlantic air transport market can be gleaned from a number of these areas of analysis.

Impacts of airline alliances

International airline alliances involving transatlantic services began to emerge in the late 1980s as carriers sought to create the economies of scope and density on the cost side and market presence on the revenue side. These were being enjoyed in domestic markets but because of capacity and fare setting constraints of the traditional ASDs could not be enjoyed on non-European international routes. Competition and mergers policy also made takeovers and mergers a more cumbersome business, even if nationality rules could be circumvented. The long haul nature of the transatlantic market, the density of traffic, and nature of the potential feeder market at either end of the trunk haul offered the potential to reap the diverse benefits of larger scale operations. The restrictive nature of the prevailing bilateral ASAs effectively forced the airlines to move to a second best alliance approach to squeeze out synergies from their various operations.

The alliances took a variety of forms but essentially entailed code shares and coordinated frequent-flier programs that have, as ASA reforms have progressed, resulted in rationalization of schedules. The number of alliances has grown and virtually all the major air carriers belong to the three global strategic alliances (the Star Alliance, oneWorld, and SkyTeam) that now dominate much of international aviation (Table 4).¹⁵ The alliances differ in detail and in their operations, but the largest variation is in terms of the US anti-trust immunity that they enjoy. In particular, oneWorld has no such immunity and that limits the ability of its members to fully exploit synergies in their business.

The impacts of the long-haul hubbing phenomenon have attracted considerable attention since its inception, not least because of anti-trust considerations and the concerns of airlines that are outside of the alliance

¹⁴ If there are declining costs, however, this monopoly power may be needed to allow for the recovery of the fixed costs of providing a scheduled service.

¹⁵ There are also many alliances that cover individual routes and services. These often provide additional feed into the larger carriers' networks. *Airline Business* publishes a full list of the main alliances annually.

structures. The illiberal elements of ASA bilaterals that have remained, or are only slowly being reformed, have limited the effectiveness of strategic alliances on many routes and thus impeded the full emergence of the gains from network operations.

Table 4
The main US and European airlines that are part of the three global strategic alliances

Star Alliance	oneWorld	SkyTeam
United Airlines Lufthansa BMI TAP Portugal Finnair Lauda Air LOT Polish Airlines Spanair SAS Scandinavian Airlines Austrian Airways Tyrolean Airlines	American Airlines British Airways Aer Lingus Iberia	Delta Airlines Continental Northwest Alitalia Air France CAS Czech Airlines KLM Royal Dutch Airlines

Table 5 provides a brief survey of the main studies that have been conducted on the impact of strategic alliances on the North Atlantic routes. They focus mainly on the implications for the airlines involved, their competitors, and the traveling public. Because it takes time for the effects of alliances to be fully realized, the nature of the analysis varies; however, most use data from the 1990s when the composition of the alliances was somewhat different and the number of strategic alliances larger (e.g., KLM and Northwest were allied and outside of the SkyTeam).

The various analyses do not paint an entirely consistent picture; one reason for this was that they often differ in the underlying question being asked. Many, for example, were more concerned with competitive effects between the alliances and other carriers rather than with the overall effect of strategic alliances. Additionally, the earlier alliances took somewhat more limited forms than those found today and there was far more experimentation going on. The lack of a fully liberalized EU market, prior to the mid-1990s, also added constraints to what could be achieved in the transatlantic market. Finally, there are qualitative differences in the work done; generally speaking, the more detailed studies suggest that the ability to form alliances added to the efficiency of the airline market.

The Brattle Report

In 2002 the Brattle Group reported on the expected impacts of an Open Aviation Area (that embraces the removal of all foreign ownership restrictions and cabotage restrictions as well as liberal air service agreements) on Europe and the US. The analysis covered a number of dimensions of the subject, although the matter of economic development was not at its core.

The benefits of the Open Aviation Area are divided between those associated with the ability of airlines to set fares as they please (“pricing synergies”) and those associated to adjust output (“No-output restricting ASA bilaterals”)¹⁶. The gains are measured in a variety of ways, including consumer and producer surplus gains, and airline cost savings, and under a variety of scenarios regarding cost effects, elasticities, and the efficiency of airports at handling additional traffic. The analysis seeks to embrace the full network effects involving feeder services and other services with the European and the US as well as the implications for direct transatlantic services.

¹⁶ These effects may be seen as the removal of the capacity constraint and the downward movement illustrated in Figure 2.

Table 5
Studies of the effects of strategic alliance¹⁷

Study	Alliances	Period	Findings
Gellman Research Associates (1994)	BA/US Air, KLM/NW	1994	Profits increased for all parties with BA and KLM gaining more than their partners
Youssef and Hansen (1994)	Swissair and SAS	1989-91	Increases in flight frequency; variations in fare levels; the strongest service levels had the lowest fare increases.
US General Accounting Office (1995)	KLM/NW, USAir/BA, UAL/Lufthansa UAL/Ansett, UAL/BMA	1994	All carriers enjoyed increased revenues and traffic gained at competitors' expense, not industry growth.
Dresner et al (1995)	Continental/SAS, Delta Swissair, KLM.NW	1987-91	Mixed successes with traffic volumes; in general alliances did not benefit partners
Park (1997)	KLM/NW, Delta/Swissair/Sabena	1990-94	Traffic increases at the expense of rivals. Complementary alliances lowered fares while parallel alliances increased fares.
Oum et al (2000)	Star Alliance, oneWorld Skyteam, KLM/NW	1992-1994	Increased traffic on alliance routes
Brueckner and Whalen (2000)	US international alliances	1999	Fare are some 18% to 20% lower on international alliance, inter-lining routes

The study focuses mainly on looking at the implications on the air transport industry and on the consumers' surplus generated through lower air fares. It does also offer some indication of employment generating effects, notably for airports under a number of different scenarios and these are laid out in Table 6. Given that airport jobs are but one of the employment effects of air transportation, the suggested impact is significant.

The study's findings on airline productivity indicate a gain that would reduce costs by about 4.2%, the vast majority of which would be linked to enhanced efficiency of intra-EU operations. Translated into consumers surplus for passengers this amounts to some €2.9 billion per annum, with a further €370 million from lower fares that additional competition would generate. In physical terms, the forecast is that a full open transatlantic aviation market would lead to between 4.1 million and 11.0 million additional transatlantic passengers and, through network effects, between 17.7 million and 46.7 million passengers on intra-EU routes. These gains would not be evenly spread. Amongst the current non-Open Skies countries, the UK, by far the largest market, would take the majority of the benefits with Greece, Ireland and Spain assuming lesser benefits.

The study, as it must, does rely on a variety of assumptions regarding fare elasticities, the reaction of airlines and airports to new market conditions under Open Skies, and on diversion effects through a network system in which many economies have already been exploited. For example, it is assumed that

¹⁷ A more comprehensive survey of airline alliances is in Morrish and Hamilton (2002)

there will be a 10% increase in traffic volume across the Atlantic that flows directly from full liberalization that is independent of any natural growth rate. These are subjective assessments.

Table 6

The Brattle Group's estimates of the direct employment effects for Europe of a full Open Aviation Area

	Airline employment	Airport employment*	Airport employment**
Low bound scenario [†]			
Pricing synergies	600	188	481
No output-restricting ASA bilaterals	1587	436	1092
Total	2178	624	1573
High bound scenario ^{††}			
Pricing synergies	3523	1124	2820
No output-restricting ASA bilaterals	1578	436	1092
Total	5101	1560	3912

Notes:

* High ideal airport capacity

** Low ideal airport capacity

† Assumes volume growth from an 18% reduction in prices following the creation of an Open Aviation Area, where price elasticity is unity.

†† Assumes volume growth from a 28% reduction in prices following the creation of an Open Aviation Area, where price elasticity is 2.5.

Source: adapted from Brattle Group (2002)

Chamber of Commerce of Ireland Report

Ireland is one of the EU countries that does not have an Open Skies agreement with the US. This study (Sørensen and Dukes, 2005) explicitly looks at the potential gains that the country could enjoy of a more liberal regime were introduced. The study makes extensive use of the findings of the Brattle Group to derive estimates specific to Ireland by focusing at the micro level on the country's airports. Many of the findings are qualitative rather than quantitative and rely on a variety of published material. Overall, it is concluded, "Benefits will accrue to business interest in Ireland, including tourism, and to transatlantic passengers to and from Ireland."

Looking at some econometric evidence

To gain a better handle on the implications of a country not having an Open Skies agreement with the US, some simple regression analysis is used. This looks at the variations in high-technology employment between European regions. High technology employment here follows the EU definition; it is quite broad and is adopted to reflect the attraction of a region for the more mobile elements of modern production. The level of analysis is a mixture of European NUTS level 2 and NUTS level 3 regions. The reason for using the hybrid data set is that the NUTS regions as defined in the EU are administrative units rather than economic units, and countries differ in the ways that their administrative units are defined. To allow for this, where a nation has relative small districts or counties (NUTS level 2) these are aggregated to make them more comparable with NUTS level 3 regions elsewhere. The aggregation is to some extent inevitably arbitrary but seeks to overcome the arbitrariness of the various forms of administrative structures.¹⁸

¹⁸ The *Nomenclature des Unites Territoriales Statistiques* (NUTS) is the five-tier hierarchical structure used in the European Union to standardize territorial units. The broad administrative regions are classified as NUTS level 2 sized-districts, counties or prefectures/nomes as NUTS level 3, municipal departments or boroughs as upper level local administrative units (LAU1, sometimes called NUTS level 5), municipal departments or wards as lower LAU (or LAU

The focus here is on what is called “high-technology employment”¹⁹. Employment is generally a better guide to the implications of policy on an area than say, income. It is easy to measure and often employment creation is the primary economic objective of policy makers. Modern industry, including manufacturing, is highly mobile and thus responds relatively rapidly to changes in demands for its products²⁰ and the costs of production. Since the aim is to look forward, it seems logical to put an emphasis on this type of employment. There are also inevitable effects on other types of jobs, some through complementary links and others as substitution takes place.

European data is scarce and what is available is often of poor quality and lacks consistency between countries.²¹ The data examined was thus for 2001 and embraced 95 European regions that covered both countries with Open Skies policies with the US and those that operated under a variety of other agreements at the time.²² This represents the most recent set of statistics for which a reasonable amount of data is available. Because we are concerned with high technology employment that takes time to respond to changing market conditions, rather than say the profitability of airlines, there should be minimal distortion effects of September 11th in the numbers.

Explaining why the structures of regional economies differ, or why some grow faster than others, has been a full time occupation for economists over the years. The analysis here does not seek to add any additional theoretical insight, but rather it looks at a set of variables often used to explain such variations in a fairly simple way with the aim of teasing out a little more about the importance of free trade in air transport services. Nevertheless, technically, the model specification must largely be seen as *ad hoc*.

To allow for difference in market size between regions, even after seeking to get homogeneity through adjustments to the NUTS data, regional population is included. To reflect the differing links regions have with the US, the amount of trade conducted was brought in. The number of passengers flying to the US from regional airports is included as a proxy for current capacity and also to reflect the fact that even those countries with no Open Skies agreement with the US still have transatlantic air services (excluding this would over estimate the implications of moving to full US/EU Open Skies). A dichotomous variable is used to reflect whether a region with an international airport is located in a country with an Open Skies agreement.²³ The results are laid out in Table 7

The overall explanatory power of the model, despite its relative crudeness, is good; it explains nearly 80% of regional variation in high-technology in the countries studied. The individual parameter estimates indicate that the move to an Open Skies agreement results in some 30,000 jobs for the surrounding region. This standard error for this is somewhat high, one can only be a little over 80% confident in it and the actual figure may range between 7,280 and 54,408. This type of variability is to be expected given the diverse nature of the national air markets in which these regions are located. From a forecasting perspective, the high-technology employment creation from expanding the existing national Open Skies

2 or NUTS level 5). Since the units are based on administrative structures that vary in size and nature by nation they are not consistent. Here a degree of aggregation has been practiced to allow for this in arriving at the regional boundaries.

¹⁹ Total high and medium high technology manufacturing and knowledge intensive high technology services Nomenclature générale des activités économiques dans les Communautés Européennes (NACE) Rev. 1.1 codes 24, 29 to 35, 64, 72, 73. This is the normal set of categories used in European analysis (for example by Eurostat) and is akin to the Armington Index often used in US work.

²⁰ The focus here is exclusively on passenger air transportation. Air cargo movements are growing faster than passengers movements and are widely used within the just-in-time logistics systems used by modern industry. The air cargo market has also been, and in many cases continues to be, heavily regulated.

²¹ Data in some cases can be highly “subjective” as witnessed by the gross underestimates of deficit expenditures by Greece and Italy that allowed them to join the Euro. Eurostat has also been the subject of a number of corruption charges in recent years.

²² The regions considered to have airports are Brussels, Copenhagen, Stuttgart, Munich, Berlin, Frankfurt, Düsseldorf, Hamburg, Madrid, Barcelona, Paris, Lyon, Milan, Rome, Amsterdam, Vienna, Stockholm, Manchester, London, Hanover, Alicante/Valencia, Palma, Malaga/Seville, Nice, Naples, Catania/Palermo, Cagliari, Newcastle, Leeds

²³ This implicitly makes the rather strong assumption that Open Skies largely benefits regions near international airports. Given the almost ubiquitous nature of EU aviation this may be seen as an excessively conservative position.

arrangement to a full EU agreement may be below the 30,000 figure because there will be some diversionary effects from regions benefiting from existing Open Skies; there are also capacity constraints in some of the regions in countries currently without a liberal ASA with the US that will dampen the effects of liberalization. Counter to this, however, there will also be the “low-technology jobs” created that come through subsequent multiplier effects.

Table 7
Analysis of impact of Open Skies on spatial variations in high-technology employment levels in Europe

Variable*	Coefficient	Standard error
<i>Constant</i>	-64.70	
<i>Population</i>	0.045	.004
<i>Open Skies</i>	30.69	23.40
<i>Passengers</i>	0.00002	6.21e-06
<i>US Trade</i>	0.0011	0.0038

Adjusted R² = 0.79

*Note:***Population* is average population in 2001 (in thousands), *Open Skies* is a dummy variable taking the value of unity if such an agreement existed (there is no attempt to distinguish between any of the other institutional structures that existed), *US Passengers* is the number of passengers (embarking plus disembarking) in 2001 to North America, and *US Trade* is the annual national imports and exports to US in \$ millions.²⁴

CONCLUSIONS

The experiences of deregulation of air transportation and other markets over the past quarter of a century are generally seen as having produced significant economic benefits. Not everyone has gained, certainly in the air transportation world some communities have lost services, some airlines have gone bankrupt, and some classes of passengers are now paying higher fares, but for those few that have been adversely affected there are many more who can fly more cheaply, have a greater variety of services to choose from, and have found jobs in the extended air transportation value chain. No positive change occurs without disruption, this has certainly been the experience of airlines, but these negative features have been far outweighed by the positive impacts.

The emergence of more flexible international air transport regimes for extra-European movements has overall benefited those involved. Efforts to get a comprehensive transatlantic agreement have proved difficult, however, in part because of somewhat differing views in Europe and the US on the meaning of free trade. It seems to be clear from a European perspective, however, that there are benefits for the Union as a whole in adopting a uniform Open Skies agreement with the US although there may be additional gains in extending this to a full Open Aviation area of the type found within the US and the EU that has proved so important in both of their long-term developments, after all many of the benefits in the US.

These benefits are largely associated with the ability of a fully competitive air market to allow countries, regions, and industries to produce more efficiently and to link with their suppliers and customers more effectively. The benefits of Open Skies agreements vary across sectors and those most reliant on air transportation reap the largest gains. These benefiting industries, however, tend to be those where the longer-term future of modern states lay; they are what are often called the high-technology industries and embrace a large proportion of “knowledge industries”. The evidence from previous work in the US indicates a sensitivity of these industries to the availability of international air services. The calculations

²⁴ A number of other possible explanatory variables were examined: Gross Domestic Product, Total Destinations, EU Destinations, US Destinations, US Flights, Population, R&D Investment, and R&D Higher Education Investment. These were found to be either highly insignificant or to take a perverse sign. Additionally, there is a high degree of multicollinearity between many of the variables.

here confirm this in the context of European regions located in countries with Open Skies agreements with the US. There emerges a differential in employment of about 30,000 jobs in favor of regions with freer air access to the US economy.

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