Zagreb International Review of Economics & Business, Vol. 13, No. 2, pp. 73-88, 2010

ISSN 1331-5609; UDC: 33+65

The Economic Impacts of Air Transport Liberalization

Martin Grančay*

Abstract: Air transport liberalization constitutes a whole new level of globalization. The impacts it brings can be divided into direct, indirect, induced and catalytic. The magnitude of impacts is determined by various factors, including air transport liberalization multiplier, market saturation and the degree of liberalization of other sectors. Airlines profit from increased efficiency derived from economies of scale, economies of scope and density economies. On the demand side, the passengers enjoy better range of available destinations, higher frequency of service and new business models, such as was the entrance of low-cost carriers to the EU market in the second half of the 1990s.

Keywords: air transportation, liberalization, multiplier, demand elasticity

JEL Classification: L93

Introduction

Air transport liberalization is a process of gradual abolition of limits on designation, capacity, frequency and tariff setting in civil aviation. It aims to create an efficient air transport structure based on free market mechanism where all the decisions are taken as a result of a mutual interaction of supply and demand. The role of national governments is limited to safety and security.

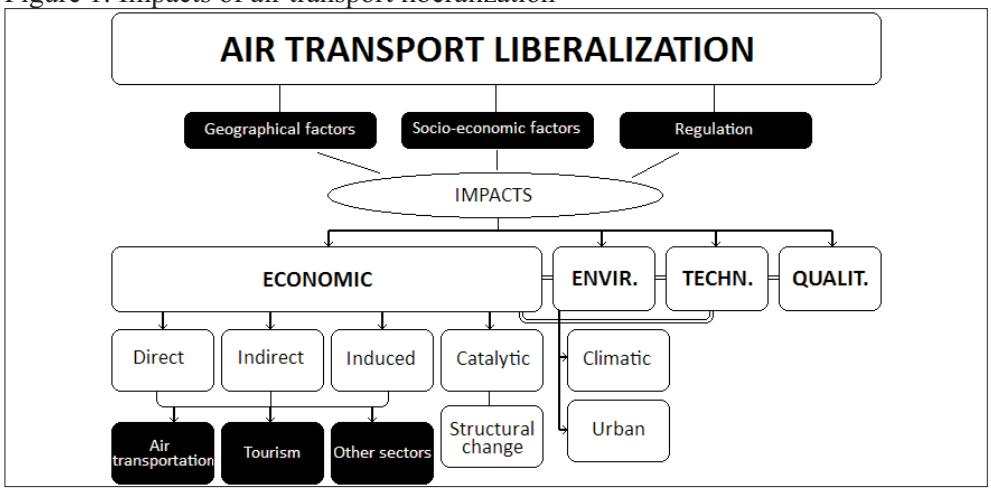
Usually impacts of air transport liberalization are divided into two groups: economic and environmental. In our opinion, this is insufficient – a category of 'other' impacts has to be introduced, including development of new technologies and other qualitative changes.

Figure 1 represents a schematic picture of different dimensions of air transport liberalization and the relations between them. It has to be mentioned that impacts of liberalization are not only influenced by changes in the regulatory environment, but also by various other factors. These include geographical and socio-economic

* Martin Grančay is at Faculty of International Relations, University of Economics, Bratislava, Slovakia.

characteristics of the regions, such as distance between the markets, their size, population density, existing geographical barriers, purchasing power, overall economic situation etcetera.

Figure 1: Impacts of air transport liberalization



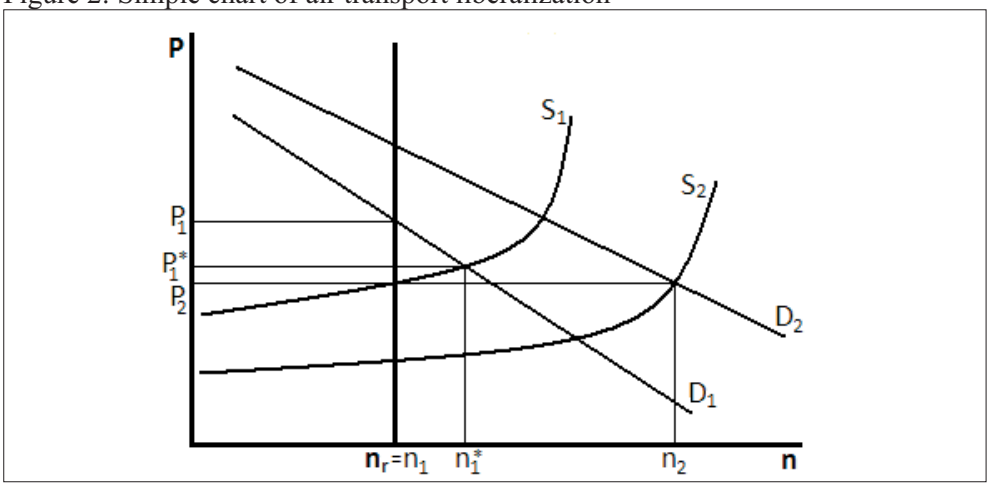
Impacts on Supply and Demand Curves

From a macroeconomic point of view liberalization leads to a shift of supply and demand curves towards right, as demonstrated in figure 2.

In a protectionist environment the demand curve is D_1 and the supply curve S_1. Air transportation between two countries is governed by a restrictive air service agreement (ASA), setting fixed capacity and pricing limits and hindering alliance cooperation. The capacity limit (n_r) implies that all the airlines together are only allowed to transport n_r passengers. However, at this traffic level a considerable overhang of demand exists – the number of people wanting to fly exceeds the number of seats offered. Therefore air fares will be set above the equilibrium level P_1*. As costs (P_1) are much lower than prices (P_2) airlines gain high profits and do not have incentives to increase their efficiency and invest in research and development.

Air transport liberalization consisting in abolishing the capacity constraint will affect both the number of passengers and air fares. The flight ticket prices will drop to P_1*, leading to a traffic increase to n_1* passengers. As a consequence of the closing gap between costs and revenue, the profit of airline industry will diminish. Airlines, in order not to get in the red, will have to adopt new cost-cutting procedures and invest in increasing efficiency.

Figure 2: Simple chart of air transport liberalization



Source: Adapted from Button & Drexler 2006, p. 52

Suppose the countries perform full liberalization of their aviation relations (e.g. sign an Open Skies agreement.) Each market player will be enabled to offer flights between any two points in the countries with no capacity, frequency or pricing limits. Coupled with the ability to form strategic alliances, an outward shift of both supply and demand curves will follow. Airlines will be allowed to coordinate their activities, rationalize flight plans and offer better connections. They will be able to transport more passengers than before with the same total costs – a result of combining economies of scale, economies of scope and density economies. Therefore the original supply curve S_1 will move to S_2. An outward shift of the demand curve (from D_1 to D_2) can be attributed to enhanced network of destinations, development of joint frequent flyer programs and overall increase in number of services offered, leading to more people willing to fly at an unchanged price level.

Figure 2 shows that applying the ceteris paribus rule, air transport liberalization leads to lower costs and higher number of passengers. The correlation between the degree of liberalization and traffic volumes seems to be strong. However, effects on air fares are disputable – the direction of their change depends on the shapes of supply and demand curves. Taking into account lower costs for airlines a decrease in flight ticket prices might be foreseeable. Empirical evidence shows this does not always have to be the case.

Air Travel Demand Elasticities

To fully understand the roots of quantitative effects of liberalization it is helpful to study air travel demand elasticities. Demand elasticity is defined as proportional change of quantity demanded that results from a proportional change in one of the factors of demand. The most important types of elasticities are price elasticity and income elasticity.

Air travel demand elasticities have received a wide attention from scientists in all parts of the world. Especially helpful sources of elasticity data are a paper by Gillen et al., (2003) and a study by InterVISTAS group (2007) – each of them constitutes a synthesis of other researchers‘ empirical and econometric studies.

There is no universal air travel demand elasticity value valid for all the markets. Rather, a wide range of elasticity values may be observed, depending on time factor, length of flight and purpose of travel. In general, long-term demand elasticity is higher than short-term demand elasticity. An unexpected increase in prices will only have small effects in short term as passengers have already made their travel plans and are mostly unable or unwilling to change them; however, in a long-term perspective passengers will adjust their expectations and change their behaviour according to the new situation on the market.

Longer flights usually have lower price elasticity than short ones – while short domestic flights can normally be easily substituted by other means of transport, intercontinental travel is virtually possible by air only. An exception from the above-mentioned rule are short-distance flights between points divided by geographical barrier such as sea or mountains (Alaska, Siberia just to mention a few).

Another important factor is the purpose of travel: short-term price elasticity of business passengers is low, as they can’t afford to cancel the planned business trips. On the other hand, in a longer term personal negotiations might be substituted by videoconferences and other travels be re-booked from first/business class to economy class. Price elasticity of demand of leisure travel in economy class is considerably less time-sensitive.

The most frequently cited values of price elasticity of demand for air travel are 0.7-1.2. Gillen, et al., (2003) identify short leisure flights as the most elastic market segment with median value of 1.52. This means a 1 per cent increase in flight ticket prices leads to a 1.52 per cent decrease in demand. Conversely, the least elastic market segment is constituted by long international business flights with median value of 0.27 – a 1 per cent increase in flight ticket prices leads to a 0.27 per cent decrease in travel. Regardless the exact elasticity values, it has to be noted that on the aggregate level price elasticity of demand for air travel is always positive. Therefore, any increase in flight ticket prices will always lead to a drop in passenger numbers. More importantly, any liberalization measures leading to a decrease in flight ticket

prices will induce new demand and increase air travel. Full elasticity data for various segments of air transport is available in the Appendix.

The approach chosen by InterVISTAS (2007) is based on studying elasticities for different levels of aggregation. The aim is to compare changes in demand caused by changes in air fares for three levels of aggregation:

a) route/market level – A price change occurs on a route between points A and B while prices of all other routes remain stable. Passenger, to avoid paying the increased price, can choose to travel on an alternative route, e.g. A-B_2, A_2-B or A_2-B_2.

b) national level – If a national government imposes a new tax on aviation, prices of all the flights from the country will increase. Passengers have only two ways to avoid the new price – choose a different mode of transport or start their journey from an airport in a different country.

c) pan-national level – This represents the most aggregate level considered by InterVISTAS, occurring when air fares from a group of countries increase. A good example for this would be the European Union. For passengers it is almost impossible to avoid paying higher price in this case.

The conclusions drawn by InterVISTAS are not unexpected: higher levels of aggregation lead to lower price elasticities of demand. On route/market level the elasticity was found to be approximately 1.4; on national level the value drops to 0.8; the lowest price elasticity of demand can be observed on pan-national level – around 0.6. We could therefore claim that the broader the geographical extent of liberalization, the smaller effects it brings. However, such a view would be incorrect – we have to take into account other important phenomena connected with liberalization processes, such as demand creation and demand diversion. These tend to gain on importance with increasing level of aggregation.[1]

Another important concept is income elasticity. After analyzing 103 studies from different regions of the world Gillen, et al. (2003) approximate the income elasticity of air travel demand at 1.14. Doganis (2006, p. 17) comes to a different conclusion – according to his research average long-term income elasticity of demand reaches 2.00. Thus, a 3 per cent increase in global gross domestic product will lead to a 6 per cent increase in passenger air traffic. Nevertheless he notes that recently the causal relationship between air transport volumes and economic growth has gotten weaker, as a result of the boom of low-cost carriers. It is therefore necessary to study income elasticities from a partial perspective. InterVISTAS (2007) suggests following three criteria: length of haul, level of aggregation and country type. The conclusions drawn from their research include:

- income elasticity of demand increases with length of haul;

- income elasticity of demand is generally higher in developing countries than in developed countries;
- income elasticity of demand decreases with increasing level of aggregation;
- notwithstanding the above-mentioned conclusions income elasticity of demand almost always takes values between 1.5 and 2.5 – that confirms the position of air transport as a luxury good.

Supposing that air transport liberalization affects both air fares and general income level, any attempt to quantify its effects has to take into account both elasticities. However, as we have seen, values of income and price elasticities differ from each other and sometimes they even move in opposite directions – while price elasticity tends to decline with the length of flight, income elasticity usually rises. Magnitude of impacts of liberalization therefore depends on elasticity values at the respective market.

In general, the air transport demand curve has a typical decreasing shape. Raises in income level shift the curve towards right. Bhadra and Schaufele (2008, p. 19) find this understandable, claiming that 'as wages increase, the opportunity cost of time increases.' Passengers will put more stress on speed than on price and as a result will prefer air transport to other modes of transport.

Scientific Approaches to Liberalization

There are many approaches to studying air transport liberalization. Different scientists use different methods, including but not limited to mathematical, statistical, econometric and empirical research. Button and Drexler (2006, pp. 12-13) divide these approaches into three basic groups:

- survey techniques – done through questioning people involved in air transportation, including professionals and passengers. Although this method often uncovers trends in behaviour of market participants, its main problem is high level of subjectivity of the responses obtained. It can become a basis for lobbying rather than one of analysis if due caution is not taken.
- input-output analysis and techniques using Keynesian multipliers – done through tracing local expenditure on air transportation either in aggregate (multipliers) or by sectors (input-output analysis). The biggest issue of this approach is to correctly choose the time frame to consider in the analysis.[2] Also, the values of the multipliers might be difficult to estimate.
- econometric methods – building of complex mathematical and statistical models. Their main advantage consists in high ability to isolate the effects of changes in air transportation policy on local development (and thus approach

the ceteris paribus rule). However, there is a risk of choosing inappropriate econometric model. Moreover the methods are highly data intensive.

Different approaches can be taken to classify liberalization impacts. After a thorough research of available literature we have identified six basic ways to divide liberalization impacts:

- direct, indirect, induced and catalytic impacts. Catalytic impacts include supply-side and demand-side catalytic impacts (Eurocontrol 2005, p. 11; Air Transport Action Group 2008, InterVISTAS 2006, p. 5);
- primary, secondary, tertiary and perpetuity impacts (Button & Taylor 2000, p. 214, also Button & Drexler 2006, pp. 11-12);
- aviation sector impacts, tourism sector impacts and catalytic impacts (InterVISTAS 2006, p. 81);
- impacts on trade and impacts on competition (Forsyth, et al., 2006, p. 147);
- competition effects, cost reducing effects and cost difference effects (Elek, et al., 1999, p. 150);
- cost savings, price reductions and output expansion (Robyn, et al., 2005, p. 58).

Figure 3: Causal relationship between liberalization and economic growth

Source: InterVISTAS 2006, p. 11

Each of these approaches (and many others as well) studies the same magnitude of market changes but using different methodology. In our opinion, the most convenient and complex research method is dividing impacts into direct, indirect, induced and catalytic (see figure 1) It is necessary to note that this categorization assumes existence of causal relationship between air transport liberalization and traffic growth. As shown in figure 3 liberalization brings better air services, leads to higher traffic and finally induces economic growth and creation of new jobs.[3]

The strength of the link between traffic growth and economic growth is different for every economy. It depends on various factors, such as level of employment, propensity to import and whether increased air travel diverts expenditures from other forms of consumption, savings and investment.

Economic Impacts of Air Transport Liberalization

Direct impacts of liberalization (D) arise immediately from the conduct of those entities performing the activity in question (InterVISTAS 2006, p. B-4). In case of air transportation this means direct impacts include all the changes in employment, value added or total product that can be immediately attributed to changes in air traffic level. These changes affect airlines, airports, ground handling agents, aircraft producers, maintenance providers, ATC providers and other companies whose principal business involves commercial aviation.

Indirect impacts (I) are defined as impacts involving the supply chain of businesses or entities conducting the primary activity (InterVISTAS 2006, p. B-4). Higher number of flights requires increased orders of fuel and in-flight services. Higher number of passengers boosts turnover of airport retail outlets. Higher demand for aircrafts supports the extensive network of sub-contractors. All in all, indirect impacts involve growth of purchases by airlines, airports, aircraft producers, airport retail outlets and hotels. They also include construction activity at the airports and services provided by call centres. It is obvious that the magnitude of indirect impacts is primarily influenced by the extent of direct impacts. Therefore indirect impacts are computed as $I = a.D$, where a is a market-specific coefficient.

Induced impacts (N) emerge when those employed directly and indirectly in air transport services use their earnings to buy other goods and services (Eurocontrol 2005, p. 11). A pilot might use a part of his salary to buy a laptop. This represents income for the computer seller, who might subsequently spend it at a bookstore; the bookseller might spend it at a grocery store and so on. The process will continue indefinitely in decreasing cycles. Thus, the initial increase in salary of one person is transformed into increase in salaries of many households. This process is known as the multiplier effect. If air transport liberalization directly or indirectly creates n new jobs, the national income will increase by $\Delta Y = \sum_{i=1}^{n} w_i$, where w_i is the wage of i-th employee. A part of this income will be saved and the rest will be spent, depending on propensity to consume (c) and propensity to save (s). The change in consumption $\Delta C = c.\Delta Y$ creates new income for other market entities who consume a part of it and save the rest. The total multiplier effect in its simple version can be computed as $\beta.\Delta Y = \Delta Y / s$, where β is a multiplier. As a result of this induced impacts equal the sum of direct and indirect impacts multiplied by the multiplier: $N = \beta.(D + I)$, that is $N = \beta.(D + a.D)$.

Catalytic impacts (C) are a very wide and diverse group. Eurocontrol (2005, p. 4) defines them as 'net economic effects (e.g. on employment, incomes, government finances etc.) resulting from the contribution of air transport to tourism and trade (demand-side effects) and the long-run contribution to productivity and GDP of growth in air transport usage (the supply-side performance of the economy).' They

include all the impacts of air transport liberalization on national economies that cannot be described as direct, indirect or induced. As a result of market changes brought about by liberalization, people alter their consumption patterns – they travel to destinations they normally would not, businesses focus on new markets, alter their production methods etcetera. Most of the catalytic impacts are utterly difficult to measure. They should be perceived as indicators of quality rather than quantifiable indicators.

Catalytic impacts can be sub-divided into various groups:

a) Demand-side catalytic impacts

- Tourism effects – increased number of passengers supports consumption in tourism sector. This can be seen literally in every tourism segment, starting with hotels and restaurants, through entertainment to public transportation. As many developing countries' economy is based on tourism sector, liberalization of air transport constitutes an important element of their success.
- Trade effects – air transport liberalization opens new markets to many businesses as a result of new destinations, better flight connections and higher frequencies offered. This leads to a broader demand for existing products.

b) Supply-side catalytic impacts

- Investment effects – one of the most important factors transnational corporations take into account when taking decisions about location of headquarters is proximity of an international airport. This is evidenced by numerous research papers. For example, according to Bel and Fageda (2005, p. 20) a 10 per cent increase in provision of intercontinental flights involves around a 4 per cent increase in the number of headquarters located in the corresponding urban area.
- Productivity effects – while providing access to new markets air transport liberalization enables businesses achieve higher efficiency through exploiting economies of scale. Better network of destinations also helps diminish warehousing costs, enabling extensive use of just-in-time deliveries.
- Labour market effects – air transportation makes it easier for companies to attract high quality employees from around the globe. It enables inter-regional migration of labour force – the most important factor is decreasing the time necessary to commute from one's home to work. Thanks to good air connections many people find employment in a region they wouldn't even consider otherwise. However, migration is a bi-directional phenomenon and thus can lead to brain-gain as well as brain-drain.
- Structural effects – the most important and permanent impact of air transport liberalization is the change of market structure. Domestic producers get easier access to foreign markets; conversely, home-market competition is increased

owing to the entry of foreign exporters. This leads to extensive changes in the matrix of comparative advantages of the economy. These changes are permanent. For example, it is literally impossible to develop an economy based on hi-tec industries without access to fast and reliable air transportation network.

Direct, indirect, induced and catalytic impacts in their combination lead to a change in Gross Domestic Product of an economy:

$$\Delta GDP = D + I + N + C + e \tag{1}$$

E stands for other unexpected random impacts. Further changing the equation:

$$\Delta GDP = D + a.D + \beta.(D + a.D) + C + e \tag{2}$$
$$\Delta GDP = (1 + a + \beta + a.\beta).D + C + e \tag{3}$$

After substituting $(1 + a + \beta + a.\beta)$ for ψ:

$$\Delta GDP = \psi.D + C + e \tag{4}$$

where ψ is the air transport liberalization multiplier. According to the equation, if ψ equals zero, GDP changes only as a result of catalytic and random impacts. However, a situation where $\psi = 0$ means liberalization did not bring any direct or indirect impacts and therefore it couldn't have brought catalytic impacts either. If ψ equals 1 direct impacts will not lead to any indirect effects. This situation is clearly hypothetic as it is difficult to imagine a market environment where growth in air transport sector does not induce growth in related sectors. Even in case of no-frills carriers (not offering any in-flight services) increased number of passengers will lead to increased fuel consumption – a clear example of an indirect impact.

Owing to different price and income elasticities of demand of different segments of air transportation the final version of the equation has to be an aggregate of the impacts in respective segments:

$$\Delta GDP = \sum_{i=1}^{n} \Delta GDP_i = \sum_{i=1}^{n} (\psi_{i.} D_i + C_i) + e \tag{5}$$

It becomes obvious that total impacts of liberalization are determined by three factors: the value of multiplier ψ_i, the extent of direct impacts D_i and the extent of catalytic impacts C_i. All of these are relatively independent from each other and are influenced by hundreds of other factors. The most important of them are shown in table 1.

Table 1: Factors determining the extent of total impacts of air transport liberalization

Multiplier ψ_i	Direct impacts D_i	Catalytic impacts C_i
Propensity to consume	Airport capacity and aviation infrastructure	Degree of liberalization of labor markets
HDP/capita	Business model of airlines	Tax system
Employment rate	Level of market saturation	Marketing in tourism sector
	Price elasticities of S and D	Existing market structure
	Geographical factors	Quality of non-aviation infrastructure

A study elaborated by Oxford Economics for Air Transport Action Group (2008, p. 5) tries to approximate the impact of air transportation on employment and GDP. In 2006 air transport generated 5.5 million direct jobs, 6.3 million indirect jobs, 2.9 million induced jobs and 17.2 million catalytic jobs in tourism sector. This brings the total to 31.9 million jobs plus other millions that were generated in trade. The direct impacts on GDP growth reached 408 billion USD, indirect impacts 465 billion USD, induced impacts 220 billion USD and catalytic impacts on tourism sector GDP constituted 389 billion USD. If we include catalytic impacts on trade, the total contribution of air transport to global GDP in 2006 reached 3.6 trillion USD, i.e. 7.5 per cent of the global GDP.

This statistics shows that one dollar directly invested in civil aviation leads to direct, indirect and induced impacts of 2.6 dollars in total – therefore the air transport liberalization multiplier can be approximated at 2.6. However, it should be noted that this does not include catalytic impacts: The value of catalytic impacts themselves is twice as high as the value of all the other impacts together!

The value of multiplier cannot be taken for granted as it changes in time. Moreover, different markets have different values of multipliers. As Holloway (2008, p. 45) puts it changing market conditions and 'shifting politics and/or lobbying power of financial interests mean that history can be an imperfect guide to the future.'

Other methods of estimating the extent of air transport liberalization impacts should bring the same results as the one we have analyzed. For example, if we choose to divide the impacts into primary, secondary, tertiary and perpetual, their total should equal the total of direct, indirect, induced and catalytic impacts.

Conclusion

As demonstrated in this paper, economic impacts of air transport liberalization are wide and significant. In a liberalized market, more efficient airlines would replace less efficient ones, or less efficient airlines would adopt the practices of more efficient ones, leading to significant cost savings and an increase in industry efficiency (Robyn, et al., 2005, p. 58). Increased competition and successful restructuring of the air transportation industry will bring along three different types of cost savings:

- Economies of scale – owing to higher passenger base;
- Economies of scope – derived from the development of hub airports;
- Density economies – better co-ordination of flights in airline's network leading to higher load factors.

On the supply side liberalization increases the number of services available to passengers – the main advantages include higher frequencies, new destinations and shorter layovers. Liberal environment works as accelerator of change and may induce development of new business models, such as was the boom of low-cost carriers in Europe after the creation of Single European Aviation Market in 1997. The majority of researchers agree emergence of low-cost carriers was the main qualitative impact of air transport liberalization in Europe, a game-changer that caused a deep structural change (for example Forsyth, et al., 2006, p. 147). However, the limitations of low-cost model are obvious and it cannot be expected that low-cost airlines become major players at intercontinental markets anytime in the near future. Rather they will continue in their function as niche long-haul carriers. Long-term predictions are more complicated – if air transport liberalization becomes global phenomenon, emergence of brand new business models is possible. Free market leads to increased competition and creates incentives for innovation. One such innovation will sooner or later bring about important structural changes to both trans-Atlantic, trans-Pacific and other long-haul markets.

This paper was supported by an internal grant of the University of Economics in Bratislava number 2319208, "Migračná politika EÚ v podmienkach globálnej liberalizácie a deregulácie dopravy"

NOTES

[1] For example, if air fare between London and New York decreases by 1 per cent leading to a passenger increase of 1.4 per cent, we assume a part of these passengers were diverted from different routes, such as Manchester-New York or London-Boston. The drop in flight ticket prices induces new demand on the London-New York route and diverts some passengers from other routes. If prices of ALL the flight connections between Europe and USA decrease, the demand creation effect will be lower than at the route level (e.g. 0.8 per cent) as a result of lower price elasticity of demand. On the other hand, the demand diversion effect will be smaller as well – due to financial and time costs passengers originating outside of Europe will not be likely to travel to Europe to start their trans-Atlantic journey there.

[2] The factor of time is one of the most important problems of any research in the field of air transportation. The delay between the time a market change occurs and the time its impacts start to be evident is difficult to predict. Flight plans are published twice a year only and airlines usually prepare them a couple years in advance. Therefore today's regulatory changes in air transportation markets will show their full impacts with a months- to years-long delay. The biggest problem is to predict the length of this delay.

[3] The acceptability of this assumption is evidenced by multiple empirical and econometric analyses. A good example is a study elaborated by InterVISTAS, quantifying impacts of liberalization of 5 different international markets. The markets include United States-United Kingdom, intra European Union, United Arab Emirates-U.K. and Germany, Australia-New Zealand and Malaysia-Thailand. InterVISTAS (2006, pp. 18-58) comes to a conclusion that in each of these cases liberalization led to an increase in air traffic by 12-50 per cent and there was robust evidence of its positive impact on employment and economic growth. Another study by Button and Drexler (2006, p. 11) estimates that liberalization leading to transformation of an airport to a hub creates 12 thousand new jobs.

REFERENCES

Air Transport Action Group (2008): The Economic and Social Benefits of Air Transport 2008, ATAG, Geneve.

Bel, G. and G. Fageda. (2005): 'Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters', Harvard University Research Working Paper Series.

Bhadra, D. and R. Schaufele (2007): Impacts of US-EU Open Aviation Area Treaty on US and the EU, Booz-Allen Hamilton, London.

Button, K. and J. Drexler (2006): 'The Implications on Economic Performance in Europe of Further Liberalization of the Transatlantic Air Market', International Journal of Transport Economics, 31, 45-68.

Button, K – S. Taylor (2000): 'International Air Transportation and Economic Development', Journal of Air Transport Management, 6, 209-22.

Doganis, R. (2007): Flying off Course, Routledge, Abingdon.

Doganis, R (2006): The Airline Business. Routledge, Abingdon.

Elek, A., et al (1999): 'Open Skies or Open Clubs? New Issues for Asia Pacific Economic Cooperation', Journal of Air Transport Management, 5, 143-51.

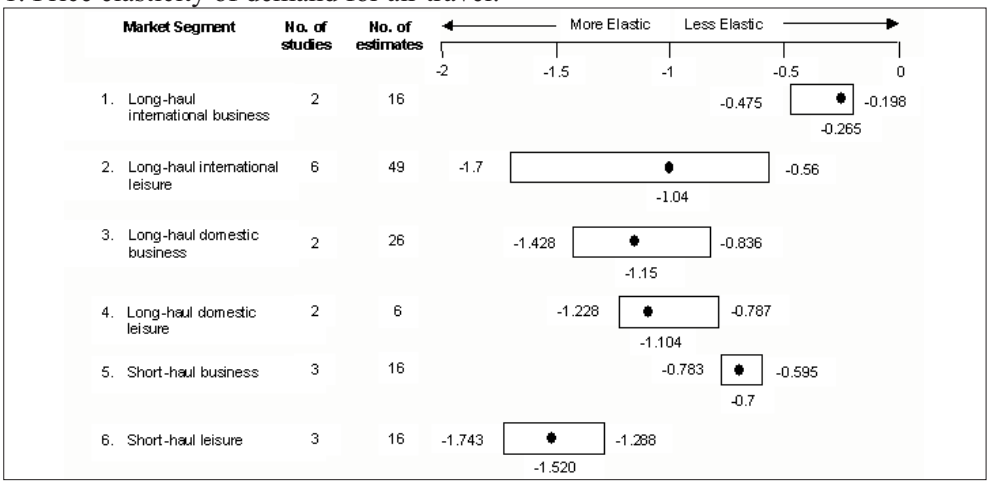
Eurocontrol (2005): The Economic Catalytic Effects of Air Transport in Europe, Eurocontrol, Brussels.

Forsyth, P., et al (2006): 'Open Skies in ASEAN', Journal of Air Transport Management, 12, 143-52.

Gillen, D., et al (2003): Air Travel Demand Elasticities – Concepts, Issues and Measurement, Department of Finance, Ottawa.
Holloway, S. (2008): Straight and Level – Practical Airline Economics, Ashgate, Aldershot.
InterVISTAS (2006): The Economic Impact of Air Service Liberalization, InterVISTAS, Washington.
InterVISTAS (2007): Estimating Air Travel Demand Elasticities, InterVISTAS, Washington.
Lipková, Ľ., et al (2006).: Medzinárodné hospodárske vzťahy, Sprint vfra, Bratislava.
Robyn, D., et al (2005): 'Beyond Open Skies: The Economic Impact of US-EU Open Aviation Area', in CEPS (ed.) Deep Integration, CEPS, Brussels, 50-73.

Appendix

1. Price elasticity of demand for air travel:



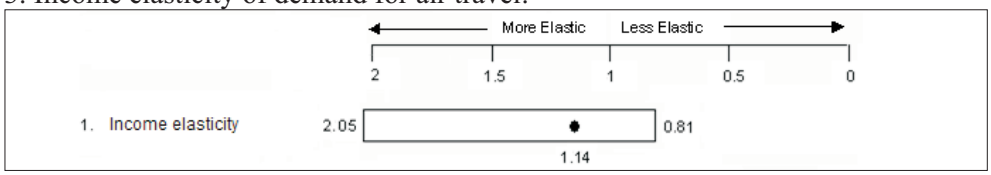
Source: Gillen, et al., 2003

2. Regional price elasticities of demand:

Level of aggregation	Route/market level		National level		Pan-national level	
Flight length	short	long	short	long	short	long
North America	1.50	1.40	0.88	0.80	0.66	0.60
Europe	1.96	1.96	1.23	1.12	0.92	0.84
Asia	1.46	1.33	0.84	0.76	0.63	0.57
Sub-Saharan Africa	0.92	0.84	0.53	0.48	0.40	0.36
South America	1.93	1.75	1.10	1.00	0.83	0.75
Transatlantic	1.85	1.68	1.06	0.96	0.79	0.72
Transpacific	0.92	0.84	0.53	0.48	0.40	0.36
Europe-Asia	1.39	1.26	0.79	0.72	0.59	0.54

Source: InterVISTAS 2007, p. 36.

3. Income elasticity of demand for air travel:



Source: Gillen, et al., 2003

4. Regional income elasticities of demand:

	Route/market level			National level		
Flight length	USA	D-ed	D-ing	USA	D-ed	D-ing
Short	1.8	1.5	2.0	1.6	1.3	1.8
Medium	1.9	1.6	2.0	1.7	1.4	1.8
Long	2.0	1.7	2.2	1.8	1.5	2.0
Very long	2.2	2.4	2.7	2.0	2.2	2.5

D-ed – developed nations minus USA, D-ing – developing economies
Source: InterVISTAS 2007, pp. 37-38.