The economic impact of the Budapest Airport on the local economy

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ABSTRACT[1]

Airports have an unquestionably dominant role in the transport of the 21st century; air transport is the heart of the modern, globalised economy. Beyond this primary function, the international literature also emphasises the considerable economic and economy development effects of airports. The significant airports of the world not only facilitate the local economy but fundamentally determine that.
The aim of the analysis is not only the study of the economic impact of the Budapest Ferihegy International Airport, but also examining the economic impact of the complex system of the companies operating at the airport and complementing each other. First of all, we discuss the methods and concepts to be applied in the analysis of the economic impact of the Budapest Airport. Although the methods and the terminology is fairly uniform in the course of the general review studies, the actual pieces of research can mean something different by the same concepts or they may examine the same thing with different concepts.

1 Introduction

The main aim of the study is to focus on the economic impact of Budapest Ferihegy International Airport. There is a long research tradition on the economic impact analysis of airports. This study do not want to present a critical overview about this literature, only want to give a short methodological and terminological description for the sake of unambiguous word of use. In a later phase of the research the critical overview and comparison will be also given.

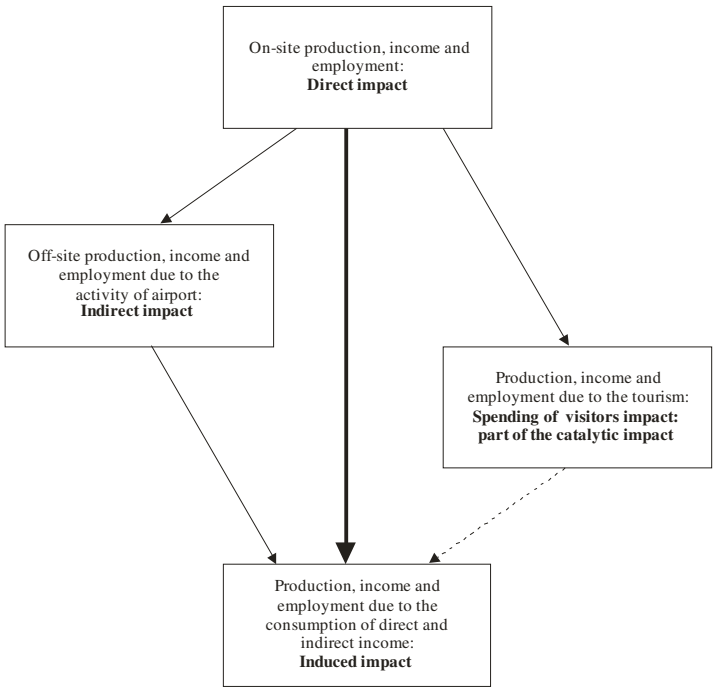
[1] The study is the result of the research and development titled "*Analysis of the Local Economic Development Effects of the Development Projects Connected to Airports*" implemented with the contribution of the DEAK Zrt. and the University of Szeged, charged on the innovation contribution of Budapest Airport Zrt.

From the 1980s, we can find the twofold, threefold or fourfold classification of the impacts in the general-purpose research. In the fourfold classification the direct, indirect, induced and catalytic impacts are differentiated, understanding by the names mostly the following:[2]

- direct impact: output, income and workplaces created on-site owing to the investments and operation of the airport,
- indirect impact: income and employment generated in the companies providing inputs for the airport,
- induced impact: income and employment generated with the multiplier impact owing to spending the incomes,
- catalytic impacts: productivity growth achieved through the operation of the airport, the income and employment created through the companies settling because of the airport and the spending of the tourists arriving because of the airport.

In the case of three impacts, the terms of direct, indirect and induced impacts are the most frequent, and in the case of two the direct and the indirect. The definition of the quantifiable impacts to be analysed is illustrated in Figure 1. The figure also shows the relationships between the impacts. Although it is not always differentiated, impacts originating from ordinary course of business and impacts from the development and investments of the airport may be separated. The separation is justified if significant investments and capacity expansions are realised in the examined period; the separate treatment of the regular smaller investments and maintenances would make the analysis unnecessarily complicated. In the study we do not differentiate between the impacts caused by the current course of business and investments. In Figure 1, there is a dashed arrow pointing from visitor spending impact to induced impact because in the case of visitor spending the primary income owners are not local inhabitants.

Figure 1. Economic impacts of the airports measurable in money and in the number of employees



Source: own construction

[2] See for example: ACI, 2004, p. 5; Percoro, 2009, p. 2429; Klophaus, 2008, p. 267.

The impacts can be measured in monetary indicators (income, tax revenue, output, sales revenue) and natural indicators (primarily the employment but the transportation performance is also often given by the number of passengers or by the mass of the transported goods). Our analysis includes a significant difference compared to the other analyses in terms of the applied indicators. Most studies determine the personal incomes, the tax revenues and the output or the sales revenue, and they refer too the output as production impact.[3] However, the capital income is also part of the total income; these three types of income (personal, capital, tax) are required to determine the gross domestic product (GDP) from the income side. The output is the gross output of the companies, which is a cumulative indicator; it also contains the inputs purchased by the companies. Owing to this its extent cannot be compared to the GDP, its measure is also influenced by the changes of the structure of the economy (separation and merger of companies) besides the real flows, therefore its use cannot be considered optimal. The reason for its frequent calculation is not its theoretical justification but the fact that can be calculated in a simple way. Therefore, we measure the impacts with the contribution to GDP, which requires more calculations but is much better interpretable and comparable, and we divide it to personal incomes, capital incomes and taxes. The local GDP, that is, the production and the total local income are identical with one another in our study. Difference would be caused by the difference of the income owners' residence from the place of production. It is not usual to be calculated in relation to areal units within the country, since the transfer data needed for the calculation cannot be observed, which can be accessed/estimated through the balance of payments between nations. We give the number of the full-time workers as the natural indicator, relying on company level data in the case of the direct impact; and we estimate it based on the average GDP per employee after determining the local GDP in the case of other impacts.

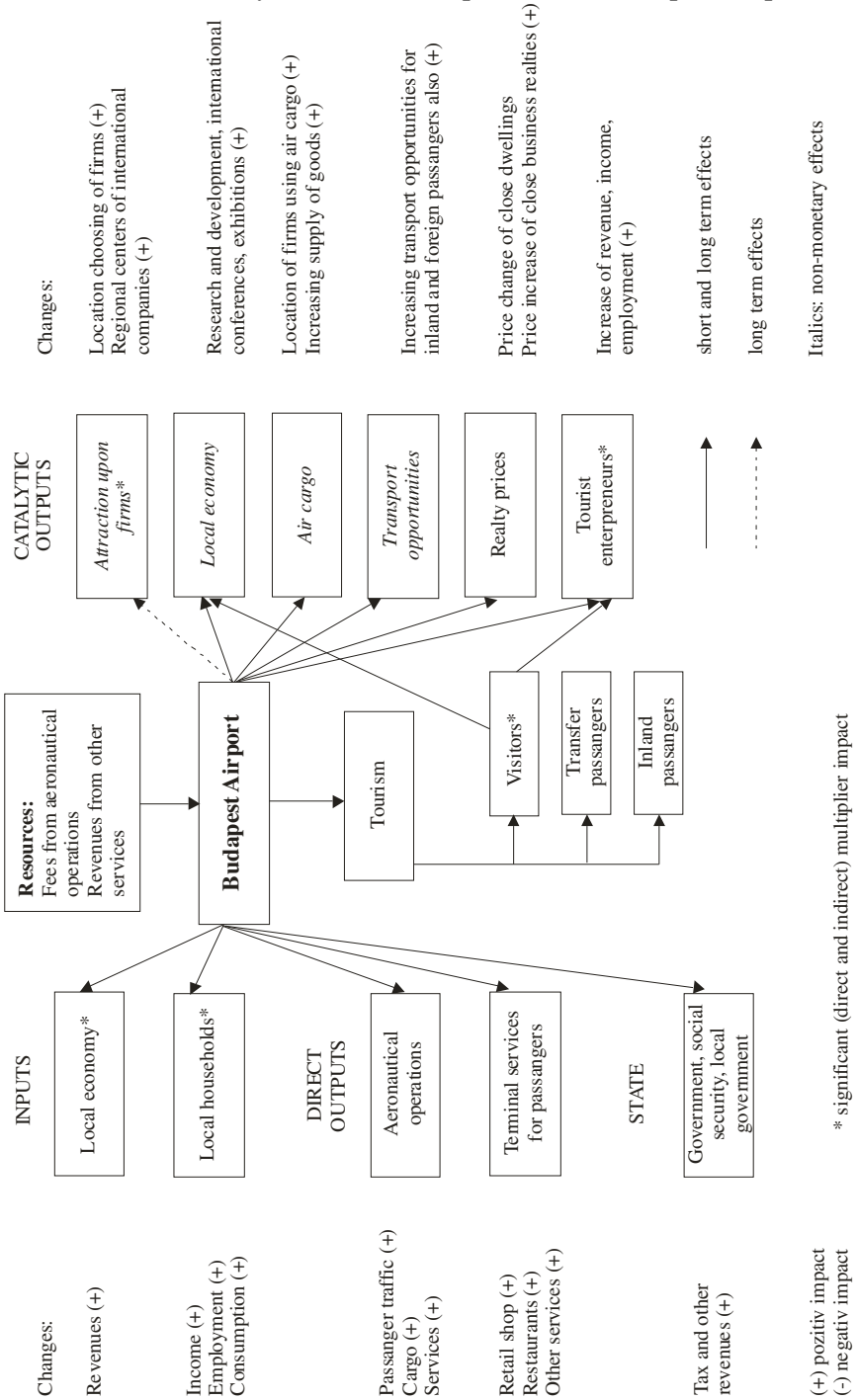
From the four kinds of impact, catalytic impacts and visitor spending within that are specifically the characteristics of the airports; the other three can be studied in the case of any other economic entities (companies or even government offices). In relation to manufacturing companies the indirect impact is referred to in terms of the local supply ratio. Catalytic impacts are connected to the use of the special output of airports, to its role played in the fast transportation of people and products. At the same time, people's travels lead to a territorial redistribution of purchasing power and consumption from the external place to the receiver place.

However, this means not only the inter-territorial but also the inter-industrial redistribution of consumption, since people arriving by airplane have a different structure of consumption compared to local inhabitants and they use the tourism services in a larger proportion and to a significantly greater extent.

It is not necessary to present a complete list of the different word of use in various researches. Just to mention some examples, direct impact can be first round effect, indirect impact is second round effect, induced impact is third round effect. First round effect is sometimes equal to direct impact, second round effect is indirect and induced impacts. The economic impact analysis of Nizza Airport uses indirect impact to the local spending of visitors[4]. The economic impact analysis of Cannes-Mandelieu Airport use the same categories, but the name of induced impact is resulting impact[5]. In the case of Otttawa Airport the indirect, induced and visitors spending impact are treated together. (Sypher: Mueller Int. Inc, 2004).

[3] See for example Wilbur Smith A. (1988, 2005).
[4] http://www.nice.aeroport.fr/developpement_en/impact/default.asp
[5] http://www.cannes.aeroport.fr/EN/impact/impact.htm

Figure 2. The direct and catalytic economic impacts of the Budapest Airport



Source: own construction

The direct impact can be measured in the simplest way, by the help of company level data. Various practical problems can arise due to the obstacles of data gathering and due to the problems of multi-location companies. The size of the induced impact is partly generated by the applied model, the local consumption ratio and the spatial delimitation of the region under consideration. American researches are based mostly on one of these three models and software: RIMS II by Bureau of Economic Analysis (Regional Multipliers, 1997) or IMPLAN

software and input-output database (Mulkey-Hodges, 2000) or REMI model. Compared the three method, the results can be very different (Rickman-Schwer, 1995).

Figure 2. gives an overall and general picture of the economic impacts of the airport. The figure shows the direct and the catalytic impacts, the indirect and the induced impacts appear or originate in the economic actors (companies and employees) giving the inputs.

2 The direct impact of the airport

The on-site economic activity of the airport is connected in a functional sense to serving passengers and the transport of goods, in addition to the direct or indirect serving of air transport (airplanes). The main groups are the following (See Montalvo, 1998):

1. General operation of the airport:
   - Administration
   - Management
   - Maintenance, repair
   - Security service
   - Air traffic control
2. Government and non-profit sector:
   - Border guard
   - Police
   - National Transport Authority
   - Transportation Safety Bureau
   - National Public Health and Medical Officer Service
   - BTH Tourism Office of Budapest KHT
   - Weather Service
3. Serving airlines:
   - Offices of airlines
   - Aircraft maintenance
   - Fuel service
   - Air cargo
   - Check-in
   - Security check
   - Passengers and ground handling
   - Airplane cleaning
   - Flight catering
4. Retail trade, catering, parking:
   - Duty-free shops
   - Restaurants
   - Car rental
   - Car parking
   - Currency exchange
   - Tourist offices
   - Other shops

The activities above are carried out by 120 companies and offices in the area of the Airport, i.e. these companies and offices all are physically located close to the Airport. We did not take into consideration companies not located near the Airport, their activities are presented among the indirect impacts. The activities of 28 out of the 120 are limited

exclusively to the airport, others have more locations, of which one is found at the Airport. The division of the operation of multi-location companies is a problem of localisation which also appears for example in the calculation of GDP on county level. The division may be completed based on several performance indicators (for instance employment, salaries, asset value). At any rate, the way of division does not influence significantly the result for Budapest Airport because the largest companies are mostly among single-site companies, and themselves have a very significant weight. In relation to the airport share we received estimations by Budapest Airport's operating company for one part of the companies, for the rest we made cautious estimations based on the size of the rented area and the study of the company activity. The data of staff numbers, sales revenue and personnel expense of the 12 largest companies can be found in Table 1., these companies employ already 6,1 thousand people. Malév and Wizz Air Hungary are two airlines of which localisable centres can be found at Budapest Airport. On the other hand, the result of the activities of airlines using Budapest as a destination is not taken into consideration. This kind of disregard is compensated by the fact that also part of the performance of Malév and Wizz Air Hungary is linked to the airports of their destinations either.

Table 1. The largest companies of Budapest Ferihegy International Airport (2009)

Name of company	Number of employees	Net sales revenue (million HUF)	Personnel expense (million HUF)
Budapest Airport Zrt.	1666	43 511	9 562
MALÉV Zrt.	1272	95 398	16 227
Malév GH Földi Kiszolgáló Zrt.	733	10 560	4 026
HUNGAROCONTROL Magyar Légiforg. Szolg. Zrt.	673	23 973	11 589
Celebi Ground Handling Hungary Kft	514	6 645	2 308
LUFTHANSA TECHNIK BUDAPEST KFT.	409	8 745	3 130
WIZZ AIR HUNGARY KFT	221	134 858	2 908
SSP HUNGARY KFT	165	1 522	396
MAGYAR DUTY-FREE KER.KFT.	130	10 341	723
AIRPORT SECURITY KFT.	105	2 446	324
BUDAPEST AEROSERVICE KFT.	90	1 463	151
CITYLINE HUNGARY KFT.	85	1 613	177

Source: Company reports and appendices

In the course of determining the impact of employment, production, income and tax revenue we took the data on company level as a starting point. We had information about 67 companies on the average staff number of full-time workers in 2009, which was a total of 6649 people. The remaining 55 airport tenants are multi-location, have activities distributed between the airport and other locations or government office. Due to the reasons mentioned earlier (counting here the activity of Malév and Wizz Air on other airports) we did not take the offices of airlines into consideration. For most companies we counted with two persons, for government and non-profit organisations collectively with 62 persons. Thus we estimated the number of employees at 173 persons in total in the case of those companies and offices for which we did not have data. So the number of employees in the area of the airport is 6822 collectively, only less than 3% of this data is based on estimation and the remaining over 97% is based on exact statistics. This means that Budapest Airport would be the second largest one-location company in Hungary (after Danube Ironworks) if the 120 companies and offices operating in its area formed one organisational unit. Even if we also take into account the largest but multi-location employers of Hungary consisting of regionally dispersed units

(MÁV, Matáv, Posta, Tesco, Mol etc.), the airport would stand in the remarkable 16th place of the employment ranking (see Table 2.).

We estimated the value added generated by the companies of the airport, and then the gross domestic product and their distribution among the factors of production based on company level data. Since part of the companies are multi-location, a certain estimation item would have appeared in the final result; also, we did not have access to data of some smaller companies similarly to the number of employees so we carried out detailed calculations concerning the 33 most significant companies of the airport. These companies have 6510 employees on the airport, which is 96,3% of employees working in the corporate sector of the airport. Within the state incomes we determined the extent of local taxes separately. We do not intend to describe the methodology in more details, the results can be found in Table 3.

Table 2. Largest employers of Hungary

Name	Number of employees (2008)	Number of locations
Magyar Posta Zrt	35973	Many
Magyar Államvasutak Zrt	20566	Many
Tesco-Global Áruházak Zrt	19184	Many
Magyar Olaj és Gázipari Nyrt	17213	Many
Budapesti Közlekedési Zrt	12587	Many
Spar Magyarország Kereskedelmi Kft	12426	Many
GE Hungary Kft	12008	Many
Magyar Telekom Távközlési Nyrt	10438	Many
Richter Gedeon Vegyészeti Gyár Nyrt	10382	Many
Magyar Villamos Művek Zrt	8553	Many
Trenkwalder-Miltiman Kft	8302	Many
ISD Dunaferr Dunai Vasmű	7868	One
Videoton Holding Zrt	7862	Many
Flextronics International Kft	7825	Many
MÁV-Start Zrt	7050	Many
Companies at Budapest Airport	6822	One

Source: HVG, own calculation

Table3. Components of the value added at factor cost of the 33 largest companies of the airport (thousand HUF)

<table>
<tr><td colspan="6">Personnel expenses</td></tr>
<tr><td colspan="4">Gross wage incomes</td><td colspan="2" rowspan="2">Wage contributions charged to employer</td></tr>
<tr><td colspan="2">Net wage of employees</td><td colspan="2">Taxes and other fees on personal income charged to employees</td></tr>
<tr><td colspan="2">21 658 952</td><td colspan="2">19 733 664</td><td colspan="2">12 476 326</td></tr>
<tr><td colspan="2">Net personal income</td><td colspan="4">Total taxes and other fees on personal income</td></tr>
<tr><td rowspan="3">Depreciation and amortisation</td><td colspan="4">Earnings before taxes</td><td rowspan="3">Local taxes</td></tr>
<tr><td colspan="3">Earnings after taxes</td><td></td></tr>
<tr><td rowspan="2">Reinvested profit into company</td><td colspan="2">Profit paid as dividend</td><td rowspan="2">Corporate tax</td></tr>
<tr><td>Net dividend</td><td>Taxes charged on dividend</td></tr>
<tr><td>19 962 285</td><td>-32 086 396</td><td>579 795</td><td>370 689</td><td>497 316</td><td>4 921 540</td></tr>
<tr><td colspan="3">Net capital income</td><td colspan="3">Taxes, contributions charged on capital incomes</td></tr>
</table>

Source: Own calculation based on company reports

With the calculations so far we received the value added at factor cost of the airport share totalling the 96,3% of all companies. In 2009 the value added in Hungary at factor cost was 22069 billion HUF and the GDP at market price was 26054 billion HUF. (National Accounts of Hungary, 2010) We multiplied the result by the ratio of the two, by 1.18 to get to

the estimated GDP at market price (we also use this to estimate from the value added at factor cost at the GDP at market price later on), in addition, by 1/0.963 to get the estimation regarding the entire corporate sector of the airport. The GDP of the government sector has to be added to this, which we estimate at 372 million HUF based on the 6 million GDP per employee of the government sector in 2009. Its division among the income owners was also made with the help of the known ratios related to the entire sector.

The final result and its development is found in Table 4.. The corporate losses of 32 billion HUF (which mainly can be attributed to Malév) could not be compensated by the amortisation, thus negative value added belongs to the capital owner part. However, the state can get significant revenues from taxes and contributions charged on work, and local governments from the local trade tax amounting to 5 billion HUF. The implicit tax rate charged on work (total tax and contribution revenue in the percentage of tax base) was 42.4% on national economic level in 2008, while it was 47.7% for companies of the airport. The GDP per employee was 6.6 million HUF on national economic level (in 2009), it was 10.1 million HUF in the Central Hungarian region (based on the Hungarian Central Statistical Office data related to the number of employees and size of GDP), on the other hand, it was on average 10.7 million HUF at Budapest Airport. On the whole, the airport contributed to the tax revenues to a significantly greater extent and rate than to the employee and the capital incomes.

Table 4. The contribution of companies operating at Budapest Airport to the GDP (million HUF)

	Income owners			Total
	Employees	Capital owners	State	
GDP at factor cost of 33 companies	21659	-11544	49279	59394
GDP at factor cost of all companies	22491	-11988	51172	61676
GDP at market price of all companies	22491	-11988	62274	72777
GDP at market price of government sector (offices authorities)	153	40	179	372
GDP at market price in total	22644	-11948	62453	73149

Source: Own calculation based on company reports

The Central Hungarian region produced the 48.1% of the Hungarian GDP in 2008 (data on 2009 is not yet available), calculating with this ration, which temporally does not change fast, we can estimate the GDP of the region in 2009 at 12542 billion HUF. Thus the 73.1 billion HUF is 0.58% of the Central Hungarian region's GDP, and 0.28% of the Hungarian GDP. This result also shows that the airport itself, by taking merely the direct impacts into account, has a significant economic impact.

3 The indirect impact of the airport

Budapest Airport uses different inputs during its activity. Out of these, work inputs result in personal incomes, the spillover impact of which is considered later on, in the course of examining the induced impacts. Material inputs, which are directed towards the local economic actors, increase the local production and income, namely in the ratio in which the given input contains local value added.

The value added growth originating from the growth of demand created for the local economy can be estimated in three steps. In the first step we have to exclude transactions between companies of the airport. This is necessary because the value added from these transactions has already been taken into account as direct impacts. The exclusion of the

transactions is theoretically unproblematic; however, it requires estimation in practice, since it would be possible only through the very detailed analysis of every company and through their active cooperation in data supplying. If the entire airport was a single company on organisational level, this step could be left out. After estimating the extent of inputs directed outside the airport, we have to examine the source of inputs from the spatial point of view. We created three categories found in Table 5. In the second step we estimated the ratios of value added originating from the local economic actors within the particular categories, the result can be seen in Table 6.

Table5. Inputs directed at the airport according to place of source

Source of input	Content of input local value added
Local product purchased by local economic actors	Local share of value added
Imported product purchased by local economic actors	Retail trade margin, cost of transport
Not purchased by local economic actors	Cost of transport at most or a part of it

Source: own construction

Table 6. Review of calculating the indirect impact

Input				Local surplus value	
Source	Ratio (%)	Value (billion HUF)	Local share(%)	At factor cost (billion HUF)	At market price (billion HUF)
Local product purchased by local economic actors	60	31.2	50	15.6	18.41
Imported product purchased by local economic actors	30	15.6	15	2.34	2.76
Not purchased by local economic actors	10	5.2	0	0	0
Total	100	52	34.5	17.94	21.17

Source: own calculation

Based on the final result, a total of 17.94 billion HUF at factor cost and 17.94*1.18=21.17 billion HUF at market price of local value added can be attributed to the operation of Budapest Airport through the inputs form the local economy. The average GDP per employee at market price was 6.6 million HUF on national level and 10.1 million HUF in the Central Hungarian region, counting with the latter it provides jobs for a total of 2100 employees with a much higher income compared to the national average, distributing it towards companies giving inputs to the local economy.

For indirect impacts the GDP cannot be divided in the same way as in the case of the direct impact. For this all suppliers should be known and the rates of supply at the airport for each of them. In the case of small companies the employee income and the capital income cannot be separated, thus we determined only the share of the public sector for the 21.2 billion HUF of the indirect impact in the known ratio of the implicit tax rate of the GDP (40.4%), we did not divide the work and the capital part. The result of this, together with the direct impact and the impact on employment, can be found in Table 7. The direct and the indirect impact can be added, because the data are homogeneous (GDP at market price and number of employees).

Table 7. The direct and indirect impact of the airport on GDP and number of employees

Name	GDP at market price, billion HUF				Number of employees, person
	Income owners				
	Employees	Capital owners	State	Total	
Direct impact	26.7	-14.1	60.5	73.1	6822
Indirect impact	12.6		8.6	21.2	2100
Direct and indirect impact together	25.2		69.1	94.3	8922
Direct and indirect impact in % of region	-		-	0.75%	0.72%

Source: own calculation

4 The impact of visitor spending

The spending of visitors is understood by some studies examining the impact of the airports as surplus money or surplus income pumped into the local economy, and they add its amount to the direct and indirect impacts. This procedure is methodologically not justified; the visitor spending is not an income but the spatial transfer of consumption which generates as large local income as the amount with which the expenses exceed the cost of the purchased products and services. If a tourist buys a memory card made in China for his camera, the retail trade margin will be the local income. If he buys a museum ticket, its almost entire amount can be regarded as local income: it is possible that because of the additional visitors they have to clean more and use imported detergents, however, its extent is definitely insignificant compared to the revenue; at any rate, the crucial part of the potential surplus means product and service produced in local economy.

The data source in relation to the visitor spending is the survey of the Hungarian Central Statistical Office: In 2009, 11,715 people were asked at Budapest Airport and 53,143 people of foreigners arriving by road. The sample population is the population of 3,258,000 foreign visitors arriving by air in 2009. 87% of passengers marked Budapest as destination, taking into consideration those arriving in Pest County and the expenses effected during passing through Budapest and Pest County, 90% of the entire population can be regarded as visitors and spenders in the Central Hungarian region (This rate is only around 30-35% for those arriving by road). The size of the sample also provides the opportunity to analyse the differences according to the home countries and the motivations. The most important summary data can be found in Table 8., together with all data of the public road traffic for the sake of comparison. Visitors arriving by airplane have several advantageous characteristics compared to the total passenger traffic: significantly longer average period of stay (9.1 days, by road only 1.8 days), considerably larger amount of average daily spending (15.8 thousand HUF as opposed to 10.9 thousand HUF) and arising from summing up the two impacts, the difference in the average expenses per visitor is even larger (144 thousand HUF as opposed to 19,6 thousand HUF). Further added benefit is the considerably smaller seasonal fluctuation of the air passenger transport compared to road transport, in addition, the much greater proportion of the local products and services (such as the accommodation and dining in restaurant) in the expense structure of the visitors arriving by air.

Owing to the visitor spending, the estimation of the surplus income produced in the local economy was made in the next steps. First we estimated the entire amount of local expenses, which is spending of all the visitors arriving by air minus the amount spent by foreigners in retail trade units (shops and restaurants) at the airport (as this was already accounted in the direct impact), multiplied by the rate of region from the total of the visitors, namely by 0.9. The amount given is (468.7-8.9)*0.9=413.8 billion HUF. After this we

estimated the contribution of expenses to the growth of the local value added in two steps based on the spending items of expense. In the first place we estimated the value added occurring in the direct provider of the good or service (for example hotel), in the second place the value added appearing in the local companies giving inputs for the provider of the good or service.

The calculations divided into spending items can be found in Table 9. The final result already shows directly the contribution of GDP at market price, because the determination of GDP happened on the side of consumption, the expenses comprise the taxes on products. The local income growth is in total 232.2 billion HUF, which is distributed between wages, capital income and taxes. By dividing this amount by the regional 10.1 million HUF average value added per employee we get the employee impact. The visitors spending mean 23 thousand local jobs in the tourism industry and the industries serving tourism collectively in the Central Hungarian region.

Table 8. Number, period of stay and expenses of tourists arriving in Hungary by air (2009)

	Expenses of visitors (million HUF)	Period of stay of visitors (thousand days)	Number of visitors (thousand person)	Average spending per visitor	Average daily spending	Period of stay per visitor
Arrivals by air	468 731	29 642	3 258	15.81	143.9	9.10
Arrivals by road	731 906	67 346	37 366	10.87	19.6	1.80
Total	1 200 637	96 988	40 624	12.38	29.6	2.39
Visitors arriving by air according to the motivation of the journey						
	468 731	29 642	3 258	144	15.8	9.1
Conference	14 660	452	81	180	32.4	5.6
Business trip	88 111	2 810	553	159	31.4	5.1
Holiday	109 628	5 789	767	143	18.9	7.5
Sightseeing	115 295	4 706	946	122	24.5	5.0
Visiting relatives or friends	59 190	6 611	591	100	9.0	11.2
Medical treatment	8 305	178	24	345	46.6	7.4
Health promotion	6 246	217	22	288	28.7	10.0
Cultural programmes	10 512	477	70	149	22.1	6.8
Religion	1 178	86	13	90	13.7	6.6
Hiking		(too small sub-sample)				
Hunting	1 553	29	4	351	54.4	6.5
Shopping		(too small sub-sample)				
Learning	34 701	5 550	107	324	6.3	51.9
Work	16 303	2 578	51	320	6.3	50.6
Other	1 657	94	17	98	17.6	5.6

Source: HCSO, OSAP data collection No.1943

The totalised result of the three impacts discussed so far in relation to the Central Hungarian region can be found in Table 10. These are again addable and non-cumulative impacts. The economic activity arising from the operation of the airport adds up to 2.6% of the entire economic activity of the Central Hungarian region, and 1.4% of the economic activity of the whole country.

Table 9. Local impact of visitor spending

	Expenses		direct surplus value		indirect surplus value		
Item of spending	Distribution, %	Amount, billion HUF	Ratio, %	Amount, billion HUF	Ratio, %	Amount, billion HUF	Direct and indirect, billion HUF
Accommodation and meal	20.1	83.2	40	33.3	40	33.3	66.5
Accommodation without meal	14.7	60.8	40	24.3	40	24.3	48.7
Dining in catering place	12	49.7	40	19.9	40	19.9	39.7
Purchased food, drink	6.6	27.3	20	5.5	20	5.5	10.9
International transport	16	66.2	0	0.0	0	0.0	0.0
Inland long-distance transport	4.1	17.0	2	0.3	10	1.7	2.0
Car rent	0.6	2.5	30	0.7	10	0.2	1.0
Fuel	0.7	2.9	20	0.6	10	0.3	0.9
Cultural programmes	2.6	10.8	80	8.6	10	1.1	9.7
One-day trip paid in Hungary	0.5	2.1	60	1.2	20	0.4	1.7
Health promotion	0.8	3.3	50	1.7	10	0.3	2.0
Medicine	1	4.1	50	2.1	10	0.4	2.5
Entertainment	2.2	9.1	60	5.5	10	0.9	6.4
Sport, fitness	0.2	0.8	50	0.4	10	0.1	0.5
Other buying souvenirs	12.3	50.9	50	25.4	10	5.1	30.5
learning	0.9	3.7	30	1.1	10	0.4	1.5
Other	4.7	19.4	30	5.8	10	1.9	7.8
Total	100	413.8	652	136.4		95.8	232.2

Source: HCSO (distribution of expenses), own calculation

Table 10. Direct, indirect and visitor spending impact of the airport on the GDP and on the number of employees (2009)

Name	GDP production, billion HUF	Employee, person
Direct impact	73.1	6822
Indirect impact	21.2	2100
Visitor spending impact	232.2	23000
Total (All impacts)	326.5	31922
In percentage of the region	2.60%	2.58%

Source: own calculation

5 The induced impact of the airport

So far we have discussed the impact of the airport on generating primary incomes. The induced impact, on the other hand, has to be rather understood as having an indirect character and it shows the extent of further income development to which the employees contribute by spending their income. The substance of the impact can be summarised briefly as follows. The owners of the earned incomes produced with the previous three impacts generate demand partly for the products of the local economy and partly for the products of the foreign economy. The demand for the products of the local economy generates further, secondary demand, which leads to tertiary demand, which leads to further demand and so on. The

incomes are multiplied formally similarly to the principle of the Keynesian multiplier, differing in one important aspect, in the presentation of the regional rate of consume.

With the invariance of other circumstances, the extent of the multiplier impact depends on the following factors besides the side of the initial income. Firstly, it depends on the size of the examined region. According to this, the smaller the examined area is, the greater the leakage of income is, and the smaller the impact is. If all of Hungary was the subject of study, the impact would be larger than on regional level, but it would be larger on regional level than on the level of county, small region or settlement. Secondly, with the increase of the complexity and the integration of the involved economy the extent of the impact is larger than in the case of a more specialised and more import-dependent economy, where local companies can satisfy only a smaller part of the demand. Therefore, for example in the case of a city, the multiplier impact is bigger than for a small town or a village. Thirdly, the extent of the impact depends on the composition they are directed on products with various tax contents. If the rate of products with larger tax content (tobacco, spirits or fuel) is higher, the impact is smaller, since the tax content is a centralised part of the gross sales revenue, it cannot be considered on local level.

Accordingly, the extent of the multiplication of the income depends on the following parameters:

Personal income tax and its rate (t)

Value Added Tax and taxes on other goods (n)

Average propensity to consume (c)

Local ratio of consumption (f)

All of these parameters or their versions subtracted from one have reducing impact on the extent of consumption in the next round for some reasons, so the greater their value is, the smaller the multiplier is. The size of the multiplier impact can be calculated by the following formula:

$$m = \frac{1}{1 - f \times c \times (1-t) \times (1-n)}$$

From the four parameters the determination of the local ratio of consumption is the most uncertain, but the estimation does not have unbearably great latitude for this factor, either. We determined 60% as the local ratio of consumption, taken into consideration the values regular in the study of local economies of similar size and character, in addition, the large size of the local economy and diversity. For the rate of the personal income tax we calculated with 42,4% based on the value of the implicit tax charged on work (total of tax and contribution income in the percentage of the tax base), for the value added tax and other tax contents with 20%, and for the average propensity to consume with 85% with the awareness of the use of household incomes, since the actual value in Hungary fluctuates steadily and in the long term around this value. Accordingly, the size of the multiplier is 1.307.

In determining the income to be multiplied we have to use estimation again, because the division of income types into components was possible only in the case of the direct incomes. For the entire income the tax content can be determined unambiguously, the separation of personal and capital incomes cannot, because the mixed income of individual companies and households comprise simultaneously personal and capital parts. The net employee income that does not comprise mixed incomes was 53.7% of the gross value added on national economic level in 2009. Calculating the rate of personal incomes with 55% due to mixed incomes, the earned income to be multiplied can be estimated to 326.5*0.55=179.6 billion HUF in total. Multiplying this with 1.307, we get 234.7 billion HUF multiplied personal income. Its net increase is 234.7-179.6=55.1 billion HUF.

However, this calculation applies only to personal incomes. We get higher results than if we also take the tax content of personal incomes into account, since the state pays part of the taxes on personal incomes, and uses it for products and services. The simplest way to consider this is to disregard the t and n factors meaning taxes in the multiplier impact, besides we assume that the national average propensity to consume and the local ratio of the national consumption equal the rates calculated for the household incomes:

$$m_2 = \frac{1}{1 - f \times c} = \frac{1}{1 - 0.6 \times 0.85} = 2.04$$

The result for the entire multiplied income is: 179.6*2.04=366.3 billion HUF, and its net part is 186.7 billion HUF. This amount contains not only the personal income but also taxes and contributions and their multiplied part, to the same extent as the original rates.

Results of the fourth impact have to be treated cautiously. Certain studies slightly overemphasize the significance of the multiplier impact, having forgotten the three circumstances required for interpretation. Firstly, this means an impact which is temporally extended, secondly it is not an airport-specific impact, it is in similar proportion to the personal incomes of the company in the case of other companies also. Thirdly, it is an indicator which contains accumulation (double accounts) as opposed to the estimated impacts before, thus its addition with the previous impacts is not justified. It can rather be understood as in the case of the closing down of the airport or the reduction of its turnover, negative spillover impacts would start according to such rate.

6 The impact of the change in passenger traffic

The quantitative and qualitative changes of passenger traffic may influence the direct, indirect and visitor spending impact and the rates between them in different ways. The numerical change of the passenger traffic results in relatively easily calculable impacts for the direct and indirect part. The total of the passenger traffic was 8 million 95 thousand person in 2009, that is, the number of the by other studies many-times mentioned direct employees per 1 million passengers was 843 person and the number of the indirect employees was 260 person. The value added per 1 million passengers 9 billion HUF (direct) and 2.6 billion HUF (indirect), in total 11.6 billion HUF. In the domains close to 8 million the extrapolation of this ratio can be allowed for both indicators, and in further domains for the value added. Thus 1 million more passengers mean 800-850 person larger direct and 260 person larger indirect employment; 9 (direct), 2.6 (indirect), and 11.6 (direct and indirect together) billion HUF GDP growth. At the same time, the extent of the impact is greater if the share of passengers consuming relatively more at the airport increases. If the increase in the number of the passengers is realised beside unchanging rates, the visitor spending impact of 1 million more passengers creates 2800 new jobs and means 28.7 billion HUF GDP growth.

The calculations can be reviewed in Table 11. The size of tax revenues was estimated not by the ratio of actual tax revenues in 2009, but by the 40-41% tax rate to GDP of the past years, assuming a tax content of 40%. These are the impacts working in the Central Hungarian region, the impacts operating in the whole country are bigger with about 25%, since the domestic suppliers outside the Central Hungarian region and the tourists arriving not in Budapest are already included in the indirect and the visitor spending impacts.

Table 11. Expected impact of the increase in number of passengers by 1 million on the number of employees, on GDP and on tax revenue in the Central Hungarian region

Impact	Number of employees	GDP growth (billion HUF)	Growth of tax and contribution incomes (billion HUF)
Direct	850	9	3.6
Indirect	260	2.6	1.04
Direct and indirect	1110	11.6	4.64
Visitor spending	2800	28.7	11.48
Total	**3910**	**40.3**	**16.12**
In percentage of the Central Hungarian region	0.226%	0.229%	-
In percentage of Hungary	0.074%	0.11%	-

Source: own calculation

In terms of the entire impact it is advantageous if the passenger traffic increases on greater scale or it consists of a greater proportion of foreign visitors incoming at Budapest than Hungarians travelling abroad and then back. The extra flights to seaside resorts barely influence visitor spending; Flights to city destinations attract more tourists to Budapest through the growth in travel opportunities. Transit passengers of travelling between Western Europe, Eastern Europe and the Middle East via Budapest Airport contribute to the direct and indirect impacts, because although they do not consume outside the airport they have a significant role because they contribute to the economical maintenance of those flights which attract visitors to Budapest.

7 Conclusion

The available data made the accurate estimation of the measurable part of the local economic impact of Budapest Airport possible. We did not deal with a number of, rather qualitative positive impacts, which could be also seen in Figure 9.2. The quantity, character and potential margin of error of the applied estimation procedures do not differ from the official estimation of the national GDP, apart from the estimation of local shares. The final result is composed of components of varying accuracy: completely accurate and reliable data for the largest companies, non-sampling data deficiency for a part of the smaller or multi-location companies, sampling error related to visitor spending. Apart from the multi-location problem these all also occur in the course of the country level GDP estimation. The accuracy of the estimation at local shares used in the models is increased by the available division by spending items and the various pieces of qualitative information related to the spatial formation of processes could be used. We could make an overall estimation for the impact of the change of passenger traffic due to the unmatchable nature of the pieces of information from the various data sources.

The most important results are repeated and summarised in Table 13., completing the results presented earlier with tax and contribution incomes emerging through the indirect and the visitor spending impact and estimated at the 40% of GDP. The table shows well that the Budapest Airport is one of the largest employers and value producers of the country based on also the direct impacts, and to an even greater extent through the various indirect impacts.

Table 13. The measurable economic benefits of the operation at Budapest Airport

Employment, production and tax impact in the Central Hungarian region in 2009			
	Employment (person)	GDP production (billion HUF)	Tax and contribution incomes of state (billion HUF)
Direct impact	6822	73.1	60.5
Indirect impact	2100	21.2	8.5
Visitor spending impact	23000	232.2	92.9
Total	**31922**	**326.5**	**161.9**
In percentage of the region	2.58%	2.60%	-
One million new passengers' impact in the Central Hungarian region			
	Employment growth (person)	GDP growth (billion HUF)	Growth of tax and contribution incomes of state (billion HUF)
Direct	850	9.0	3.60
Indirect	260	2.6	1.04
Visitor spending	2800	28.7	11.48
Total	**3910**	**40.3**	**16.12**

Source: own calculation

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