

The impact of a low-cost airline's flights on local economy – On the example of Cluj-Napoca International Airport (Romania)

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Aviation is paramount in contemporary medium and long-distance transport, and airports are essential junctions in the modern globalised economy. The presence of airports is determinative concerning local regions or areas, and a specific methodology demonstrates its impact on the economy. It allows estimating the direct, indirect, and consequent multiplicative effect of the presence of airports on employment and income more accurately. Thus, it numerically describes the economic significance of certain airports as well. It is not only about quantifying the significant impact of an airport on the local economy; it should also be the extent to which an airline's presence impacts regional and local economic processes.

Besides analysing general methodological issues concerning the impact analysis of airports, this study aims to evaluate the impact of a particular low-cost airline's flights on the local economy. The basis of our study is the Cluj Avram Iancu International Airport (CLJ) of Cluj-Napoca, Romania, and its dominant airline Wizz Air, which has a distinct impact because of its distance from large international airports. Thus, we can conclude that as a net result at the regional level, the presence of Wizz Air's Cluj-Napoca flights generates over 4,000 person employment impact besides about 54 million euro income impact on the local economy.

Keywords:

impact analysis,
economic impact,
low-cost airlines,
airport,
airline

Introduction

It is complex and methodologically widespread to assess the impact of several economic units on the local economy (Varga et al. 2014, Dusek–Lukovics 2014, Kotosz et al. 2015, Koppány 2017, Vörös 2017, Erdős et al. 2021). Since the 1970s, an increasing number of analyses have focused on the impacts airports have on the local economy. Some of these analyses were initialised by airport management to support and justify the necessity of grants requested or received from various agencies (such as the central government, regional, and local authorities). Besides direct impacts, these analyses typically show numerous indirect, multiplicative effects while being extremely difficult to quantify in the case of a particular airport as well as other objects and economic activities.

Most of the impact assessments in the international literature are about airports (Gillen–Hinsch 2001, ACI 2004, Transportation Research Board 2008, Dusek–Lukovics 2011, Redondi et al. 2012, Pancer-Cybulska et al. 2014, Bohl et al. 2017), not airlines. Since airlines and airports exhibit a symbiotic relationship (neither party can operate without the other), determining the weight of a specific airline within an airport allows identifying the portion attributable to one particular airline within the airport's overall impact. The starting point such segmentation can be the number of passengers, incidentally adjusting it with known differences in quality (for instance, charter flights play a role only in outbound or inbound tourism on certain airports).

Analysing the impact of low-cost airlines that have emerged because of aviation liberalisation is more challenging because of other autonomous processes and their influence on aviation, making it difficult to treat them separately. The most significant concurrent changes are the decrease in relative (compared to other means of transport) travel costs and the increase in income, which has increased the proportion of leisure travellers, even among traditional airlines.

Analyses about low-cost airlines often target the boost of tourism and related growth in the local economy (Rebollo–Baidal 2009, Graham–Dennis 2010, Chung–Whang 2011, Laplace–Latgé–Roucolle 2016, Olipra 2012, Tsui 2017, Chen et al. 2021, Pot–Koster 2022). All these posit a positive impact on the local economy, whereas country-level impact is reduced owing to the crowding-out effect (influence concerning the surroundings of the airport and regions distant from the airport can be relatively infrequent).

The analysis of the role of low-cost airlines was a separate viewpoint in the study by Álvarez-Díaz et al. (2019). They found that the composition of passenger traffic of low-cost airlines differs from that of traditional airlines, when the proportion of family visits, education, or second-home-related travel is higher (VFR – visiting friends and relatives travel) and that of business travel is lower.

This study aims to discuss the general theoretical, methodological, and conceptual framework of the impact analysis of airports and airlines and subsequently quantify the impact of a particular low-cost airline's flights on the local economy.

Our study is based on Romania's second-largest airport, the Aeroportul International Avram Iancu Cluj-Napoca, a large international airport distant from other airports, thus having distinguishable economic impacts. Wizz Air is the dominant low-cost airline at the Cluj-Napoca International Airport, contributing 65.5% of its passenger traffic (2019).

This study examines the overall local economic impacts of Wizz Air's Cluj-Napoca flights, thus only considering the contributions that would not have occurred without Wizz Air flights. The year analysed was 2019, the year preceding the COVID-19 outbreak.

Typology of local economic impact analyses of airports and aviation

The methods for analysing the economic impact of airports and aviation can be standardised in various ways. Airports (a complex, multi-actor system involving numerous organisational units) and flights are the two main units of area-related impact analysis. An airline can also be the unit of analysis, but the area-related aspect may be less relevant in such cases. The units of analysis can further be divided into smaller units for analysing an airport, all airports of a region or all airports (following the given analysis criteria) of a country. Furthermore, the unit of analysis can be a flight between two airports, a group of flights, all flights related to an airport, or an airline.

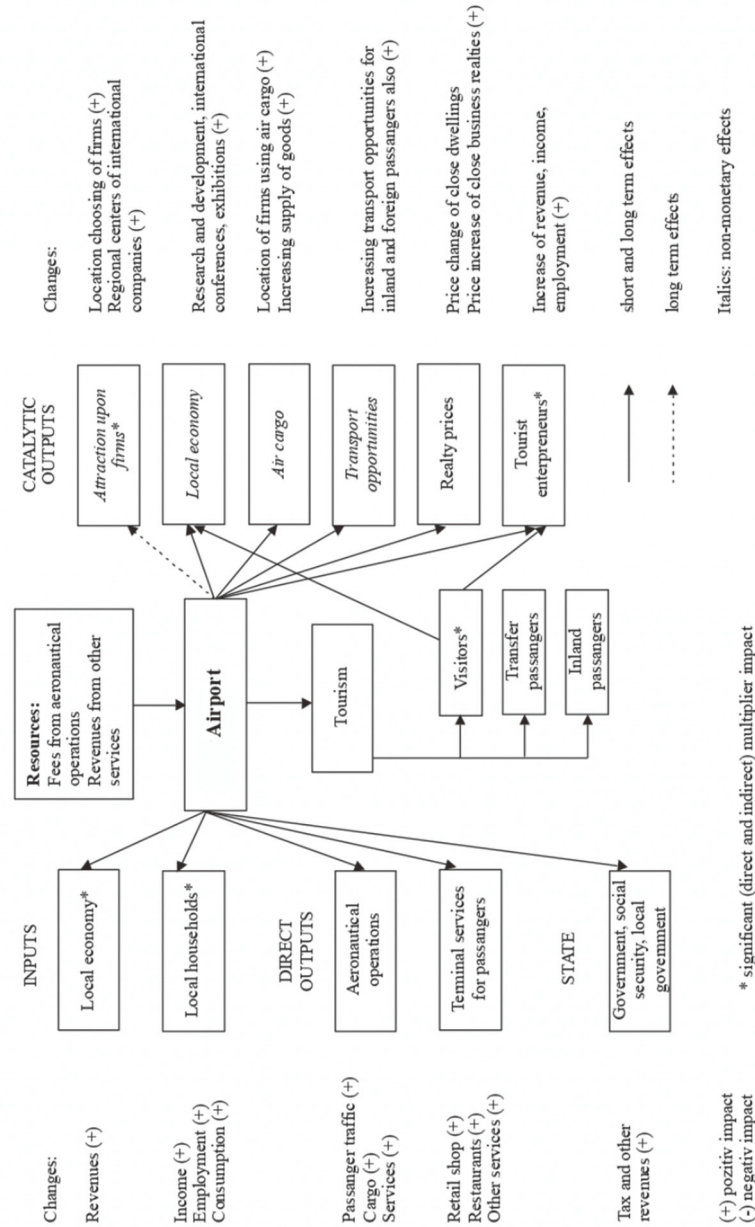
General-purpose research has a long-standing tradition dating back to the 1970s. According to the practice that emerged by the 2000s, the most in-depth analyses distinguish between four types of local economic impacts:

- Direct impact: The output, income, and employment generated by the airport's investments and operations in its area;
- Indirect impact: The income and employment generated by businesses that provide input to the airport;
- Induced impact: The income and employment multiplicatively generated by the local income expenditure, derived directly or indirectly.
- Catalytic impact: The income and employment generated by increased productivity from the airport's operation, its impact on local surroundings through businesses established around the airport and tourism expenditure.

The production and employment component of the direct impact is generated primarily in the airport's area. The income and consumption components are regionally diffused and difficult to localise because of the income holders' mobility and difference in geographical levels (such as national tax revenues). The sum of quantifying other impacts beyond the direct ones is highly dependent on the methodology applied, only partially arising from the diverse handling of issues concerning localisation and spatial delimitation (Pancer-Cybulska et al. 2014).

Figure 1

The direct and catalytic economic impacts of an airport



Source: own construction using Dusek et al. (2011).

The catalytic impact is specific to aviation, but other institutions can also generate similar effects (such as universities, local tourist attractions, and other institutions attracting tourism). This results in two ways for the regional restructuring of purchasing power in municipalities and agglomerations with airports compared to regions without airports:

1. By virtue of expenditure connected to tourism.
2. By its impact on the location choice of business.

Figure 1 provides an overall and general economic impact of an airport. It demonstrates the direct and catalytic impacts; the indirect and induced impacts appear or originate in the economic actors (companies and employees) providing the inputs.

The influence of an airport on the location choice of business involves the regional labour force restructuring besides having a beneficial impact on the sectoral composition of the local economy because businesses utilising airfreight transport usually originates from the technology and knowledge-intensive sectors (ACI 2004). Easy accessibility attributable to the airport's proximity plays a significant role in locating the centres of (primarily multinational) businesses operating in the regional network. Several studies have shown the presence of such impacts, suggesting that these impacts were expected to emerge in the case of impact analyses that were lacking questionnaire surveys on travel destinations, company-related data, and company-related questionnaire surveys, respectively. Tourism expenditures are easier to manage as they can be better defined in time, while the impact on establishing places of business is a prolonged, continuous phenomenon that necessitates the coexistence of other aspects. Moreover, catalytic impacts involve non-measurable elements such as the benefits concerning the location of the business (for already existing businesses and not for the location choice of business), contributions to the business environment, and improving the quality of life due to broadening travel options.

Analyses different from the abovementioned also exist, such as three-component analyses with the first three impacts or two-component analyses that can include tourism merged with the direct impact, where the indirect impact can also mean induced impact. The operationalization and measurement methodology of impacts can also vary. The direct impact is the easiest to measure by studying company-related data, but not without difficulty because the activity undertaken at airports can be shared by hundreds of organisations and businesses, some with multiple sites. Other factors require questionnaire surveys, estimates, and modelling. Furthermore, questionnaire surveys on the airport's significance and role in choosing and maintaining the business location can be conducted with economic organisations. Concerning the multiplicative effect estimation, the total can be influenced by defining the local expenditure rate and boundaries of related local economies.

Another set of analyses aims to quantify and financially define the time-saving effect and the greater safety and cost advantage of aviation over other means of transport. Financially defining the time-saving effect raises some conceptual

questions; based on long-term surveys, the average time spent travelling changes only to a slight extent. Aviation enables relationships that would be impossible without it, or possible only with much lower intensity. Therefore, instead of the time-saving effect, broadening travel options, strengthening regional relations and the profit they bring is considered imperative (Metz 2008).

An airport impact analysis can cover several additional factors. These include the impact on the local housing market (positive impact: improved accessibility; negative impact: noise and crowding near the airport), estimating the time-saving effect and cost savings, the impact on the local labour market, tourism and related services, the impact of the changes in timetables and airline strategy, air pollution and its impact on soil and water quality (Peredy–Venczel 2019), health issues, and several other factors.

Finally, it should be noted that direct and indirect taxes and levies imposed on aviation-related activities do not boost the local economy; they are interpreted on a national level. Their magnitudes matched that of the local impacts.

The characteristics of local economic impacts concerning airports and aviation

Aviation's primary function is ensuring the fast movement of passengers and goods. The possibility of fast movement has several benefits for all participants. Airlines and airports are the two key players in the sector. The state provides the general through its authorities, while its regulatory and legislative function and air traffic control provide various services. The state can also be one of the owners of airlines and airports; however, community ownership is more prevalent in airports on a global scale. Customers include several players, such as passengers, travel agencies, tourism players, insurance companies, financial institutions, and companies that store and move the goods. Generally, this sector is further affected by the natural environment besides climatic, weather, and atmospheric conditions. Aircraft manufacturers and the construction industry that builds and maintains airports are closest to this sector concerning inputs. However, both airlines and airports have some connection with almost all sectors of the industry.

These characteristics result in airports and aviation having many features that do not arise as issues when studying other activities and businesses. Eight of these characteristics are discussed below:

1. The lack of substitution. Most agriculture, manufacturing, and services sectors reasonably assume that an eliminated entity can be replaced by a completely different entity. Hence, a slight spillover economic impact can be expected in the replacement/lack of an entity, but aviation has no substitution as a whole. Airport services without close substitutes, such as the rapid transportation of people and goods over long distances, do not justify examining the use of

- resources in other areas. Substitutability exists only between individual airlines (the lack of one can be substituted by another) and airports in a limited form; as the distance increases, the surrounding airports will rapidly decline as substitutes for a specific airport. Therefore, it is appropriate to examine the substitutability of flights at airlines besides the extent and possibilities of spatial substitutability (Harvey 1987, Pels et al. 2000, Lian–Ronnevik 2011, Marcucci–Gatta 2011, Paliska et al. 2016). However, these observations are not valid if the emergence of high-speed railways between certain cities could replace flying.
2. Airports (on a national scale) are point-like, but their catchment areas which attract outbound passengers and are locations for the final destination of inbound passengers, overlap with the catchment areas of neighbouring airports. There is no specified boundary of the catchment area; those with multi-seat airports operating several flights are much larger than smaller airports. Moreover, larger airports have an overwhelming effect on the expansion potential of smaller airports until they reach their maximum capacity and expansion potential.
 3. Besides the direct and indirect impacts, other impacts appear as the sector improves the connection of the local economy with the rest of the world (and not with the direct environment). It is a significant locational factor and attraction for certain businesses, specifically high value-added business services requiring frequent personal meetings with other enterprises in large centres (Kasarda–Lindsay 2011, Bilotkach 2014).
 4. The external visitors attracted by air connection mostly make local expenditures as they typically use local services, most of which are locally produced, improving the local economy with employment opportunities and income. It especially applies to a larger local economy on the spatial extent and the diversity of services and sectors.
 5. Traditionally, transport infrastructure has played a significant role in shaping the territorial distribution of the population and economy. Aviation has much fewer hubs (airports) than other modes of transport infrastructure (except large sea and river ports, which play a minor role in passenger transport and a greater role in freight transport). Concentrating on a few points makes better accessibility a competitive advantage for municipalities with an airport and their immediate surroundings, as more flights are connected to other airports. The relationship between airport traffic and the surrounding population has long been a research subject. Although the relationship between the two factors (increase in the volume of air traffic on the one hand and the growth of the settlement on the other) is reciprocal, the volume of air traffic (not influenced by other impacts) proves to be a good predictor of population and economic growth (Irwin–Kasarda 1991, Brueckner 2003, Green 2007, Baker et al. 2015, Tveter 2017).

6. The airport (on a national scale) is a point-like object, a transport hub in a location and surrounding environment where several businesses operate in a symbiotic relationship with each other. In terms of proportions, the original fundamental function of airports, the departure and take off of aircraft, represents a declining share of airport activity, while the importance of the original secondary functions is growing. Although the world's largest airports can be composed of hundreds of organisationally separate units, they are also the world's largest single-location employers with interdependencies between actors. Depending on the volume of air traffic, airport management and administration create workplaces in the airport area, and it maintains additional workplaces in narrower and wider environments through the related sectors. Real estate developments near airports provide an attractive location for businesses that use airlines frequently. Furthermore, the advances in the last 30 years had a significant impact on urban models, planning, and development (Karsner 1997, Harris 1997, Bel-Fageda 2008).
7. A high-traffic airport cannot be developed without a significant potential for local business and residential traffic. One of the most significant factors influencing airport size is the population size in the catchment area of airports. An airport cannot establish a settlement, whereas examples of settlements founded or dominated by a single enterprise can be seen in other sectors. The precondition for high-traffic airports is the pre-existing potential, further strengthened by the presence of airports and the resulting attractiveness. Exceptions to this rule are cases that are difficult to replicate, such as Las Vegas (Bubb 2012).
8. In earlier stages, airport traffic was heavily influenced by government regulations. Initially, aviation was much more expensive than other modes of transport; the gap gradually narrowed, subsequently increasing passenger traffic. It has also transformed the perception of airports.

Units and boundary conditions of the analysis

The base unit of our analysis is the international airport in Cluj-Napoca (Aeroportul International Avram Iancu Cluj-Napoca in Romanian), the second busiest airport in Romania, where the Wizz Air airline is a dominant player obtaining about two-thirds of passenger traffic. The current analysis examines the local economic effects of Wizz Air flights on Cluj-Napoca in a net approach that considers only those contributions which would not have occurred without Wizz Air flights. The year analysed was 2019, the one preceding the COVID-19 outbreak.

Notably, the Cluj-Napoca International Airport is close to the geographical centre of Transylvania and far from major international airports. Budapest is six and a half hours by road, while Bucharest and Belgrade are seven-hour drives from the city. The

on-road distances of smaller and medium-sized airports are four hours for Timisoara, nine hours for Iasi, and almost three hours for Sibiu. These are long distances to consider Cluj-Napoca airport a part of an overlapping multi-airport area. Its location and catchment area within Romania are more favourable than the third-largest airport in Timisoara, which is at a peripheral position in southwest Romania, and its catchment area extends to Hungary and Serbia. The closest airport in Tirgu-Mures, a little further than a two-hour drive, could be a meaningful competitor and suction power for several flights. However, it should not be considered competition due to low traffic and few flights. The under-construction Brasov airport is also a five-hour drive far away, and its catchment area partially overlaps with Bucharest (and Sibiu).

The passenger number is the most important natural indicator of airport performance, with the advantage of being an accurately determinable and registered indicator. Several studies have posited a uniform close relationship between income from tourism and the magnitude of local economic impacts, including indicators such as the number of employees at the airport. Accordingly, we begin from the passenger traffic of Wizz Air in the impact assessment, considering its qualitative composition concerning the impact on tourism. We focus on the employment impact as it is methodologically simple and more comparable in time and space, and it can also help estimate the local income impact.

The territorial scope of an airport's impacts cannot be determined for territorial units sharply separated along administrative borders. Moreover, the growing distance from the airport is expected to have a gradually decreasing influence on production, income, employment, and tourism. Simultaneously, the applied research specifies the territorial scope considered, as it is essential for determining the absolute magnitude and proportion of impacts. Cluj-Napoca is relevant concerning the most direct impacts (direct employment and income, part of tourism), while less direct impacts are measured using Cluj County, which is well adapted to the full labour market catchment area with the airport located in the middle. Furthermore, these two territorial units are crucial from an administrative perspective and provide a territorial framework for statistical data collection. Although, the airport also has a direct impact beyond Cluj County to a marginal extent.

Impact of airline flights on primary income generation

Direct employment impact

Direct economic impacts are related to activities carried out in the airport area. The economic activity in the airport territory is functionally associated with the service of air passengers and freight air transport besides the direct or indirect air transport service (aeroplanes). The following are the primary groups of the activity performer:

1. The general operation of the airport: administration, management, maintenance, installation, security service, air traffic control.

2. Government and non-profit sector: border guard, police, traffic and traffic safety authorities, health services, meteorological services.
3. Airline service: airline offices, aircraft maintenance, aircraft refuelling, air freight, check-in, security control, baggage handling, aircraft cleaning, aircraft food and beverage supply.
4. Retail, catering, parking: duty-free shops, restaurants, car rental, car parking, currency exchange, tourist offices, and other shops.

We can estimate the number of employees from the ratio of the average employment density to the number of passengers because no local special features justify below or above-average employment, and the traffic volume is sufficiently above the critical level, below which under-employment and under-utilisation of capacity are common. In 2010, the average employment density in Europe was 800–1000 employees per 1 million passengers (BITRE 2013). The number of Wizz air passengers created a growing number of employment opportunities in aviation for more than 1,700 people in 2019 at an average value of 900 employees. Even with an administrative record of all office employees and enterprises for each year, the actual number may deviate from this, and complete and precise data would be unavailable because of the multi-site enterprises. However, the deviation should not be more than 10–20 per cent in either direction. The airport operator, Aeroportul International Avram Iancu Cluj, employed 327 people in 2019. This number represents just over 10% of the estimated 2,630 employees at the airport. According to international experience, based on the functions performed within the organisation or outsourced to other units, the ratio of the airport operator and the total number of employees at the airport fluctuates widely.

The direct income impact is divided into three main sectors: employee income, corporate income, and government income. The employee and corporate incomes are primary, whereas government income is secondary or redistributed. Concerning local effects, the employee income is crucial; second, corporate income may belong to companies whose headquarters and owners are not local. It could be challenging to determine and localise even with company-level data. Government income is not local; state revenues flow into a large national imaginary register, with the territorial aspect non-primary in its redistribution. Therefore, estimating labour income best describes the amount spent by the labour force locally. Corporate and government incomes are also significant considerations.

Indirect employment impact

There are several definitions of indirect impact. To differentiate the impacts, we understand that indirect impacts result from purchasing those labour and material inputs used for airport operations that the organisations operating at the airport do not produce but procure from other actors. Among other actors, inputs from local actors contribute to the local economy in terms of either employment or income proportional to the locally added value of that input. For example, an airline's purchase

of an aeroplane does not boost the local economy because it is not manufactured in Cluj County. According to the level of retail and wholesale contributions, equipment purchased for aeroplane maintenance, other manufacturing products, and fuel has more or less local added value even if not produced locally. Various services and constructions typically demand a higher proportion of inputs produced at the local level. Table 1 shows that three categories could be distinguished. Therefore, the indirect employment impact can be summarised as an increase in demand for the local economy due to airport operation and the associated increase in added value and employment. Precisely, it would be necessary to discover the purchases of the companies operating at the airport, the input providing companies, the companies concerned, etc. The complexity of processes between companies is not practically observable; therefore, an estimate is needed while assessing their impact.

Table 1

Inputs to the airport according to the location of the source

Source of input	Local added value content of the input
Local products purchased from local economic operators	The local proportion of the added value
Imported products purchased from local economic operators	Retail margin, transport cost
Products purchased from non-local economic operators	Not more than transport cost or part thereof

Survey-based estimates mostly reveal the primary impacts; companies operating at the airport are asked to estimate their demand for local economic operators. According to several surveys, one-third of the rate is the most common; that is, the magnitude of the indirect impact is about one-third of the direct impact. These surveys demonstrate intuitively clear results; if the airport is terminated, some nearby companies will lose significant orders, forcing them to reduce some of their capacities. Thus, based on the direct impact of 1,724 people in 2019, the airport's indirect impact can be estimated at 575 employees, the number of workplaces outside the airport area induced by the airport operation, mainly in Cluj-Napoca. It implies that the actual and unknown impacts do not deviate positively or negatively from this magnitude.

Visitor spending impact

International studies have explored the factors influencing tourist expenditure (Kincses et al. 2016, Bakucz et al. 2021). Generally, passenger traffic can be divided into three categories based on local impact: inbound, outbound, and transit passengers. The latter category of passengers is not relevant at Cluj-Napoca airport. Inbound passengers create demand for the local economy outside the airport between their arrival and departure, while outbound passengers consume at the airport area. Since none of the examined studies estimated the possible demand-reducing impact of outbound passengers, the present study did not address this issue. Mentioning this

factor highlights the potential for beneficial business relationships and the quality-of-life impact of leisure travel. Furthermore, the disregard for this factor can be justified by the asymmetry in the spending of outbound and inbound travellers. Outbound travellers represent only a temporary drop in demand for a narrow range of everyday consumption, and the extent of their demand-absorbing impact is lower than the consumption of local products and services by inbound visitors.

The factors influencing the contribution of visitor spending to the local economy have been well-researched. Previous surveys for similar purposes have demonstrated that travel motivations have the maximum influence on spending, while all other factors (such as age, income status, and place of residence) related to income contribute less. Individual exceptions are possible since it is statistical truth. Based on the primary motivations for travelling, business travellers have the highest average expenditure, followed by leisure tourists and visitors to friends and relatives, respectively. However, travel does not always have a single motivation, and the distinction between motivations may vary among surveys.

Some studies on the impact of airports interpret visitor spending as extra money or income received by the local economy, adding to the direct and indirect impacts. The procedure is methodologically unjustified; visitor spending cannot be considered income rather the spatial relocation of consumption generating a local income to the extent that expenditure exceeds the cost of the products and services purchased. If the tourists buy a memory card produced in China for their camera in Cluj-Napoca, the retail margin will be the local income. In the case of museum tickets, almost the total amount can be considered local income. Due to additional visitors, more cleaning will be needed, using extra imported detergents. However, this is almost insignificant compared to revenue. The majority of added costs are due to the product and service produced in the local economy.

One of the potential methods to determine the impact of visitors on the local economy requires the following steps. First, to determine the number of visitors, to estimate the average local expenditure per visitor, which can be accomplished by sampling or estimation based on other surveys in its absence. The total local expenditure can be calculated from these two data points. The impact on the local economy can be divided into direct and indirect impacts. The direct impact is the additional income generated directly by the product or service provider, for example, the hotel for the tourist. The indirect impact manifests at local businesses providing inputs to the direct providers of products and services, such as food and beverage suppliers, water, electricity, and gas companies. The presence of additional guests increases the costs of the hotel, implying simultaneous orders for suppliers with profiles similar to those listed as examples. Therefore, in the case of an indirect impact, it is necessary to estimate the proportion of purchased goods and services that contain local inputs for the entire production chain. The estimate can be clarified

if data on the spending structure are also available. The size of local inputs affects local income growth, which may help estimate the number of employees indirectly. A simple estimation method for impact assessment uses the relationship between the number of visitors and the number of people employed in the tourism sector, and it was the procedure for the Gillen and Hinsch analysis of 2001, which posited that an additional 1,000 tourists created two further job opportunities due to tourism.

Concerning passenger traffic, the proportion of inbound and outbound passengers in Cluj-Napoca was balanced, with 50.6% inbound passengers to Cluj-Napoca for the entire period. This proportion showed slight variation through the years; it was 49.1% in 2019, which means 940 thousand passengers in absolute terms. 44.4% of the inbound passengers were residents of Romania, 11.6% were from Italy, 11.6% from the United Kingdom, 9.8% from Spain, 5.8% from Germany, 5.4% from France, 1.9% from Belgium, 1.9% from the Netherlands, 1.1% from Israel, and 1% from Sweden. The proportion of Hungarian passengers was only 0.61%. The rest of the passengers were from other countries, and people from 235 countries purchased airline tickets to enter Romania. The bookings of Romanian passengers can be largely attributed to the trips of citizens living and working abroad (similar issues have been addressed in several studies referred for the general study). However, this travel habit may represent a small proportion of other countries' bookings, and business and leisure tourism may be the dominant factor. It does not cause a magnitude error if 50% of the inbound passengers are considered business and leisure tourists, that is 470 thousand passengers. It means 940 jobs in the tourism sector based on the two-thousandth employment rate, most in accommodation and hospitality besides other related services. We did not have information regarding the proportion concentrated in Cluj-Napoca. Based on the city's size and its tourist attractions, the share of Cluj-Napoca is estimated to be 25–50%, with 313 jobs in Cluj-Napoca. Most of the remaining proportion affects Cluj County, but with a significant overflow impact on the county border. The number of registered tourists in Cluj-Napoca has increased significantly over the last ten years, indicating a trend; however, the tourism statistics are inaccurate. There were 317,453 registered guest nights in 2010 and 704,921 in 2016. The increase is significant, and growth in air traffic has contributed to it, yet we do not have data on the means of transport for the arriving hotel guests.

Passengers buying return tickets through a single booking spend an average of 9.1 nights between arrival and return. It equals the average duration of stay for visitors arriving in Hungary via plane. There is no significant deviation between the passengers of each country, and the length of stay of Hungarian passengers is the shortest among the countries sending considerable passengers (5.8 nights) and the other countries with 8–9 nights. The number is slightly larger than the findings of other similar studies, which typically demonstrate an asymmetric distribution. The mode is around three or four nights, while the average increased by week-long visits.

The inbound visitors' expenditure can also be estimated. Based on the results of several surveys, but rather underestimating the average total travel expenses in 1000 Romanian lei, 470 million Romanian lei of purchasing power arrived in Romania by the 470 thousand tourists, especially in Cluj-Napoca and its surroundings. It ultimately appears as income depending on the nature of each territorial component in the product or service purchased. For instance, the proportion spent on products imported to Romania from elsewhere "disappears" from Cluj-Napoca and Cluj County as well as from the country. If the entire share remained in the country, 470 million lei corresponds to 7,800 annual average wages based on the average annual gross wage, which was 60,000 lei in 2019. Besides, relatives and friends also have local expenses; however, they demand fewer tourism services based on each survey.

Impact of direct, indirect, and visitor spending concerning employment income

Since knowing the level of capital-intensiveness of employment is necessary, it will be challenging to convert the three impacts far from total income because of the impact on capital and state income. However, converting employment to employment income into the knowledge of annual average income is simple if capital income is disregarded. In 2019, the average gross income in Romania was 60,880 lei. Table 2 shows the estimated employment income obtained using this data. Considering the different average incomes by sector, the direct and indirect income impacts are underestimated, and the visitor spending impact is overestimated. However, the difference cannot be significant because all three categories belong to different sectors. The territorial scope of each impact is different. A direct impact is generated in the airport area, but the income owners live in and around Cluj-Napoca. The indirect impact is generated in and around Cluj-Napoca, and the visitors' spending has an impact on a larger area than in Cluj County. These three impacts collectively account for nearly 1% (0.95%) of those employed in Cluj County.

Table 2

Direct, indirect, and visitor spending impact of Wizz Air flights to Cluj-Napoca on the number of employees and gross income in 2019

Description	Number of employees, person	Gross employment income, thousand lei
Direct impact	1,724	104,957
Indirect impact	575	35,006
Visitor spending impact	940	57,227
Three impacts collectively	3,239	197,190
Expressed in percentage of employees in Cluj county, %	0.95	–

Indirect economic impact (induced impact)

The impact of airlines' operations on primary income generation has been discussed. However, the induced impact should rather be interpreted as spill-over impact, demonstrating the extent to which employees contribute to the additional income by spending their own. This impact can be summarised as follows. The owner generated employment income through the previous three impacts creates partial demand for the products of the local economy as well as the external economies. Demand for the products of the local economy generates a secondary demand that leads to tertiary and quaternary demand. Formally, incomes are multiplied according to the principle of the Keynesian-type multiplier; they are different in the case of an important point, that is, including the regional consumption share.

All other factors being equal, the magnitude of the multiplier impact depends on the following three factors besides the magnitude of the initial income. First, it depends on the size of the investigation region; the smaller the studied area, the greater the leakage of demand and the lesser the impact. Considering entire Romania as the subject of the study, the impact would be greater than that at the regional level. However, the impact at the regional level would be greater than that at the county or municipal level. Second, as the complexity and integration of the affected economy increases, the degree of impact is greater than that of a more specialised, import-oriented economy, where local businesses can only meet a small portion of the demand. For instance, the multiplier effect is greater in a larger city than in a small town or village. Third, the extent of the impact depends on the composition of directing to products with different tax content. Since the tax is a centralised part of gross revenue and cannot be considered at the local level, if the proportion of products with higher tax content (such as tobacco, spirit drinks, or fuel) is greater, the impact is minimised.

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

- Personal income tax and rate (t)
- Value-added tax and other tax on goods (n)
- Average propensity to consume (c)
- Local share of consumption (f)

In the next consumption stage, each of these parameters or their variants deduced from them have a decreasing impact for some reason. Therefore, their larger value implies a smaller magnitude of the multiplier. The magnitude of the multiplier effect is calculated using the following formula:

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

The determination of the local share consumption is the most uncertain among the four parameters; however, there is no unbearably large room for manoeuvring

while estimating this factor. Considering the values used for studying local economies of similar size and nature, as well as those of large size and diversity, the local share of consumption was found to be 60%. The difference between the gross and net average employment income was calculated for the personal income tax rate, which was 39%, and 20% for the value-added tax and other tax content. For the average consumption propensity, 85% were considered based on the use of household income because the actual value fluctuates stably in the long term. Accordingly, the magnitude of the multiplier was 1.331.

The volume of income to be multiplied was previously estimated. The only correction here was that only two-thirds of the visitors' impact was calculated with, and the remaining one-third was likely to be outside Cluj County. Thus, a total of $104,957 + 35,006 + 57,227 * 2/3 = 178,115$ thousand lei can be calculated. Multiplying this by 1,331 gives 237,070 thousand lei, increasing from 178,115 thousand lei to 58,956 thousand lei. In terms of employees, the result is $58,956 \text{ thousand} / 60,880 = 968$ extra jobs. Thus, additional workplaces arise from spending on income. In the present case, the data were readily identifiable because the definition of capital income was omitted (partially due to the lack of data and partially due to the less localisable nature of capital income, that is, less local impact than those determined by the number of employees).

This impact should only be regarded as an indication. Several studies have overemphasised the importance of the multiplier effect, disregarding the three conditions required for its interpretation. On the one hand, it has a simultaneous effect, while on the other, it is not an air traffic-specific effect (although the visitor spending factor is specifically related to tourism). In the case of other businesses, it is similar to the employment income of the enterprise. Third, it is an indicator that also includes accumulation compared to the impacts estimated for the first time; therefore, its inclusion in the abovementioned impacts is not justified. It could be interpreted that such a proportion of negative spillover impacts is triggered by terminating flights or reducing traffic.

Conclusion

The present analysis examines the local economic impact of Wizz Air Airline flights on Cluj-Napoca as follows:

- Calculations are conducted on a net basis, which means only those revenues that could not have been generated without Wizz Air flights are considered.
- Calculations are based on data from 2019, the last financial year, the accounts for which were closed.
- The territorial scope of the analysis concerning the most direct impact is the Cluj-Napoca city. When considering the less direct impact, it was Cluj County.

The following impacts were quantified in our study: direct effect, the income and employment generated at the airport area; indirect effect, the income and employment

of local enterprises providing inputs to the airport; visitor spending impact, the income and employment generated by the local expenditures of tourists arriving at the airport; induced effect, the income and employment generated by spillover impact due to the first three impacts (Table 3).

Table 3

The local economic impact of Wizz Air airline flights to Cluj-Napoca in 2019

Description	Number of employees	Gross employment income, euro	Tax, euro
(1) Direct impact	1,724	22,040,970	10,504,134
(2) Indirect impact	575	7,351,260	3,503,413
(3) Visitor spending impact	940	12,017,670	5,727,298
<i>Primary impact (1)+(2)+(3)</i>	<i>3,239</i>	<i>41,409,900</i>	<i>19,734,845</i>
Induced impact (from spending primary incomes)	968	12,380,760	5,900,337
<i>Full impact</i>	<i>4,207</i>	<i>53,790,660</i>	<i>25,635,182</i>

The primary employment impact was 0.95% of people employed in the region. Specifically, the employment impact of Wizz Air exceeds the number of employees of the largest employer in Cluj County (The three largest companies in Cluj County: Fujikura Automotive Romania Srl. with 2,697 employees; Emerson Srl. with 2,615 employees; Endava Romania Srl. with 599 employees).

Moreover, it is crucial to emphasise that the actual impact will be higher than the reported data, as Wizz Air Traffic benefits other airlines with economies of scale and scope. It suggests that other airlines operating in Cluj-Napoca would have less impact, and the airport would operate at a higher unit cost without Wizz Air. Furthermore, the non-quantifiable catalytic impacts referred to in the general study (firm location choices, city image, and others) are significant.

Wizz Air flights contributed significantly and in several ways (direct, indirect, and catalytic) to the improved situation of Cluj-Napoca and Cluj County in Romania, besides developing well above the national average in the last ten years.

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