Genève Aéroport

Economic Impact of Geneva Airport 2016

Final Report
Zurich/Basel, 23 November 2017

Damaris Bertschmann, Maura Killer, Martin Peter (INFRAS)
Martin Eichler, Oskar Eugster, Markus Karl, Martin Peters (BAK Economics)

INFRAS
Research and Consulting
www.infras.ch

Editorial Information

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Written by
Damaris Bertschmann, Maura Killer, Martin Peter (INFRAS)
INFRAS AG, Binzstrasse 23, 8045 Zurich
Tel. +41 44 205 95 95

Martin Eichler, Oskar Eugster, Markus Karl, Martin Peters (BAK Economics)
BAK Economics AG, Güterstrasse 82, 4053 Basel
Tel. +41 61 279 97 00

Advisory group
Schneider André
Leprat Sébastien
Viredaz Yves-Daniel
Mounier Marc
Vaglio Aline
Benoit Sébastien

Content

Summary

Geneva is a center of commerce, trade, and finance, and hosts many headquarters of international corporations and organizations. To these players, Geneva's high accessibility from all over the world is crucial. One important link between Geneva and the world is its airport, Geneva Airport. It is the main airport in the Romandie and after Zurich Airport the second biggest Airport in Switzerland. Located directly at the Swiss-French border, Geneva Airport is not only important for Switzerland, but also for its French vicinity. In this context, Geneva Airport stands in close interactions with political circles, economic circles and civil society. To support this dialogue, Geneva Airport contracted the independent economic research institutes INFRAS and BAK Economics to give objective evidence to the role of Geneva Airport in the region's economy. This study presents our main findings.

The study analyzes the economic impact Geneva Airport had in the year 2016. Airports affect the economy through two main channels:

- Supply side effects: Companies located on the airport generate employment and value added by the production of air transport services.
- Demand side effects: Airports increase the international accessibility of a region for both people and goods. Accessibility of a region is an important factor for the region's attractiveness. Therefore, airports can affect employment and value added of companies in the region that do not belong to the aviation sector.

In this study, both aspects of these economic benefits are analyzed in three modules:

- Module I analyzes the **supply side effects** of the Geneva Airport. It illustrates how much value added and employment are connected to the production of air transport services on the Geneva Airport.
- Module II analyses the **accessibility** of Geneva and adjoining regions in comparison to other benchmark regions. Furthermore, it identifies the share to which the Geneva Airport contributes to the accessibility of Geneva, Switzerland and the surrounding regions (demand side effect).
- Module III quantifies the share of **foreign guests** in Switzerland who enter Switzerland via Geneva Airport and determines the related touristic demand as well as their expenditures (demand side effect)).

The following illustration show an overview of the demand and supply side effects of air transport services analyzed in this study.

Figure 1: Economic impact of an airport

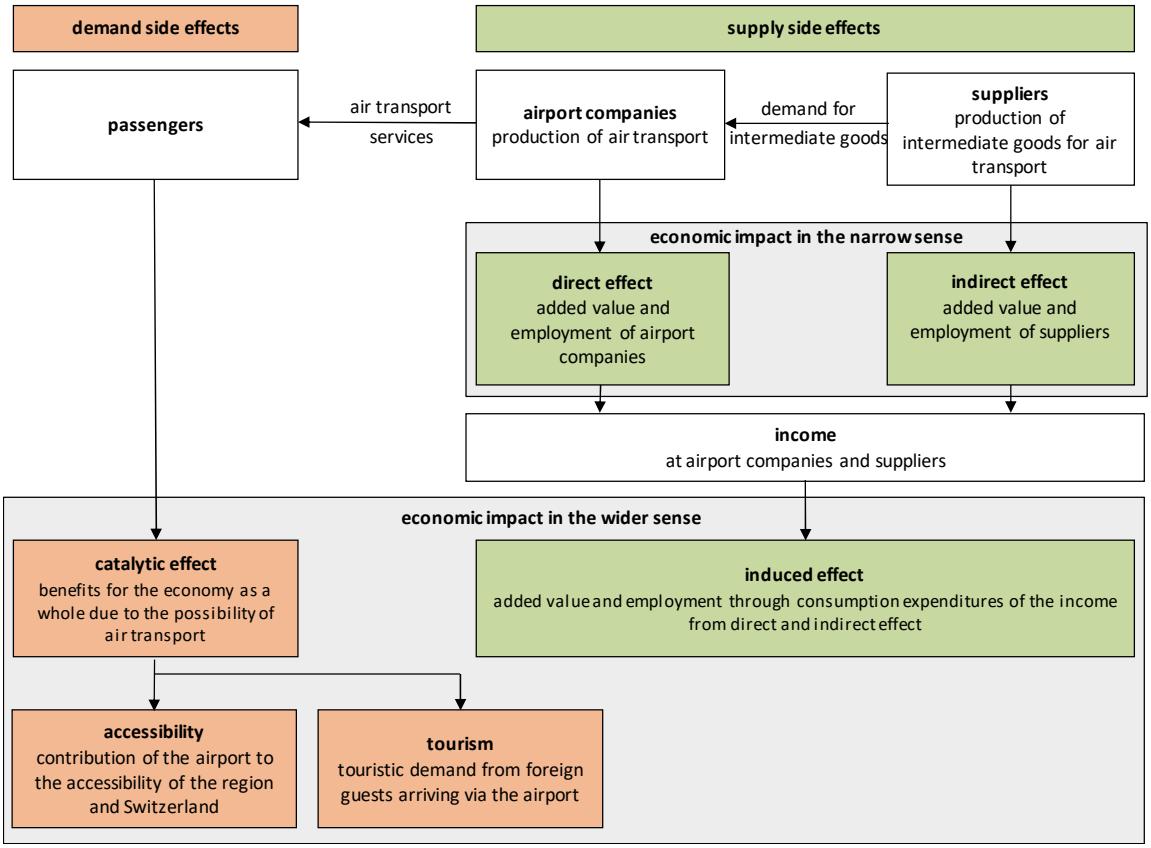


Figure INFRAS.

The effects directly and indirectly connected to the production of air transport services are called *economic impact in a narrow sense*. They reflect the economic effect directly related to the turnover generated at the Geneva Airport.

The induced effect and the catalytic effects are causally less directly related to air transport and represent the *economic impact in a wider sense.* Nevertheless, their relevance is not to be underestimated in qualitative terms.

Module I: Supply side effects

The supply side effects show, how much employment and value added is connected to the activities of companies on Geneva Airport. We distinguish between the direct, indirect and induced effect. The effects are calculated for Switzerland and the French vicinity in 2016.

Direct effect

The direct effect reflects the employment provided by companies on the airport and the value added produced by these companies on airport. The direct effect shows which part of national, cantonal or regional employment or value added is directly connected to the Geneva Airport. If the Geneva Airport were to stop existing, the whole direct effect would disappear.

- The companies located on the Geneva Airport employed 10'800 people in 2016. This corresponds to about 0.3% of total employment in Switzerland, about 3% of total employment in the Canton of Geneva, or about 55% of the employment of the financial sector in the Canton of Geneva (BFS, 2017b).
- Measured in value added, the companies on the airport generated 1.5 bn. CHF in 2016. This corresponds to about 0.2% of value added of Switzerland and 3% of value added of the Canton Geneva.

Indirect effect

In an economy based on the division of labour, the companies on airport need goods from other companies for their production. We call these goods intermediate goods. The indirect effect measures the effect generated by the production of intermediate goods for the airport. Together, the direct and indirect effect shows the impact of the total turnover on Geneva Airport over the whole supply chain (economic impact in the narrow sense). If Geneva Airport were to stop existing, the indirect effect would be lost to the extent to which suppliers for airport companies cannot replace the airport customers with other customers.

- Through the demand of intermediate goods in Switzerland and the French vicinity, the economic activities of the airport companies are indirectly related to 3'400 jobs.
- In terms of value added, the companies at the Geneva Airport generated 0.4 bn. CHF indirect effect.

Induced effects

The direct and indirect effect generate income. This income will be spent again e.g. as rent, on groceries, transportation, cultural events, and so on. These goods and services must be produced as well. The induced effect measures the employment and value added generated by the production of goods and services, which are paid with income generated in the direct and

indirect effect. In other words, the induced effect measures the impact of spending the income from the direct and indirect effect.

The induced effect shows a multiplying effect: It illustrates what happens if the income measured in the direct and indirect effect is spent again. In this sense, it is a downstream effect. If the Geneva Airport were to cease existing, the induced effect would only be lost to the extent of the income loss that the direct and indirect employees experience if they would instead work in an alternative and lower paying job or - in the worst case – would be unemployed.

- By the spending of the income generated in the direct and indirect effect, another 19'400 employees and 2.2 bn. CHF value added are connected to the Geneva Airport.

Table 1: Economic impact of Geneva Airport in the year 2016

	Employment in head count	**Value added in m. CHF**
Direct effect	10'800	1'500
Indirect effect	3'400	400
Total economic impact in the narrow sense	**14'200**	**1'900**
Induced effect (part of the economic impact in the wider sense)	19'400	2'200

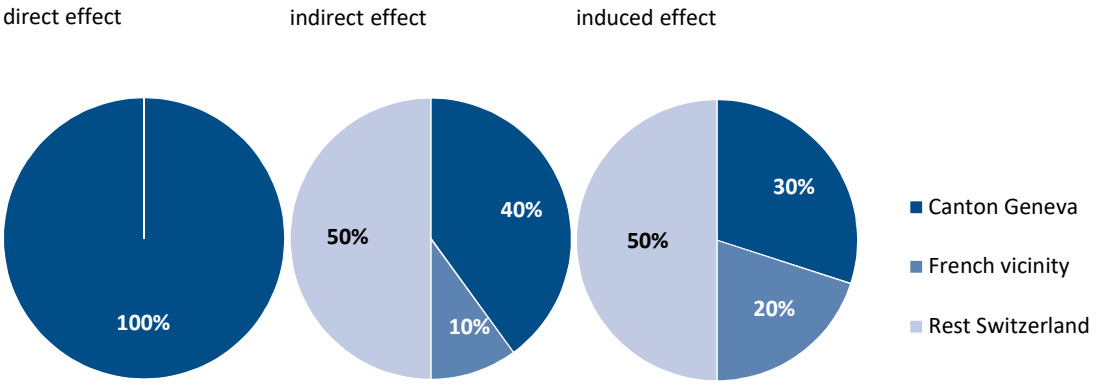
Table INFRAS.

Regional distribution

Based on all available information, we estimate the regional distribution of the three effects as follows:

- Direct effect: The direct effect is fully realized within the Canton of Geneva.
- Indirect effect: We estimate that around 40% is generated within the Canton of Geneva, 10% within the French vicinity, and 50% within the rest of Switzerland.
- Induced effect: According to our estimation, we assign 30% of the induced effect to the Canton of Geneva, 20% to the French vicinity, and 50% to the rest of Switzerland.

Figure 2: Estimation of the regional distribution of the economic impact of the Geneva Airport in 2016 with respect to employment and value added



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Module II: Accessibility provided by Geneva Airport

Regions benefit from their local airports. Besides substantial added value and the large number of jobs airports create locally, airports provide their home regions with another important asset: Accessibility. Accessibility is a key location factor -- the easier people can access other economically attractive locations from a certain region, the more attractive it is to locate a business there.

Why accessibility matters

Because businesses bring jobs and, thereby, generate income and wealth for local residents, being attractive for businesses is key to a region's success. If a region offers advantages compared to other regions, its attractiveness increases and companies can be convinced to relocate there. One way to increase the attractiveness of a region is to increase its accessibility. Accessibility matters for a multitude of reasons:

- Cost efficiency and market expansion: High accessibility reduces the cost of business trips for employees, clients, suppliers and business partners. Increasing accessibility opens up new possibilities to operate in additional markets.
- Innovation: Highly specialized knowledge is spread globally nowadays. Even so, access to this knowledge often depends on face-to-face exchange. Better accessibility allows easier and more personal access to these knowledge networks.
- Quality of life: Often mobile and flexible, highly qualified workers choose freely where to work and live. Well-developed accessibility, along with other factors, enhances a location's quality of life, which is important to attract those "high potentials" in the "war for talents".

Empirical studies, survey based as well as econometric, looking into accessibility and business locations confirm the importance of accessibility for economic development.

- In particular, highly productive activities like the export-intense, high-tech industry and export-oriented services often concentrate in highly accessible locations. Such highly productive companies are crucial for the competitiveness and wealth of a regional economy.
- Headquarters and global trading activities are particularly dependent on good accessibility.
- Having a share of more than 55 percent of high-tech and export-oriented industries shows clearly that accessibility is important to Geneva's economy.

Continental accessibility of Geneva and Switzerland

Having established that accessibility is important, the analysis turns to the quality of accessibility in Geneva, in Switzerland and in the surrounding regions. Furthermore, the contribution Geneva Airport makes to bolster this quality is evaluated. The long-established BAK accessibility model is used here, a model focusing on the aspects of accessibility for businesses which are economically relevant. The model allows an analysis of both continental accessibility (connection to other European regions) and global accessibility (connection to regions worldwide outside Europe).

Geneva is very well-positioned with respect to continental accessibility compared to competing locations. Geneva Airport is at the core of the regional transportation system ensuring good accessibility to European regions which is essential for a top business location:

- With 135.5 index points, Geneva is well-above the average of all European regions and ranks among the best 10 percent of the 411 European regions analysed.
- With respect to close competitors, Geneva is almost 14 points better than Lyon. Within Switzerland, only Zurich and Winterthur have better continental accessibility. Geneva beats out both Basel and – by a substantial margin – Bern.
- Beyond Geneva, accessibility is well-developed in its neighbouring regions as well. For example, Vaud, Haute-Savoie, and Ain all figure among the best third of European regions.

What is the contribution of Geneva Airport to this satisfying result?

- Such well-developed accessibility wouldn't be possible without a powerful airport.
- 126 of Geneva's 136 accessibility index points (93%) depend on aerial services and, of those 126, 116 points (85%) alone are from connections depending on the Geneva Airport. As these are particularly high shares compared to other regions, air traffic, in general, and Geneva Airport, in particular, are of specific importance to Geneva's accessibility.
- The impact of Geneva Airport reaches far beyond Geneva. Regions in Romandie and the adjacent French regions rely heavily on Geneva Airport for their accessibility. Even people as far away as Valle d'Aosta in Italy or Lyon travel faster to some European destinations when choosing to go via Geneva Airport.

Global accessibility of Geneva and Switzerland

The global accessibility index assesses the connections to destinations beyond one's own continent. Here, it is particularly important to have good access to one of the primary European hub airports – London, Amsterdam, Paris or Frankfurt. Therefore, regions close to these hubs enjoy the best global accessibility. Although Geneva is not especially close to one of these primary hubs, it is nonetheless well-connected and globally accessible:

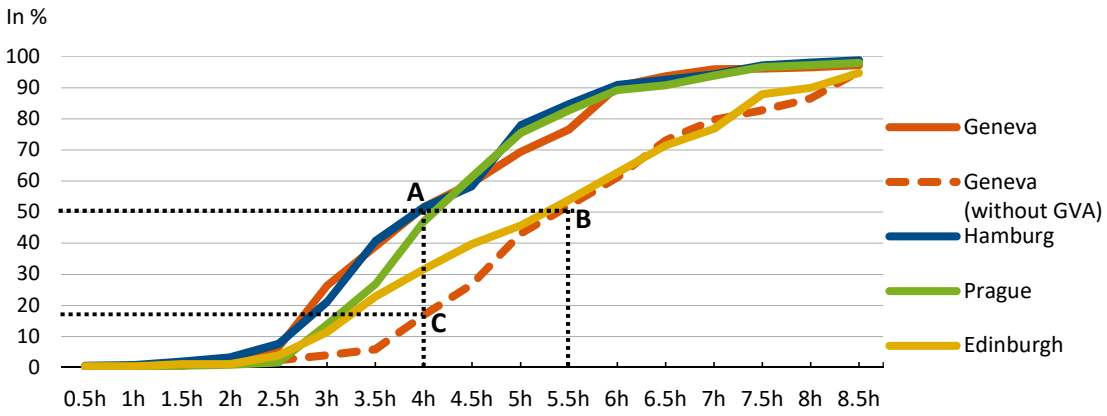
- Geneva ranks in the top quarter of European regions.
- Again, it is Geneva Airport ensuring this high ranking. For global connections, it is almost always the fastest way to travel to check-in at Geneva Airport. Leaving from Geneva, only two of the 138 global destinations surveyed are reached faster by checking-in at an airport other than Geneva Airport.
- Geneva Airport is equality important for its adjacent regions. Travellers from Vaud and Haute-Savoie reach more than 100 of the 138 global destinations most quickly when they check-in at Geneva Airport. For travellers from Valais, Savoie, Jura (FR), Neuchâtel, and Fribourg, the same is true for around half of the global destinations.

Simulation "accessibility without Geneva Airport"

Air traffic via Geneva Airport contributes substantially to the well-developed accessibility of Geneva. A simulation shows what would happen to its accessibility if Geneva Airport were not available anymore. Of course, modern traffic networks provide alternative options, but these routes are less convenient and, therefore, would reduce Geneva's overall accessibility:

- Geneva loses almost 43 continental index points, or almost one third of its total points, if it did not have its own airport. In the ranking of European regions, Geneva would drop 207 positions and end up in 251st place, which would be below the average of all European regions and substantially behind its competitors. Attractiveness of Geneva would be hurt markedly.
- Looking at global accessibility, results would be equally bad for Geneva. It would lose 186 places ending up ranked 295th out of 414 European regions.
- The alternative airports which would profit most in such a scenario would be Lyon-Satolas, followed by Zurich.
- Other regions in Switzerland (Vaud and Valais) and France (Rhône-Alpes) would be badly affected as well.

Figure 3: Isochrones of continental travel times with and without Geneva Airport



Percentage share of European GDP that is reached within x hours (time slot 5.30am to 9am on weekdays)

Figure TransSol, BAK Economics

- Travelers from Geneva, as well as from adjoining regions, would need substantially more time for their trips. The grave impact can be illustrated by analysing the so-called “iso-chrones” (see Figure 3). From Geneva, you can currently reach nearly half of the European economic activities (Gross domestic product, GDP) in a travel time of four hours or less (see Figure 3, point A). Traveling four hours one way is about the maximum time a reasonable person will spend traveling for a one day business trip. Without using Geneva Airport, the share economic activities reachable in four hours drops to less than 20 percent (see Figure 3, point C).

Module III: Geneva Airport and incoming tourism in Switzerland

Fast and convenient connections are crucial for Swiss tourism. Geneva Airport provides the required infrastructure both for the Canton of Geneva and for other parts of Switzerland. To assess the economic importance of the airport for incoming tourism, both the number of foreign guests arriving at Geneva Airport has been estimated as well as the revenue generated by these tourists. Furthermore, the development of tourism, both in the Canton of Geneva and in all of Switzerland, is briefly discussed in this study below.

Tourism in Geneva compared to the rest of Switzerland

In recent years, Swiss tourism has faced challenging market conditions, especially due the appreciation of the Swiss franc. However, tourism in the Canton of Geneva has been affected less than tourism in Switzerland in general.

- In Switzerland, overnight stays undertaken by Western European guests declined drastically in the years since the financial and economic crisis (2009-2016: -4.4% p.a.). Thanks to Asian guests, whose number of overnight stays increased rapidly during the same period (+10.6% p.a.), a severe decline of the total number of overnight stays was prevented.
- Despite the challenging conditions, tourism in Geneva has performed robustly and has recorded a significant increase of overnight stays by tourists (2009-2016: +1.4% p.a.). This was due, in particular, to an increase in the number of overnight stays by tourists coming from Asia or the Gulf States. However, it should also be noted that the number of visitors from Western Europe did not decrease, but rather, it stayed constant.
- This is, at least to some extent, due to business tourism which is less dependent on prices and trends compared to leisure tourism. Business tourism is quite important to Geneva with its globally oriented businesses and being host to so many international organizations.

Number of foreign guests arriving at Geneva Airport

In recent years, passenger traffic rose considerably at Geneva Airport. The number of arriving passengers was 8.2 million in 2016. This marked an increase of 39 percent compared to 2010. The growth was widespread: all world regions rose, except for Africa and North America. Of course, only a part of these passengers were foreign tourists.

- It is estimated that in 2016, 4.1 million incoming tourists arrived at Geneva Airport. This was equivalent to 11,000 incoming tourists per day.
- In the Canton of Geneva, foreign guests arriving at Geneva Airport accounted for 0.9 million accommodation arrivals in 2016. This means that almost every second arrival in the canton could be traced back to tourists coming via Geneva Airport (45%).

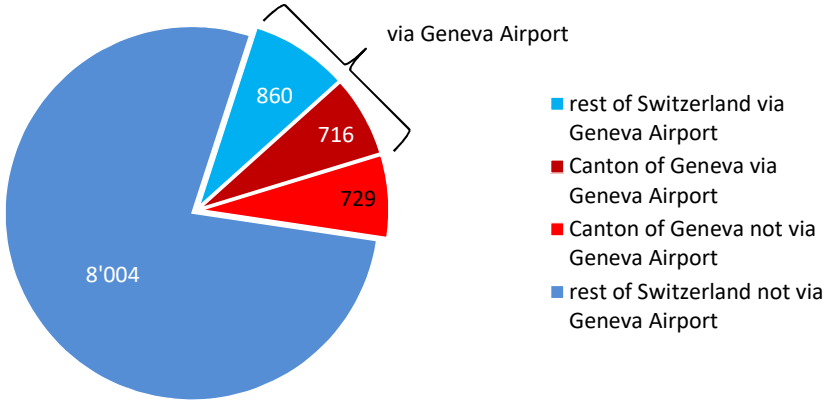
- In the rest of Switzerland, foreign guests arriving at Geneva Airport accounted for 1.9 million accommodation arrivals in 2016. This was equal to 15% of all guest arrivals in Switzerland and illustrates that Geneva Airport plays an important role even for tourism outside the Canton of Geneva.
- Tourism in the surrounding French regions benefits from Geneva Airport as well. It can be estimated that roughly 1.4 million accommodation arrivals in Auvergne-Rhône-Alpes and Bourgogne-Franche-Comté are generated by foreign guests using Geneva Airport.

Tourism revenue generated by foreign guests arriving at Geneva Airport

In addition to the number of accommodation arrivals by foreign guests traveling via Geneva Airport, the revenue generated by these tourists can be estimated. This is the crucial figure in assessing the economic importance of the airport for tourism as a whole.

- In the Canton of Geneva, the revenue generated by foreign tourists arriving at Geneva Airport was 716 million CHF in 2016. Almost one in two francs spent by foreign guests in the Canton of Geneva can be traced back to guests arriving via Geneva Airport.

Figure 4: Tourism revenue by foreign overnight guests in 2016 – in million CHF



Tourism revenue by foreign overnight tourists entering the Canton of Geneva resp. the rest of Switzerland via Geneva Airport or otherwise

Figure hesta, TMS, TBP, calculations BAK Economics

- Tourists visiting the Canton of Geneva spend considerably more money per day than tourists in the rest of Switzerland. This can be explained both by its higher costs for most types of accommodation and its higher market share of more exclusive accommodation.

- In the rest of Switzerland, 860 million CHF was spent by tourists arriving at Geneva Airport in 2016.
- Hence, the total revenue generated by foreign tourists who entered Switzerland via Geneva Airport was estimated to be 1.6 billion CHF in total in 2016. Consequently, tourists who arrived at Geneva Airport accounted for about 15 percent of the total revenue generated by foreign overnight guests in Switzerland.
- Tourists from Western Europe are still the most important group of foreign tourists in Switzerland. This is true for tourists traveling via Geneva Airport as well. Tourists from Western Europe account for 29% of tourism revenue in the Canton of Geneva and 33% in the rest of Switzerland of all expenditures of tourist arriving at Geneva Airport. But guests from Asia are growing in importance and generate 17% of tourism revenue in the Canton of Geneva and 27% in the rest of Switzerland.

1. Introduction

Geneva is a center of commerce, trade, and finance. Moreover, many headquarters of international corporations and organizations are located in Geneva, e.g. the United Nations and the International Labour Organization. To these players, Geneva's high accessibility from all over the world is crucial. One important link between Geneva and the world is its airport, Geneva Airport. It is the main airport in the Romandie and after Zurich Airport the second biggest Airport in Switzerland. In 2016, it counted 16.5 Mio. passengers and moved 55'000 tons of freight. This was 32% of the total passenger volume traveling through Swiss airports[1]. Located directly at the Swiss-French border, Geneva Airport is not only important for Switzerland but also for its French vicinity. In this context, Geneva Airport stands in close interactions with political circles, economic circles and civil society. To support this dialogue, Geneva Airport contracted the independent economic research institutes INFRAS and BAK Economics to give objective evidence to the role of Geneva Airport in the region's economy. This study presents our main findings.

The study analyzes the economic impact Geneva Airport had in the year 2016. Airports affect the economy through two main channels: On the one hand, companies located on the airport generate employment and value added by themselves. This is called the production side effect. On the other hand, airports increase the international accessibility of a region for both people and goods. Accessibility of a region is an important factor for the region's attractiveness. This means airports can additionally affect employment and value added of companies in the region that do not belong to the aviation sector. The economic impact arising from a region's increased attractiveness is called the demand side effect.

In this study, both aspects of these economic benefits - the productions side as well as the demand side effects - are analyzed in three modules. The estimation of these two kinds of economic benefits is based on different models, which should not be summed up. The study is structured as follows:

- Module I (chapter 2) analyzes the production side effects of the Geneva Airport. It illustrates how much value added and employment are connected to the production of air transport services on the Geneva Airport.
- Chapter 3 and 4 discuss the demand side effects of the Geneva Airport:
  - Module II (chapter 3) analyses the accessibility of Geneva and adjoining regions in comparison to other benchmark regions. Furthermore, it identifies the share to which the

[1] Including Euroairport Basel Mulhouse

Geneva Airport contributes to the accessibility of Geneva, Switzerland and the surrounding regions (demand side effect).

- Module III (chapter 4) quantifies the share of foreign guests in Switzerland who enter Switzerland via Geneva Airport and determines the related touristic demand as well as their expenditures (demand side effect)).

The following illustration show an overview of the demand and supply side effects of air transport analyzed in this study.

Figure 5: Economic impact of an airport

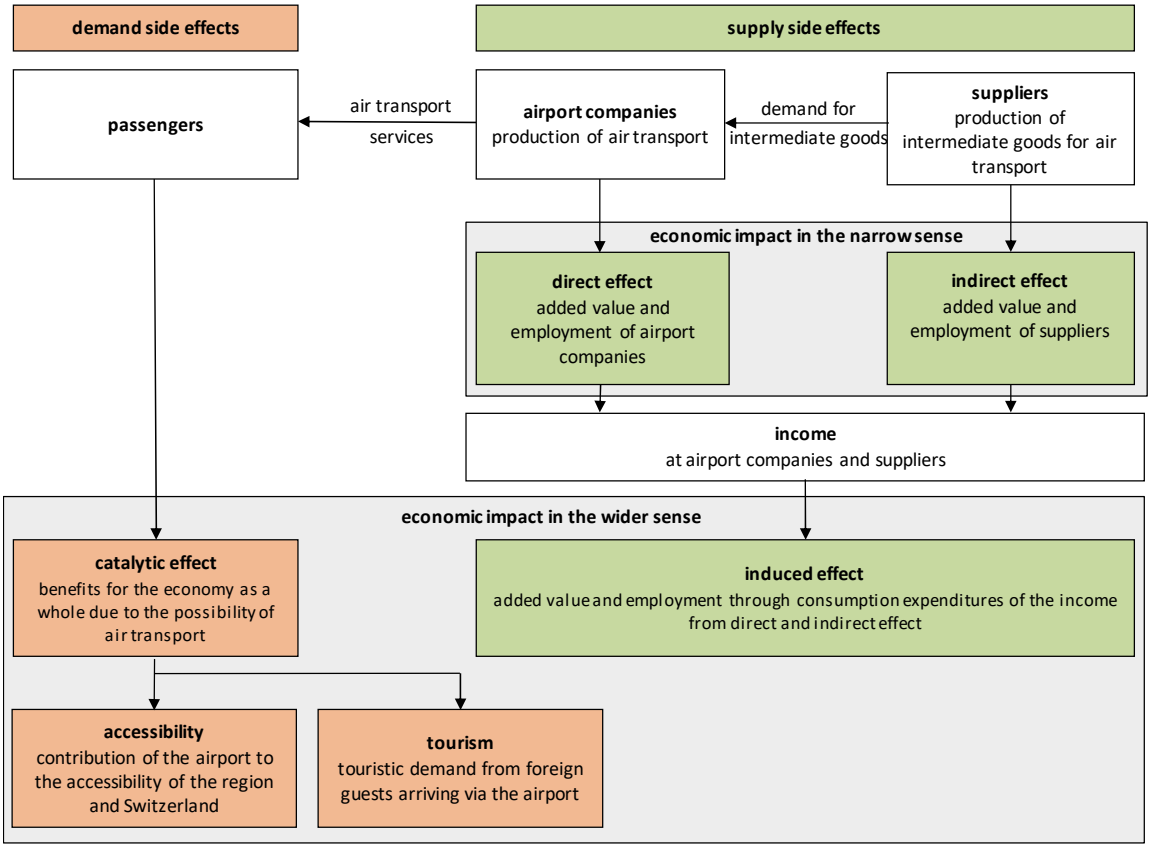


Figure INFRAS.

The effects directly and indirectly connected to the production of air transport services are called *economic impact in a narrow sense*. They reflect the economic effect directly related to the turnover generated at the Geneva Airport.

The induced effect and the catalytic effects are causally less directly related to air transport and represent the *economic impact in a wider sense.* Nevertheless, their relevance is not to be underestimated in qualitative terms.

2. Modul I: Supply side effects

2.1. Methodology

The supply side effects show the relevance of the work realized by companies on airport. They show how much employment and value added is connected to the provision of air transport services. Typically, the following three effects are distinguished:

- Direct effect: The direct effect reflects the employment provided by companies on the airport and the value added produced by these companies on airport.
- Indirect effect: In an economy based on the division of labour, the companies on airport need goods from other companies for their production. We call these goods intermediate goods. The indirect effect measures the effect generated by the production of intermediate goods for the airport. It is measured by the number of employees involved in the production of intermediate goods for companies on the airport and by the value added generated by them.
- Induced effects: Employment and value added generated in the direct and indirect effects mean that income is generated. This income will be spent again e.g. as rent, on groceries, transportation, cultural events, and so on. These goods and services must be produced as well. The induced effect measures the employment and value added generated by the production of goods and services, which are paid with income generated in the direct and indirect effect. In other words, the induced effect measures the impact of spending the income from the direct and indirect effect.

Figure 6: Supply side effects

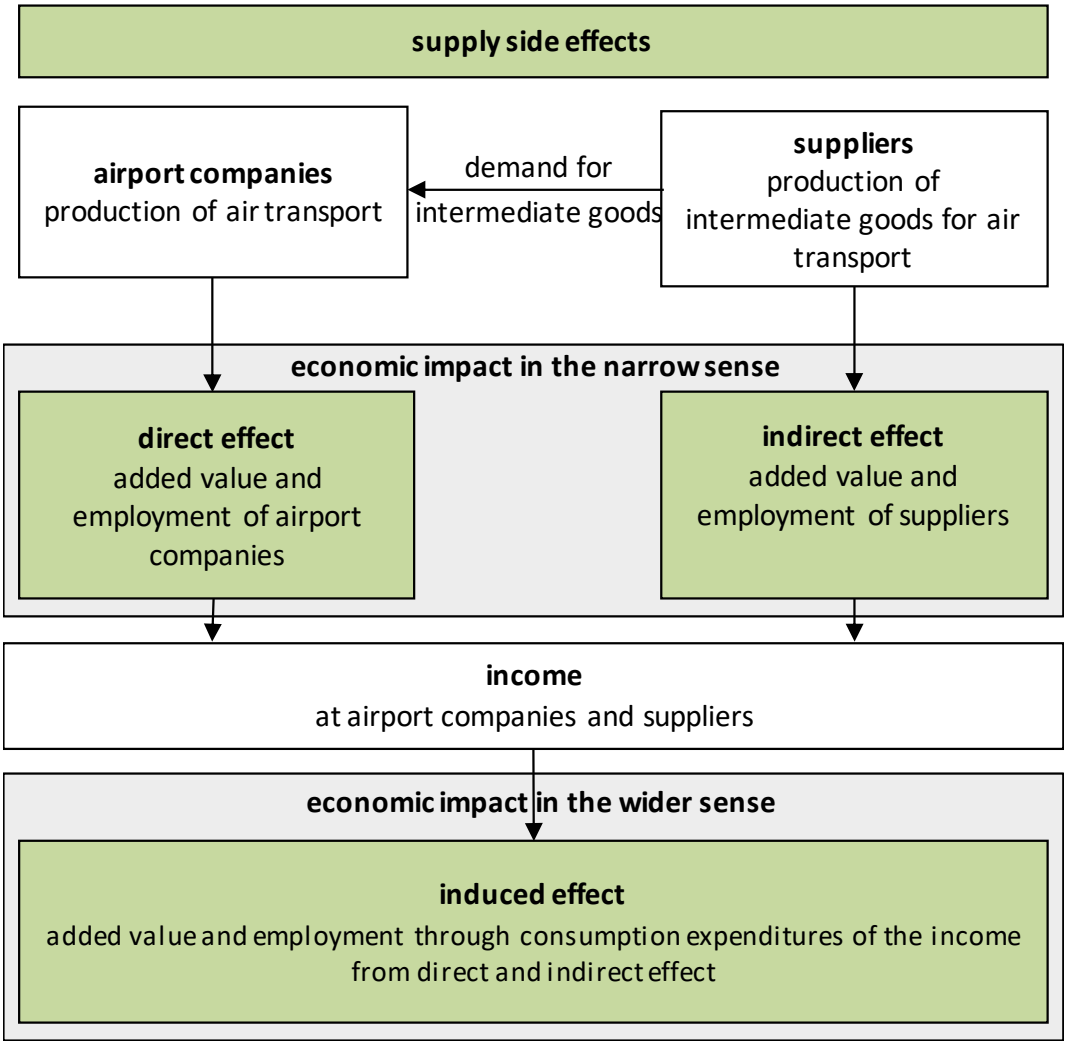


Figure INFRAS.

The three supply side effects are connected to the airport activities to different degrees:

- Direct effect: The direct effect has the closest link to the airport. The direct effect can be calculated for every single company within Switzerland. If the direct effect of all companies in Switzerland is summed up, this results in the national employment and national value added (GDP). The direct effect shows which part of national, cantonal or regional employment or value added is directly connected to the Geneva Airport. If the Geneva Airport were to stop existing, the whole direct effect would disappear.
- Indirect effect: The indirect effect has the second closest ties to the airport. It show all economic effects outside the airport, which are generated by the supply chain induced by the provision of air transport services from and to Geneva Airport. The sum of the direct and in-

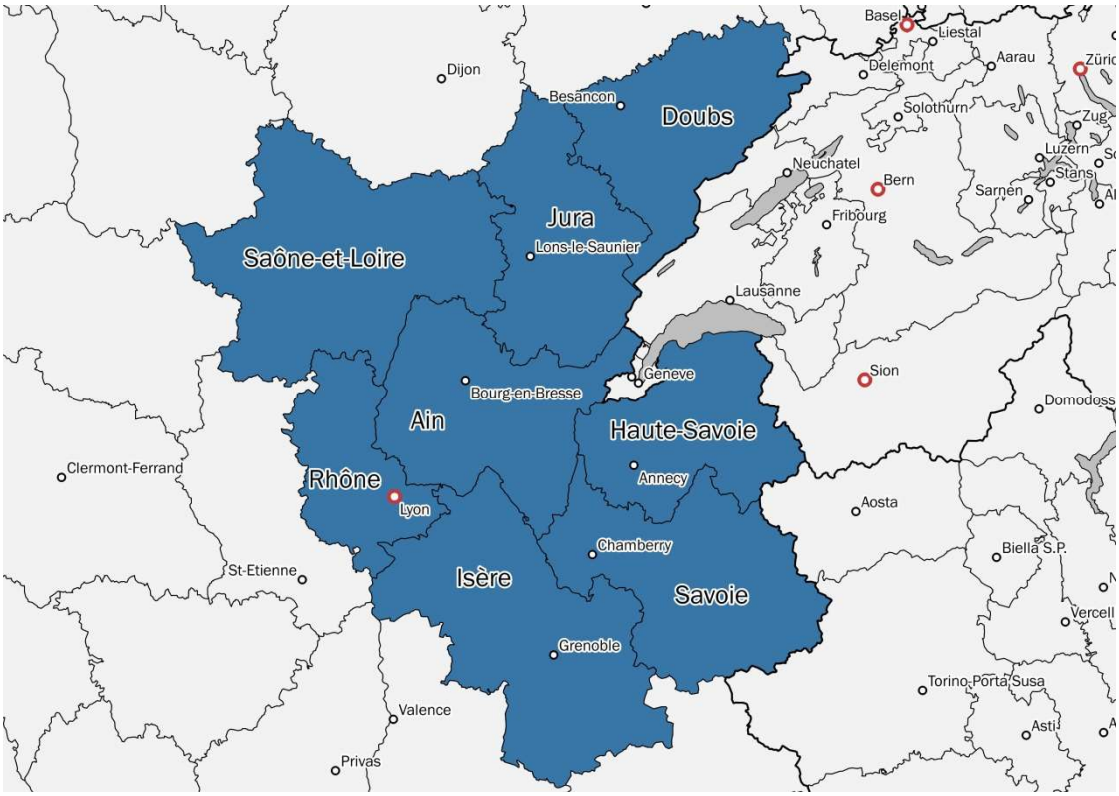
direct effect shows the economic impact in Switzerland and the French vicinity associated with the total turnover of all firms on the Geneva Airport. Therefore, we call the direct and the indirect effect the economic impact of the airport in the narrow sense.
Nevertheless, in a regular economic environment the indirect employment and value added would – at least in the medium run - not diminish completely if the Geneva Airport were to stop existing. In a dynamic process, producers of intermediate goods for airport companies could replace a part of the airport companies' demand by increasing the demand of other customers.

- Induced effect: The induced effect is less directly connected to the airport. It shows the economic effect caused by the spending of the incomes generated by the direct and indirect effect. The induced effect shows a multiplying effect: It illustrates what happens if the income measured in the direct and indirect effect is spent again. In this sense, it is a downstream effect. If the Geneva Airport were to cease existing, the induced effect would only be lost to the extent of the income loss that the direct and indirect employees experience if they would instead work in an alternative and lower paying job or - in the worst case – would be unemployed.

2.1.1. Spatial and temporal delimitation

The economic impact of the Geneva Airport is determined for Switzerland plus the French vicinity in the year 2016 and considered both on a national and regional level. All activities of companies within Switzerland and the French vicinity are analyzed. In the context of this study this means that exports from this area are included while imports are excluded. The French vicinity includes all departments that can be reached from the airport by car within two hours. These are the following departments: Haute-Savoie, Savoie, Isère, Rhône, Lyon, Ain, Saône-et-Loire, Jura et Doubs (see Figure 7).

Figure 7: French vicinity



The French vicinity is defined as: Departments Haute-Savoie, Savoie, Isère, Rhône, Lyon, Ain, Saône-et-Loire, Jura et Doubs.

Figure BAK Economics

In addition to the total effects (Switzerland and French vicinity) the study also analyzes the regional distribution of the effects. The regional level of the study is defined as the Canton of Geneva, the rest of Switzerland, and the French vicinity. To estimate the effects on the regions, information about the place of residency of all employees on airport and the place of residency of the suppliers of intermediate goods for companies on airport are necessary. This information is sensitive and the available data show a degree of uncertainty. Therefore, an exact calculation is not possible. Nevertheless, the available information allows for a rough estimation of the regional distribution.

2.1.2. Model EIOBRA

The results of the economic effects are estimated with the model EIOBRA (empirical and input-output data based regional economic impact analysis) of INFRAS, which calculates the effects based on airport specific company data, industry data available in the national accounts and further official statistical data.

The goal of the model is to determine the direct, indirect and induced effect of an airport on the regional and national economy for the target values employment and added value. Compared to general input-output-models the strength of the model lies in the empirical approach that considers the specific structure of the analyzed airport.

The logic of the model is as following:

- All employees working on the airport are counted and classified by activity (airlines, general aviation, handling, public authorities, retail, facility management, etc.)
- For each sector, the typical turnover, value added and demand for intermediate goods per employee is evaluated based on the following sources:
  - Survey of the most important companies on the airport: Collected are turnover, value added, demand for intermediate goods as well as the origin of intermediate goods demanded by airport companies. The collected data was verified and if necessary, interviews with companies were held for further inquiries.
  - Statistical data of the federal statistic office: Data from the national accounts provide information about the turnover, value added and consumption of intermediate goods per sector and the structural business statistics STATENT gives insight in the employment per sector. [2] By crossing these two data sources, typical turnover, value added, and consumption of intermediate goods per employee can be calculated.
- The direct effect is evaluated by the number of employees per sector on the airport and the corresponding typical value added per employee.
- The indirect effect is generated by the production of intermediate goods of airport companies in a defined area of interest. In the case of Geneva Airport, the area of interest is defined as “Switzerland and its French vicinity” (see chapter 2.1.1). The indirect effect is calculated for Switzerland and its French vicinity as a total value in the following steps:
  - Specification of the sum of intermediate goods demanded by airport companies: Based on the company survey and the national accounting the average consumption per employee per sector is defined (see above) and multiplied by the numbers of employees in this sector.
  - Definition of interdependencies between airport companies: There is an interdependency of the production of the companies located on the airport: Many companies supply intermediate goods for other companies on the airport. The production of these intermediate goods is already counted in the direct effect. To avoid double counting, in a

[2] Information about employment is provided by different official statistics, which use slightly different definitions. To cross employment data with data from the national account, the best data source is STATENT, since it uses the same delimitations as the national accounts.

first step, the companies' inter airport supply relationships need to be determined. This determination is based on the company survey.

- Definition of imports in the area of interest: Since we only analyze the effects within Switzerland and the French vicinity, the intermediate goods from outside this region need to be deducted. This is as well based on the company survey. Furthermore, the import differentiated input-output tables from Nathani et al (2014) provide some additional information on the typical import quota of economic sectors.
- Definition of the share of intermediate goods relevant for the indirect effect: The airport companies' interdependencies as well as the imports to the region of interest (Switzerland and its French vicinity) have to be deducted from the total value of intermediate goods of the airport companies. This results in the intermediate goods relevant to the indirect effect.
- The relevant intermediate goods are multiplied by the defined multiplier for the indirect effect, which results in the indirect value added. In order to calculate the number of employees from the value added, the value added of the indirect effect is divided by the average value added per employee of the Swiss economy.

  The multiplier for the indirect effect is determined by the average share of imports of intermediate goods in the area of interest (21%) (BFS 2008) and the average share of intermediate goods of the production value (51%) (BFS 2015). In 2016, the indirect multiplier was 0.82. The derivation of the effect is documented in Bleisch 2001.
- The estimation of the regional distribution of the indirect effect is based on information from the company survey about the origin of their intermediate goods. Regarding this aspect, no official database is available and the information from the company survey contains some uncertainties. Therefore, we refrain from attempting to precisely calculate the regional distribution but instead make a rough estimation on the regional distribution. Based on the information from the company survey, for every sector considered in the model, the distribution of the origin of intermediate goods is specified. A sum over all sectors shows the distribution of the origin of all intermediate goods. We estimate that the distribution of the indirect effect is the same as the distribution of the origin of intermediate goods. Second and third round effects are not specified, since uncertainties in the database are higher than the potential small effects from second and third round effects.

- The induced effect calculates the impact of the spending of income generated in the direct and indirect effect. We define the income by the value added of the direct and indirect effect.[3] This sum is multiplied with the multiplier of the induced effect.
  - Specification of the multiplier of the indirect effect: Aside from the share of imported intermediate goods and the share of total intermediate goods in the production value, the share of domestic consumption (75%) (BFS 2017a) is also accounted for in the multiplier. For the year 2016, the indirect multiplier was 1.58. The derivation of the effect is documented in Bleisch 2001.
  - The estimation of the regional distribution of the induced effect is based on two sources: First, the induced effect generated by the direct effect is assigned to the different regions by the place of residence of the employees at Geneva Airport. This information is based on the «sondage mobilité» of Genève Aéroport. To avoid the impression of a precise calculation, the numbers are rounded in 5%-point steps. Second, the induced effect generated through the income of the indirect effect is assigned to the different regions by the origin of intermediate goods. This procedure is described above.

2.2. Results: Effect of employment and value added

This chapter focuses on the economic impact of the Geneva Airport from a supply side point of view. The economic impact is shown with two indicators: the value added and the number of employees that are needed to generate the value added.

2.2.1. Total effects

Overview

- In 2016, the companies located on the Geneva Airport employed 10’800 people and generated a value added of 1.5 bn. CHF (direct effect).
- Through the employment of the supplier of intermediate products, additional 3’400 workplaces and 0.4 bn. CHF value added are related to the Geneva Airport (indirect effect).
- Taking into consideration the income spending of the employees in the direct and indirect effect, another 19’400 employees and 2.2 bn. CHF value added are connected to the Geneva Airport (induced effect).

[3] The income on which the induced effect is based is delimitated in different ways in different studies. In line with Bleisch 2001 and in accordance with Swiss studies on the importance of civil aviation in Switzerland conducted by the federal office of civil aviation (INFRAS 2011) and on the economic impact of Zurich Airport conducted by the Flughafen Zürich AG (INFRAS and BAK BASEL 2013), we define the income used to calculate the induced effect as the value added of the direct and indirect effect. Another approach, which is mainly used in Germany, is to base the induced effect only on the earned income of the direct and indirect effect (see e.g. INFRAS and BAK BASEL 2014).

Together the direct and indirect effect show the impact of the turnover at Geneva Airport on the economy. Therefore, we call these combined effects the “economic impact in the narrow sense”. The induced effect shows a multiplying effect and has a less direct connection to the airport: It illustrates what happens if the income measured in the direct and indirect effect is spent again. In this sense, it is a downstream effect. Together with catalytic effects, we think of the induced effect as the “economic impact in the wider sense”.

Figure 8: Economic impact of the Geneva Airport – employment and value added

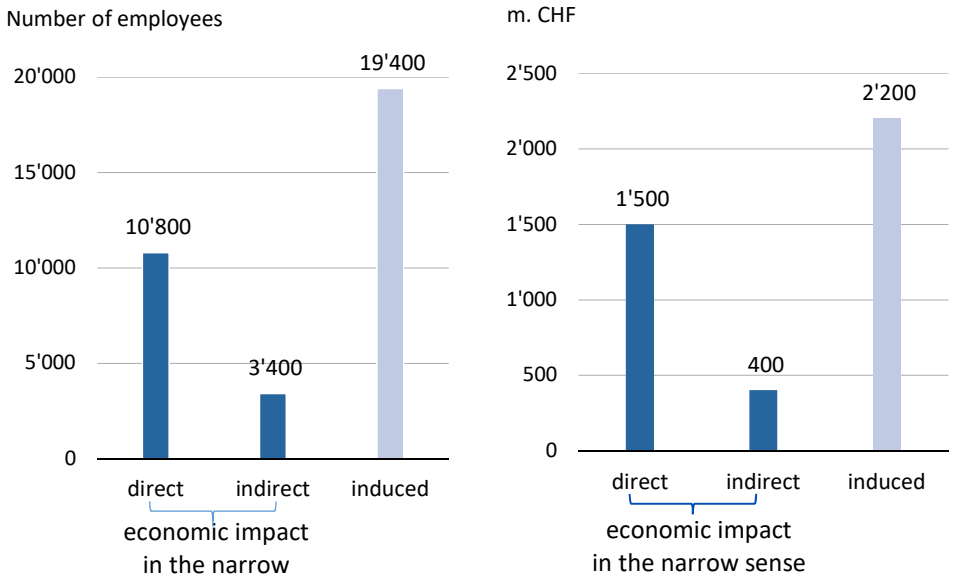


Figure INFRAS.

Table 2: Economic impact of Geneva Airport in the year 2016

	Employment in head count	**Value added measured in m. CHF**
Direct effect	10’800	1’500
Indirect effect	3’400	400
Total economic impact in the narrow sense	**14’200**	**1’900**
Induced effect (part of the economic impact in the wider sense)	19’400	2’200

Table INFRAS.

Direct effect

In 2016, the companies located on the Geneva Airport employed 10'800 people.[4] This direct employment is entirely allocated to the region and shows the direct employment effect of the airport. This corresponds to about 0.3% of total employment in Switzerland, about 3% of total employment in the Canton of Geneva or about 55% of the employment of the financial sector in the Canton of Geneva (BFS, 2017b). Almost 80% of total employment at the Geneva Airport is in aviation related companies and the remaining 20% in non-aviation companies. The delimitation of these two areas is based on the following definition:

- Aviation: Airlines, general aviation, handling, aircraft maintenance, catering on air, mineral oil companies, haulage contractors, airport operators, public authorities (including Skyguide), IATA, facility management, and security.
- Non-aviation: Retail; catering on ground/hotels/gastronomy, car rental and remaining services (i.e. financial institutions, consulting, travel agencies).

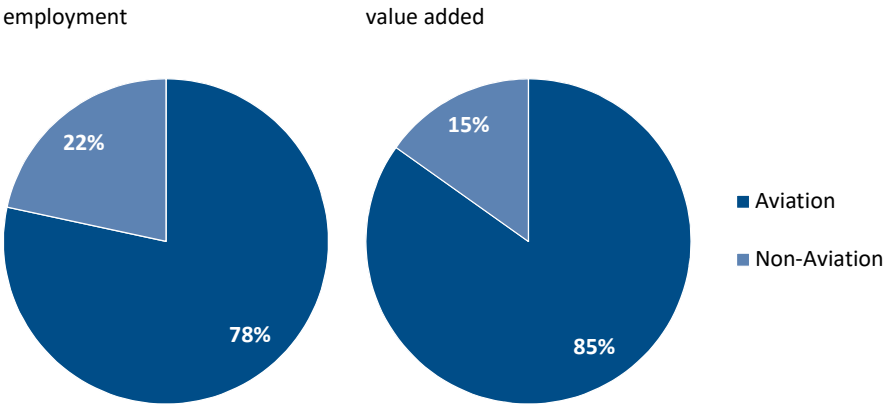
Aside from the employment, a second important economic indicator is the value added. This includes labor costs as well as capital costs, depreciation, profits and taxes.

In 2016, the companies on the airport generated a valued added of 1.5 bn. CHF. This corresponds to about 0.2% of value added of Switzerland and 3% of value added of the Canton Geneva. 85% of total value added at Geneva Airport was derived by the aviation sector.

The share of non-aviation in the direct effect is with respect to employment higher (22%) than with respect to value added (15%). This has two reasons: First, usually the average employment degree is higher in the aviation sector than in the non-aviation sector. The non-aviation sector contains activities such as retail and gastronomy, where many employees work part-time. Since the employment is measured by head count, this leads to a higher number of employees. Second, the aviation sector typically has a higher work productivity. This means that the average value added per full time employee in the aviation sector is higher than in the non-aviation sector.

[4] Number of employees according to the airport census 2016 of Geneva airport

Figure 9:Breakdown of direct employment and value added by aviation and non-aviation



Percentage shares by unrounded figures

Figure INFRAS.

Indirect effect

The airport companies acquired intermediate goods of a total value of 1.3 bn. CHF in 2016. Of this, 0.8 bn. CHF were produced by suppliers (companies) on the airport or from suppliers from abroad. The remaining 0.5 bn. CHF of intermediate goods originated in the remaining part of Switzerland and the French vicinity. To calculate the indirect effect, only the intermediate goods from the remaining part of Switzerland and the French vicinity are taken into consideration. Intermediate goods from companies on airport are already included in the direct effect (airport companies) and cannot be counted a second time. Intermediate goods from abroad (excluding French vicinity) are not relevant for the economy in Switzerland and its French vicinity, because value added and employment is generated outside this region.

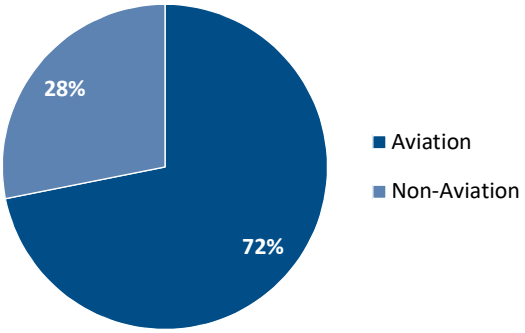
Through the demand of intermediate goods in Switzerland and the French vicinity the economic activities of the airport companies are indirectly related to 3'400 jobs. In terms of value added, the companies at the Geneva Airport generated 0.4 bn. CHF indirect effect. This employment and value added is generated by the production of intermediate goods for the airport. In the calculation of total value added and employment figures for Switzerland (and France), this employment and value added is assigned to the sector the suppliers are assigned to, and not to aviation. In the sense of the value-added-chain, the indirect effect shows the impact of aviation not reflected within the direct effect. In a regular economic environment, the indirect employment and value added would – at least in the medium run - not diminish completely if the Geneva Airport were to stop existing. In a dynamic process, producers of

intermediate goods for airport companies could replace a part of the airport companies' demand by increasing the demand of other customers.

72% of the employment as well as value added is connected to the demand for intermediate goods of the aviation sector. In the indirect effect, the non-aviation share is higher than in the direct effect. The reason for this is that the aviation sector on airport is highly integrated. That means that a high share of the demand for intermediate goods of aviation companies is produced by other companies on airport belonging to the aviation sector (e.g. the demand for infrastructure-, handling-, maintenance- and catering services of airlines). In contrast, most non-aviation companies on the airport purchase only a small share of their demand for intermediate goods from other airport companies. As a result, the share of non-aviation companies in the indirect effect is higher than in the direct effect.

Figure 10: Breakdown of indirect employment and value added by aviation and non-aviation

employment - indirect effect



Percentage shares by unrounded figures

Figure INFRAS

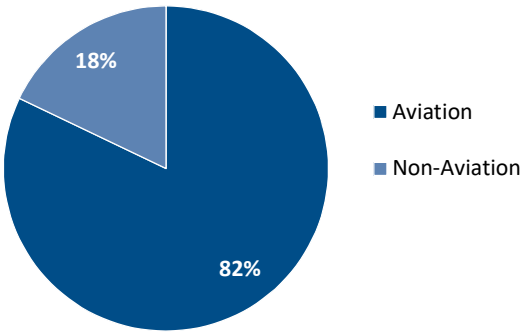
Induced effect

The induced effect is caused by the spending of the income generated in the direct and indirect effect. In this sense, it is a downstream effect.

By spending the income generated in the direct and indirect effect of Geneva Airport, an additional employment of 19'400 people value added of 2.2 bn. CHF is connected to Geneva Airport. If the Geneva Airport were to cease existing, the induced effect would be lost to the extent of the income loss that the direct and indirect employees experience if they would instead work in an alternative and lower paying job or - in the worst case – would be unemployed.

Of the induced effect, over 80% of employment as well as value added is generated by aviation related companies and 20% by non-aviation companies. Since the basis for the calculation of the induced effect is the direct and indirect effect, the share of the aviation sector in the induced effect lies between the share of aviation in the direct and indirect effect. In absolute numbers, the direct effect is considerably bigger than the indirect effect. This means the distribution of the direct effect has a stronger impact on the distribution of the induced effect than the distribution of the indirect effect.

Figure 11: Breakdown of induced employment and value added by aviation and non-aviation



Percentage shares by unrounded figures

Figure INFRAS.

Changes in the supply side effects over the last decade

The European aviation business has been affected by a strong competition over the last decade. On the one hand, competition between low cost carriers and traditional network carriers has intensified, on the other hand, airlines from the Near East have entered the European market and thereby intensified the competition. The result has been a decrease in prices. E.g. in Switzerland, according to the Harmonised Indices of Consumer Prices (HICP), the prices for air passenger transport services have dropped by more than one third within the last decade (Eurostat 2017).

This has had consequences on the supply side effects of aviation: Airlines have rolled out programs to decrease costs. In consequence, the average value added per employee and the demand for intermediate goods - from other companies on airport as well as from companies outside the airport – have decreased. Some examples:

- During the discussion about the takeover conditions of parts of Air Berlin by Lufthansa, reports suggested that depending on the collective labor agreement applied, pilot salaries within the Lufthansa group would differ by up to 40%. As salaries are part of value added, a decrease in salaries diminishes the value added per employee.
- In the last years, airlines have reduced their regular catering services. This has led to a decrease in the demand for intermediate goods of catering companies.

With the decrease of the income generated in the direct and indirect effect, the induced effect has decreased as well. Therefore, the average supply side impact per employee on airport has decreased. While prices have declined, the demand for air transport services have increased: In 2016, the passenger volume at Geneva Airport was almost 70% higher than ten years before. Overall, the economic effect of the decline in prices has been compensated by an increase in traffic volumes.

2.2.2. Estimation of the regional distribution of the effects

The following section shows the estimated regional distribution of the effects. The regions considered are the Canton of Geneva, the rest of Switzerland, and the French vicinity. As already mentioned, the regional distribution of the economic effect is based on sensitive information, which contain some uncertainties. Therefore, the results represent an estimation. It is important to note that in many cases, it is easy to quickly change the supplier of intermediate goods. Therefore, changes in the regional structure of intermediate goods are possible over time. The estimation is based on the following information:

- **Direct effect:** The direct effect is by its nature completely allocated to the Canton of Geneva.
- **Indirect effect:** The distribution of the indirect effect is determined by the share of intermediate goods that were purchased in the different regions. Based on the data available, we estimate that 15% of the intermediate goods for the enterprises of the direct effect were purchased in the Canton of Geneva, 5% in the French vicinity and the remaining 20% in the rest of Switzerland (60% were purchased from the Geneva Airport and abroad).
- **Induced effect:** The regional distribution of the induced effect is obtained by information on the place of residence of the employees and where they spend their earnings. Based on available data from a mobility survey on behalf of the Geneva Airport in 2014, we estimate that 40% of the employees at the Geneva Airport live in the Canton of Geneva and 35% in the French vicinity. The remaining 25% live in the rest of Switzerland. Furthermore, derived from the average household consumptions in Switzerland, we assume that 69% of the consumption of households is made in the vicinity of their place of residence.

Based on this information we estimate that the effects are regionally distributed as follows:

- Direct effect: The 10’800 jobs that are generated in the direct effect and the corresponding value added of 1.5 bn. CHF are fully assigned to the Canton of Geneva.
- Indirect effect: From the total of 3’400 employees and the 0.4 bn. CHF value added that are indirectly connected to the Geneva Airport through demand for intermediate goods, around 40% are ascribed to the Canton of Geneva, 10% for the French vicinity, and 50% to the rest of Switzerland.
- Induced effect: Of the employment through the induced effect, which accounts for a total of 19’400 jobs , 30% of the jobs are attributed to the Canton of Geneva, 20% to the French vicinity, and the remaining 50% of the jobs to the rest of Switzerland.

Figure 12: Estimation of the regional distribution of the economic impact of the Geneva Airport in 2016 with respect to employment and value added

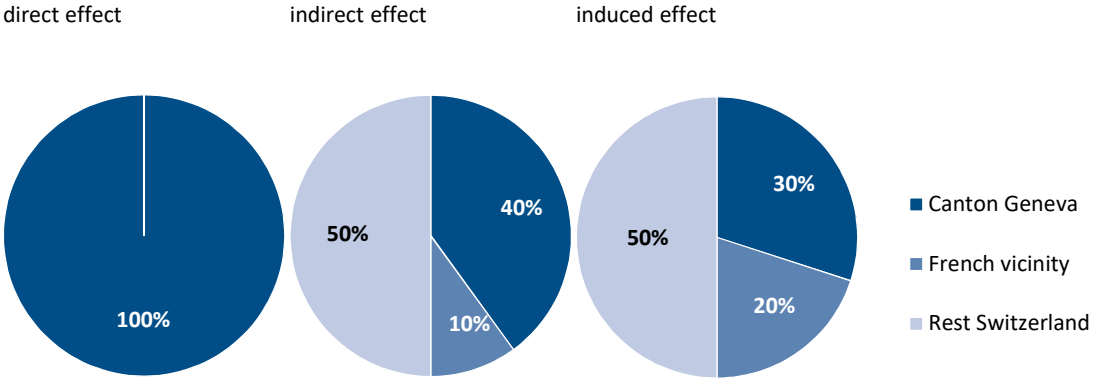


Figure INFRAS.

3. Module II: Accessibility provided by Geneva Airport

3.1. Accessibility, an important location factor

Geneva Airport is important for the region of Geneva: it contributes to the economic well-being with substantial local added value and a large number of jobs. This impact of the large-scale enterprise Genève Aéroport is analysed in chapter 2.

Yet the sole consideration of these production side effects would not show the entire economic importance of Genève Aéroport for the region. Airports provide their home region with another asset: this benefit is accessibility. It is a service which is provided stationary. Therefore, it cannot be substituted easily. It would not be equally available in regions without an airport.

First, "Accessibility as a location factor" analyses if and to which extent adequate accessibility makes a location attractive for businesses. Accessibility constitutes an important location factor for businesses. But it differs depending which types of businesses are present and on the industrial structure. It will also be analysed how sensible the Geneva economy is regarding accessibility. Overall it can be stated that depending on the industrial structure, accessibility is rather important for a region. This is particularly true for businesses when they are in the process of choosing a location.

Second, "Accessibility of Geneva and Geneva Airport" analyses and quantifies the quality of accessibility of Geneva and the surrounding regions as well as the extent to which Geneva Airport contributes to it. An international comparison with similar structured regions in Europe is undertaken. A simulation shows to which extent the accessibility of Geneva would decrease if Geneva Airport did not exist. The accessibility model of BAK Economics is the base for these calculations.

3.1.1. Definition of accessibility

First, a common definition of accessibility is needed. BAK Economics defines accessibility as "quality of a spatial point, which is given through its transport links to other (economically) attractive spatial points" (BAK Economics 2011). The accessibility refers here to passenger traffic. The time cost is generally higher in passenger traffic than in freight traffic in the overall economic mix of industries. In freight traffic, reliability and predictability of the delivery are of greater importance than speed, especially in just-in-time-production. In conclusion, this means that a region gets more attractive the faster a person gets from this to other economically attractive regions by means of road, railway or aviation.

3.1.2. Businesses need accessibility

The wealth of a region depends on businesses. Businesses bring jobs and thereby generate income for the population. They also pay taxes and contribute in many other ways to a region's well-being. Therefore, it is essential for regions to be attractive for businesses, keep businesses in the region and allow them to grow.

Even more, regions largely depend on the willingness of businesses to relocate to the region to increase its wealth. The settlement of further businesses generates more jobs from which the local population profits immediately. The increasing number of jobs leads to decreasing unemployment and thus to more job security and rising wages in the complete labour market. Due to the competition for office space, production locations and labour, businesses with a higher productivity will prevail most of the time. Those businesses will pay higher wages on average and offer jobs with generally better conditions. Ultimately, this leads to a higher tax volume, which allows for better infrastructure, cultural offerings and/or other preferred public goods for the population. In turn, this makes the region more attractive for newcomers. Eventually such a process may lead to a self-supporting economic boom.

To convince companies to relocate to the region, a region has to offer advantages which are better than in other regions. Location factors can be divided into three classes: public, parastatal and non-public location factors. Typically, for publicly provided location factors the level of regulation and tax burden are examined. The level of qualification of the local employees has to be regarded as parastatal, since the governments influence on the education system is only indirect. The relevant knowledge for innovation is a non-public location factor as such clusters of knowledge are often developed by the interaction of businesses.

With respect to accessibility, the state contributes substantially to transport infrastructure, but a large part of the existing transport services is offered by private companies, which use the infrastructure for their services. Accessibility is considered a parastatal location factor.

Accessibility is an important location factor for businesses. Theoretical reasoning provides several reasons why a business should consider the accessibility of a (potential) branch in its location decision. Three central aspects are examined in more depth:

- Cost efficiency and market expansions
- Innovation
- Quality of life at the regional level

Cost efficiency and market expansions

A higher accessibility based on a well-organised traffic system means shorter travel times and thus lower costs. A business can assume that its employees find it relatively easy to do business trips. This in turn simplifies and cheapens business processes. The same goes for clients, sup-

pliers and business partners visiting the business. On the one hand, a business can handle its business relations and the internal processes more efficient. This allows businesses to make more profit or lower their prices in comparison with competitors. On the other hand, increasing accessibility opens up new possibilities to operate in additional markets which were too expensive to reach before. A well-developed accessibility lowers productions costs and increases market size at the same time. These mechanisms make more accessible locations more attractive for businesses.

Innovation

Accessibility promotes innovation. The main reason is that most of the time highly specialized knowledge is nowadays spread globally. Therefore, the networks of researchers and developers from the same field have a global scale. But working on a global scale makes a global exchange of knowledge necessary as well. Parts of the necessary exchange of knowledge takes place either publically, e.g. via publications. Other parts are privately shared through modern means of telecommunications. A lot of knowledge relevant for innovation consists of non-verbalizable so called “implicit” or “tacit” knowledge. It is assumed that this knowledge is only exchangeable through immediate face-to-face communication. Therefore, a good transport linkage is helpful to enable the essential physical meetings of the knowledge carriers. Accessibility facilitates the participation in important innovation processes for regional research institutes and contributes to securing the long-term competitiveness of a region.

Quality of life at the regional level

Accessibility contributes to the regional quality by allowing the people to fly to vacation spots or to visiting friends and family, as well as by giving the region a more urbane international atmosphere (see chapter 3.1.5for an extended analysis). In doing so it affects the economy of a region in an indirect way as well. The main linkage is the availability of labour.

Particularly relevant is the argument for highly qualified workers, who are evermore mobile and flexible. They choose their residence and work place according to its quality of life, among other things (Florida, Gates 2003). In the modern competition between regions, this factor – the presence of highly qualified labour – got a pivotal lever in the economic development. There is a widespread consensus between research and location policy makers that knowledge and the creativity of highly qualified employees are driving forces for innovation and growth dynamics. Thus, a location must improve its ability to attract talents and to tie them to the location permanently (Florida, Gates 2003) to be successful in international competition in the long-term. The fact that a significant portion of the highly qualified jobs in cities

like Geneva are occupied by expatriates illustrates the importance of this argument for Switzerland (see e.g. Bentz 2009).

Furthermore, apart from availability of labour quality of life can also influence the cost of labour. If employees seek monetary compensation for jobs in regions with a low quality of life, businesses are forced to pay a premium to their new hires as compensation. This leads to tangible cost disadvantages for businesses located in regions with a low quality of life.

The well-known study by Mercer Human Resource Consulting regarding quality of life confirms this point of view (Mercer 2017). The study is supposed to provide an information basis for the compensation of employees in different regions. One of the factors considered is the connection of the region to an airport. The concept of the study suggests firstly that highly qualified employees are aware of the quality of life, since it is directly compensated by the wages and secondly that an airport affects quality of life positively.

Accessibility, quality of life and economic prosperity are thus tightly linked. Quality of life – and thus indirectly the accessibility of a region – has an altogether substantial repercussion on the business location: through the availability of highly qualified employees, the attractiveness for businesses and not least through the cost of wages.

3.1.3. Empirical findings regarding accessibility and business locations

There are two studies which conceptualise accessibility and econometrically estimate its importance for economic development. Further scientific studies, which are presented here, look at accessibility in a more indirect way. They focus on the profitability of public (transportation) infrastructure. This view is a bit vaguer, but they are nonetheless a valuable supplement, because of the thin state of facts.

Importance of accessibility for economic development

Harschel and co-authors examined the location decisions of businesses for ECAD[5]. They surveyed circa 100 foreign businesses located in the vicinity of an airport. The results show that the moving in was directly linked to the airport in those regions: the transport connection via air traffic is ranked the third most important criterion of the 24 location factors. Only the supply of highly qualified workers and transport connection via road are considered more important. The 24 location factors incorporated in the survey included all conventional factors, especially regulation, taxes and infrastructure.

[5] Harschel et al. (2008): "Katalytische volks- und regionalwirtschaftliche Effekte des Luftverkehrs in Deutschland" (Catalytic Economic and Regional Economic Effects of Air Traffic in Germany) by the European Centre for Aviation Development (EACD).

In addition to the survey two econometric estimations were conducted: a panel analysis for 439 German administrative districts and cities for the period from 1995 to 2005 as well as an international estimation with data from 208 countries for the period of 1997 to 2005. In the case of the German districts, the result for the chosen dependent variables labour productivity, employment, innovative strength and direct investments are affirmative. The same goes for the international sample. Here, only the effect on labour productivity and innovative strength were estimated.

A study by BAK Basel Economics distinguishes itself by assigning each region an individual accessibility value[6]. The individual value is determined by the GDP of all reachable regions weighted by the travel time to these regions.[7] Short travel times to important economic centres are of advantage. In this way, 202 regions within the European Union as well as 102 Swiss regions were calculated for the period of 1990 to 2008. The econometric calculations confirmed the hypothesis that growth, as well as the level of the GDP, rises with an increasing accessibility. The model was tested for its robustness by means of different methods. The scale of the effect varies among the estimations but is always significantly positive.

Infrastructure investments

Infrastructure investments are defined in some studies as the explanatory variable, which should approximatively capture the effect of additional accessibility on economic growth. In this sense an (above average) increasing regional GDP points to the fact that the conditions for expansion investments and incoming businesses have become more favourable. The depth of the scientific studies and their methodology regarding the examined regions as well as regarding the concrete scientific question varies greatly.[8] In conclusion, it can be stated that the existing evidence points to the claim that high accessibility affects the economic success of regions significantly positively.

Aschauers includes accessibility via roads, airports and transport as a factor[9]. He includes also administrative buildings and the buildings of police, fire department and healthcare. His econometric estimations suggest that the mentioned infrastructure affected the profitability of private capital positively.

[6] BAKBASEL (2011): “Erreichbarkeit und Wirtschaftsentwicklung” (Accessibility and Economic Development).
[7] A short explanation of the calculation can be found in Box 1 “BAK Economics’ Accessibility Index” in chapter 3.2.1 “Measuring accessibility”.
[8] Besides the below mentioned studies, further scientific studies are Spiekemann and Wegener (2006), Canning and Pedroni (2004) as well as Rupasingha et al. (2002). Their research approaches and results are related to the below discussed studies.
[9] Aschauers (1989): "öffentlicher Kapitalstock" (public capital stock).

Munnell varies Aschauers' approach[10]. Besides growth, he also uses private investment activity and the employment growth of U.S. states as a dependent variable. His results support Aschausers findings. Another study by Munnel finds that the level of non-military public capital and key infrastructure in the U.S. has a positive, significant effect on the productivity of the private sector[11].

Buttons and Taylors preclude only a few industries like mining, because there is a limited location decision in mining[12]. They analyse 41 American airports with a direct flight connection to the 15 EU countries (of that period). The success is measured by the development of the employment for the respective greater regions. The econometric estimation suggests that a connection to an airport – freight as well as passenger transport – supports the economic success of a region.

3.1.4. Accessibility and the regional economic tissue

Above the effect of accessibility on the businesses' location and investment decisions was discussed in general. Upon closer examination, it is not to be expected that all industries profit equally from accessibility. Which businesses and industries profit directly from a better supply of accessibility? The quite extensive studies by Harschel et al. (2008) and BAKBASEL (2011) dedicate special attention to the structural effect of accessibility on regional economical areas. BAKBASEL (2011) for example estimates the effect of accessibility through railway, road and air transport on the productivity of four industry aggregates[13]:

- Export orientated services (e.g. financial services) and
- Domestic market orientated services (e.g. retail trade) and
- High-tech industry (e.g. pharmaceutical industry) and
- Low-tech-industry & agriculture (e.g. steel production).

It can be assumed that a there is a bigger effect of accessibility on productivity in the case of the export-intense high-tech industry aggregate and the export-oriented services.

The export businesses of the secondary and tertiary sector must be physically present in the markets. This makes it vital to have a certain degree of accessibility. The financial services industry is an accurate example of an export-orientated service. Big banking houses in important financial centres are globally acting businesses, which keep customer relations and

[10] Munnell (1990a).
[11] Munnell (1990b).
[12] Buttons and Taylors (2000).
[13] 1: Wholesale trade, food & beverage, transportation, financial sector, real estate, IT, R&D, business rel. services;
2: Energy, water, construction, other services;
3: Investment goods (without metals) and chemical-pharmaceutical industry, synthetics;
4: Other industries, agriculture, commodities

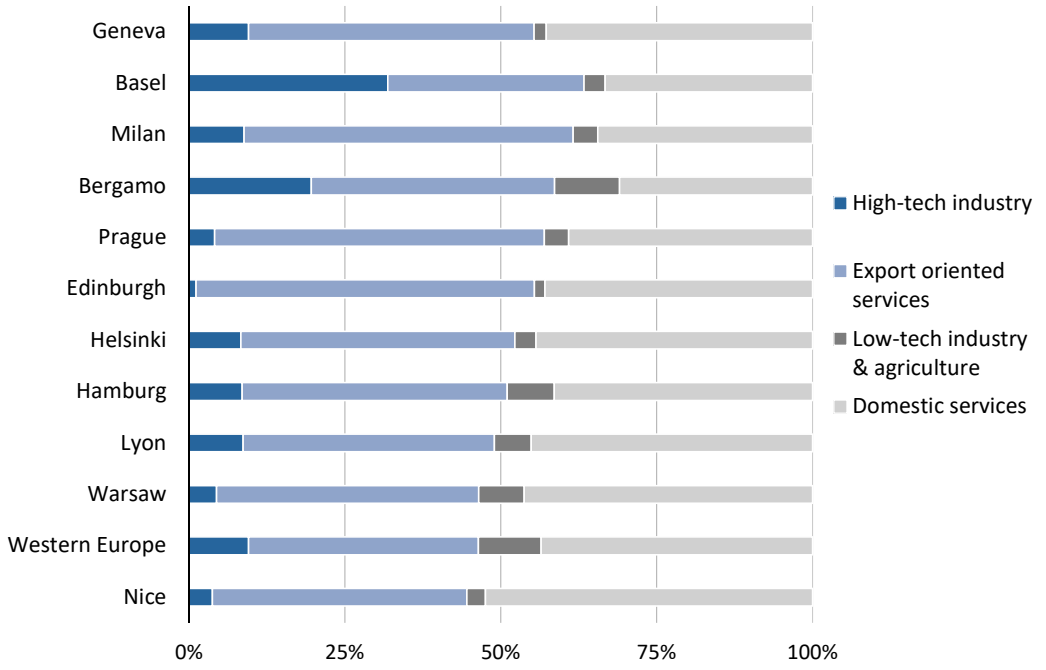
invest across the globe. This is particularly the case for the Swiss financial institutes and internationally active private banks, because they operate abroad to a high degree. Even more is this the case for trade financing.

The example of mechanical engineering shows the high-tech industry's dependence on high accessibility. Here, it is not mainly the fast delivery of the main product, the machine, but especially the whole offering after the delivery. Service agreements are often an important part of the whole product. Special spare parts, which are not available on the market, must be deliverable at short notice, in order to not jeopardise the ongoing operation of the machine (see below Figure 14, page 43 "structure of air freight exports via Geneva"). Furthermore, the producer's engineers must maintain and repair the appliances at the location of the client. This requires a corresponding accessibility.

Not regarding the industry affiliation, each transnationally active business has its headquarters, where the top management is situated and crucial functions for the whole business take place. This place, in particular, must have good accessibility as a communicative centre of the business. As Geneva is home to several internationally active businesses, this argument is especially relevant for Geneva. The region is home to two businesses in the Financial Times Global 500. The list ranks the 500 companies with the highest market capitalisations worldwide. Nestle and Richemont rank 14th and 247th respectively (Financial Times 2015). Additionally, Forbes (2017) lists companies like BCV group, STMicroelectronics, Transocean, Givaudan, and SGS in the Lake Geneva region.

The goods and services of those export-oriented businesses require continuous innovation. As discussed above, these businesses should participate in global knowledge networks and thus require accessibility to generate innovations efficiently. Especially this circumstance yields the actual value of accessibility. Lively innovation activity promises locations a continuously growing labour productivity and increasing wages.

Figure 13: Industrial structure of Geneva and its compared regions - share of nominal gross value added in the region



2015, share of nominal gross value added in the region, in %

Figure BAK Economics

Figure 13 shows Geneva's and its benchmark cities' industrial structure according to the industry segmentation of BAK (2011). Ten European metropolitan regions, as well as the Western European average, help to assess Geneva's industrial structure. A share of more than 55 percent of high-tech and export-oriented industries show clearly that accessibility is important for Geneva's economy. Geneva has a slightly above-average share of export-oriented industries compared to the other metropolitan areas.

The position of the compared aggregate Western Europe near the end of the spectrum supports the thesis that the industry aggregate low-tech industry and domestic-orientated services have a greater weight in inaccessible regions. Compared to Geneva, the accessibility sensitive industries' share is about ten percentage points smaller.

Table 3 focusses on a small group of especially accessibility-sensitive industries. In this table Geneva's position becomes even clearer.

In BAK's econometric analysis (2011) of 202 European and 106 Swiss regions, the assumed patterns are approximately confirmed. Even though the statistical significance and the signs are not distinctively interpretable for the European sample, the Swiss sample's results seem to

be in accord with the theoretical view. The accessibility coefficient is significantly positive for the high-tech industries as well as the export oriented service industries for Switzerland. Accessibility tends to be of more importance for the Swiss small-scaled regions than for the European large-scaled regions.

Table 3: Share of selected Industries on the overall economy

	Financial sector	Professional, scientific and technical activities	Capital Goods	Tourism	Chemical and pharmaceutical industry
Switzerland	10%	7%	9%	2%	5%
Geneva	14%	8%	8%	2%	2%
Basel	7%	9%	4%	1%	28%
Edinburgh	23%	9%	1%	4%	0%
Milan	11%	10%	5%	3%	3%
Bergamo	6%	6%	15%	2%	2%
Prague	12%	10%	3%	2%	1%
Western Europe	6%	7%	7%	2%	2%
Lyon	4%	9%	4%	2%	4%
Helsinki	5%	7%	6%	2%	2%
Hamburg	5%	7%	6%	2%	2%
Warsaw	5%	9%	2%	1%	1%
Nice	3%	6%	1%	7%	2%

2015, share of nominal gross value added in the region

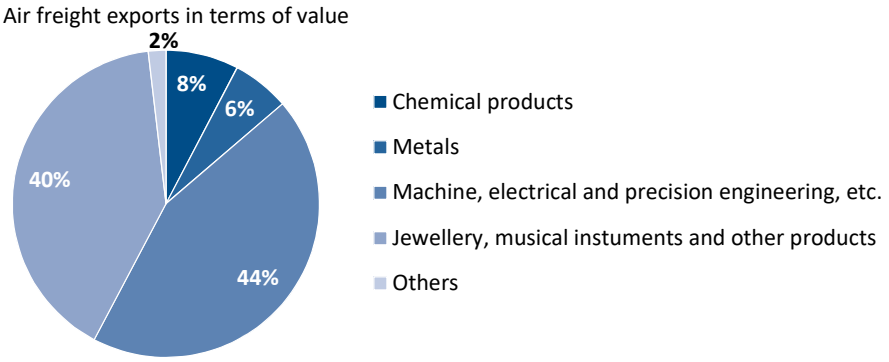
Table BAK Economics

European Center for Aviation Development's study (Harschel et al. 2008) did a survey of 100 internationally active businesses located in the surroundings of an airport. The sample confirms the theoretically deduced relation between accessibility and industry structure by tendency. 67 percent of the businesses belong either to the export-oriented industry aggregates "Finance, renting and business services" or "trade, transport, communication and hospitality". Another 11 percent belong to the high-tech industries "machine engineering, vehicle construction, computers and electrical engineering". Other industries have only a small share (Harschel et al. 2008). The accessibility affinity is not only industry specific, since all the surveyed businesses have their headquarters abroad. Therefore, the sample is not random and the results are merely indicative.

The consultancy Hamilton, Rabinovitz & Alschuler (2001) identifies firstly an industry aggregate comprising movie and multimedia industry and secondly a high-tech aggregate by qualitative methods (machine engineering, computer hardware and electrical engineering) as highly dependent on Los Angeles International Airport. The case studies show a high accessibility affinity for the movie and multimedia industries, but the future trends are inconsistent. Among other things, digitalisation should reduce the industry's cargo-demand. This shows that the relationship between accessibility and industries is not static. The just-in-time trend, increasingly centralised distribution channels, as well as the demand from the emerging markets in Asia, clearly increase the high-tech industry's airport affinity.

Convetz and Thierstein (2011) look at the case of the hub airport Amsterdam-Schiphol and the moving-in of knowledge-based businesses. The office rents in the airport area are the highest in the country, followed by rents for facilities located between the airport and the inner-city of Amsterdam. The high demand is caused by businesses in the financial, consulting and logistics sectors, as well as the public administration and healthcare. The authors conclude that "international airports have gone through a morphogenesis from original pure infrastructure facilities to multimodal and multilayered spatial growth poles and centers of competence" (Convertz, Thierstein 2011). Whereas the airport in Munich does not dominate the city's traditional business centre, the airport is located within the regions with the highest settlement dynamic (Dross, Thierstein 2011).

Figure 14: Structure of Geneva's the air freight exports [in terms of value]



Exports without the category "cookery and oil products", because these "exports" are predominantly kerosene consumption of the airplanes.

Figure FCA

Even though this chapter's focus lies on passenger accessibility, the insights of the studies above reflect the Swiss air freight exports (of the secondary sector) (Figure 14). Chemical and machine, electrical and precision engineered products account for more than half of the ex-

ports. Jewellery and other products account for another 40 percent. Apart from the air transportation of its employees, these businesses use air freight exports to ship their valuable, light products abroad.

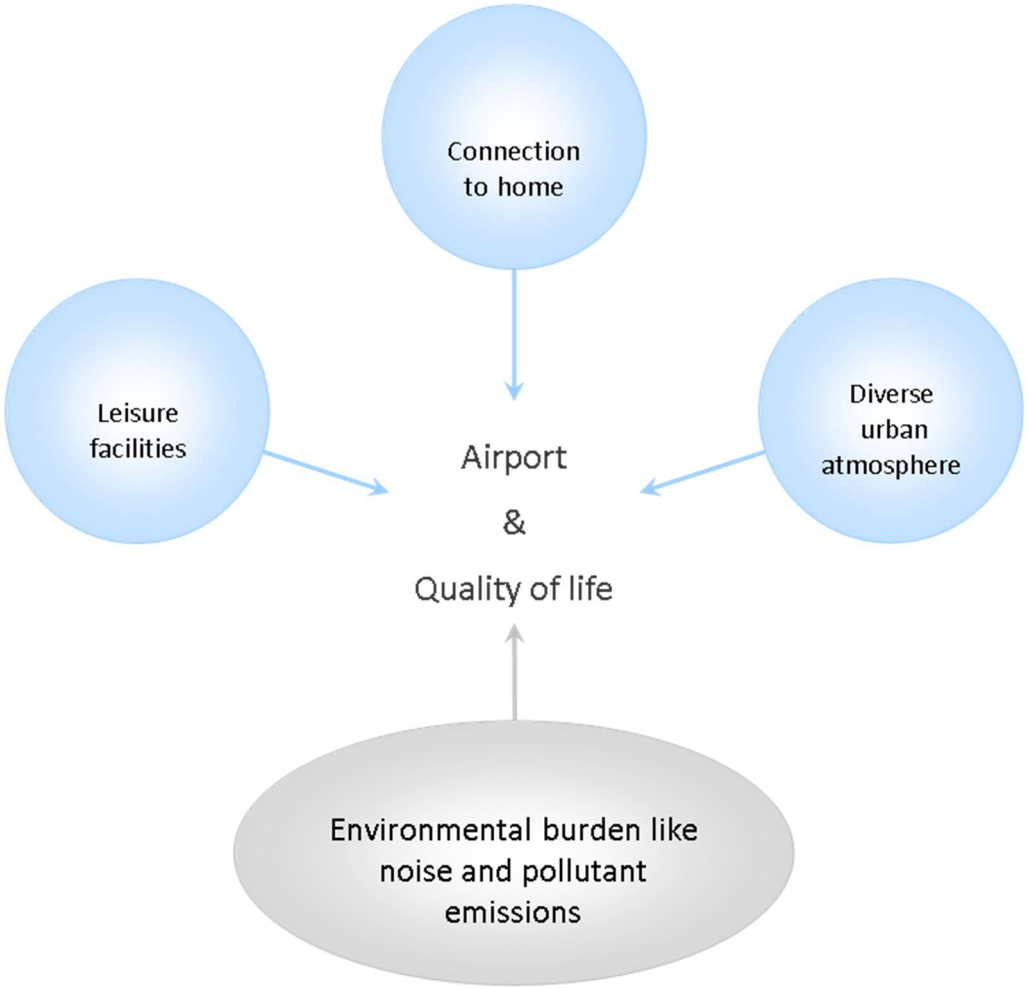
Overall, it can be said that the industry structure in airport regions tends to develop towards knowledge-intensive high-tech and service industries. This supports the conclusion that the location factor accessibility affects the regional businesses' medium to long-term chances of success and the economic success of the whole region positively. Businesses think that it is crucial for their success to invest in rather well accessible locations.

3.1.5. Accessibility and quality of life

Accessibility not only has a big impact on economic life, but also on the quality of life of the population. By allowing the people to fly to vacation spots or to visiting friends and family accessibility enriches their lives. Further, the international accessibility of a region and the increased number of visitors to the region adds to a more urbane and international atmosphere in the region, which is attractive for the people living there as well.

In this chapter the connection between accessibility and quality of live will be analysed in more detail. Note that they can be positive as well as negative, e.g. through emissions due to traffic needed to generate the accessibility. First, the term quality of life is first defined. Second, the most important influencing factors of airports on the quality of life are discussed. These factors are summarized in Figure 15.

Figure 15: Airports' influencing factors on the quality of life



Economics uses quality of life regularly as an evaluation criterion in economic assessments and benchmarking of international standout regions. The categorization of the airports' influencing factors on the quality of life is based on the "BAK Quality of Life Index" (BAKBASEL 2008b).

Figure BAK Economics

Definition of quality of life

Quality of life is understood as the entirety of all subjective and objective, material and immaterial as well as individual and collective components of prosperity. It is a multi-layered concept. Regarding definition, distinction and the measuring of quality of life the assessment of subjective criterions is an especially high obstacle, as an evaluated factor can be irrelevant to one person and essential to another person, like an opera house, which can be frequented by some people but never frequented by others. Therefore, a group of prosperity factors cannot

be determined universally. Nevertheless, there are some objective components, which increase virtually everybody's quality of life, independent of individual preferences, characteristics or environment, such as health

The importance of leisure facilities

An attractive metropolitan area needs diverse offerings of culture and leisure activities to be a compelling place of residence. The airport is rightly so associated with leisure, not least because airplanes became the tourists' favourite means of transport. Deregulation led to hugely fallen prices in the last decade and to a lot more flight connections being offered. An airport in close spatial proximity means a fast connection to the Mediterranean and other important vacation spots. The fact that the trend goes towards more spontaneous, shorter vacations (GDI 2006) increases the importance of proximity to airports and thus of faster travel times. Figure 16 shows that about sixty percent of the passengers of Geneva Airport travelled for leisure reasons in 2016. The share of non-business travellers is increasing by tendency.

An airport in close proximity increases the quality of life of its local business travellers. Not only employers benefit from shorter travel times. It can also mean more time spent at home for the travellers.

Figure 16: Passengers and travel purpose at Geneva Airport

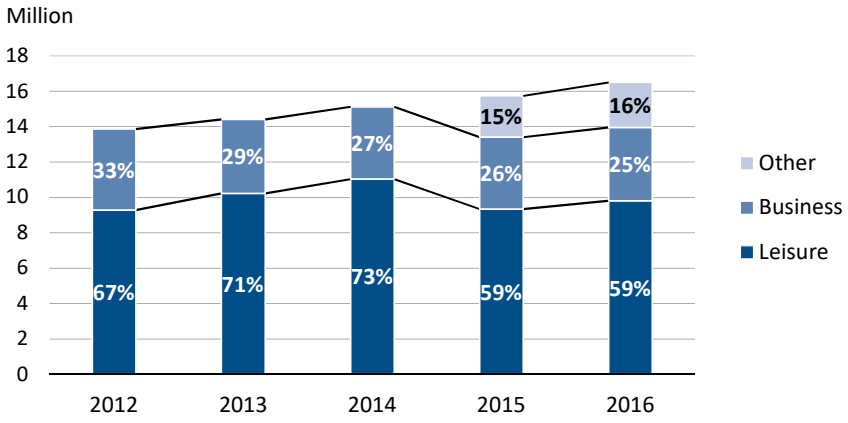


Figure Genève Aéroport

Connection to home

An increasingly economically integrated world means living and working abroad for a lot of people. This circumstance brings not only economic advantages but also genuine disadvantages: migrants must leave their families and their regular social environment behind at the previous residence and forgo a part of their quality of life. A connection to home is of great

importance, because it takes time to build a new social network at the new domicile. Thus, it is a solid incentive to convince them to come and stay at the new place.

Diverse urban atmosphere

Airports are also motors of cultural exchange, because they supply a constant inflow of foreign business travellers and tourists in the connected metropolitan areas. The sheer presence of this circle of people, as well as the emergence of specifically tailored offerings for them, lead to cultural variety and a diverse urban, cosmopolitan atmosphere. This is an essential characteristic of their city for a large part of the urban population.

According to Florida and Gates (2003) especially uncommitted highly qualified people tend to be attracted by this atmosphere and consider it in their choice of a residence. Tolerance and openness are regarded as a breeding ground for innovative business ideas and thus for economic prosperity. Thereby quality of life affects also the economic development, from which the general public profits in return. This aspect is extensively described above in the segment "Accessibility, an important location factor".

Environmental burden by noise, pollutant emissions and landscape depletion

Besides the transport infrastructure's merits regarding the quality of life, there are some downsides. As an example, one can name the space used for infrastructure, which cannot be used for other purposes anymore, as well as pollutant emissions, which are prominently discussed regarding air traffic.

The environment-related effects of transport infrastructure are discussed manifoldly and rather controversially, especially concerning its extent. A comprehensive depiction or even a quantification of the effects is not feasible in this study, because of the complexity of the topic and the scientifically inconsistent results.

3.2. Accessibility of Geneva and Geneva Airport

Up until now, the importance of accessibility on economic success has been discussed. There are direct effects on economic attractiveness of a region as well as indirect effects through innovation networks and an improved quality of life. The theoretical considerations are supported by empirical findings. Next, the focus will be on the analysis and quantification of accessibility of Geneva and the contribution of Geneva Airport to this accessibility.

For this purpose, the accessibility model of BAK Economics is used. Different approaches will be applied like international comparisons ("benchmarking"), the position Geneva Airport takes up in the accessibility matrix of Geneva, the French-speaking Switzerland and the surrounding French regions, and a simulation exercise demonstrating the decrease of accessibility

if the Geneva Airport wold not be available. Together this draws a clear picture on the location factor accessibility for the region on how much Geneva Airport contributes to it.

The international comparison will benchmark Geneva with cities and regions with similar structure, size, and external circumstances (Milan, Helsinki, Hamburg, Prague, Warsaw, and Edinburgh) as well as cities with an airport in the surrounding regions (Lyon, Milan, Bergamo, Nice, and Marseille). Furthermore, the national comparison includes Switzerland's biggest cities (Zurich, Basel, Bern, and Lausanne) as well as Sion.

3.2.1. Measuring accessibility

Accessibility indicators are a measure of utility of households and companies gained by using the transport infrastructure (see Chapter 3.1 Accessibility, an important location factor). Different indicators are available for different tasks, either focussing on intraregional or interregional transport networks. There are many indicators in the literature. They can be categorised in three groups. Some are based on infrastructure, others on activity and the rest on utility. Infrastructure-based indicators on the one hand hardly explain the networking and connections to other regions. On the other hand, utility-based models require a comprehensive database, which is often not available and difficult to gather. Thus, the model of BAK Economics uses an activity-based gravitational indicators approach. Gravitational indicators (also named potential indicators) weight the destinations based on their attractiveness and discount each destination by a measure of spatial resistance. The attraction of a point for the accessibility index gets bigger, if

- the attractiveness is increasing or
- spatial resistance is decreasing.

This assumption is based on the gravity model for traffic behaviour. Mathematically, the relation between accessibility, potential (here: economic power measured by gross domestic product) and spatial resistance (here: shortest travel time, taking frequencies into account) is formulated by means of an inverse exponential function. See Box 1 for more details.

Box 1 BAK Economics' Accessibility Index

The accessibility model of BAK Economics dates back to a joint project with the Institute for Transport Planning and Systems of ETH Zurich, the Faculty of Business and Economics of the University of Basel, and the company TansSol GmbH. The project was initiated in 2003 and has continuously evolved ever since.

The accessibility model is based on the utility gained from the access to markets. Regarding the underlying transmission channels it is about increases in productivity, cost savings due to efficient use of existing markets and the developing of new markets respectively. The utility

gained from access to markets gets diminished by the cost of travel or transport (activity-based gravitational indicators). With regard to travel time, the model follows the concept of outbound accessibility (but it can be assumed that inbound accessibility is similar).

There are three different geographical perspectives covered, each in an individual model: global, continental and regional accessibility. The global accessibility index assesses the connections to destinations outside the own continent (implemented for Europe, North America and Asia). The continental index assesses destinations from within the own continent (implemented for Europe) and the regional index the connections to domestic destinations (implemented for Switzerland, including neighbouring regions abroad). The accessibility indexes are formed by the sum of the reaching potential minus the spatial resistance between region of origin and target area. The sum of all the values from all target areas yields the accessibility value of a region of origin.

$AU = \sum (WZ * e^{-\beta * cUZ})$ with

AU = Accessibility value of the region U
WZ = activity in the target area (regional GDP)
cUZ = spatial resistance (travel time)
β = parameter of spatial resistance sensitivity

Parameter β fixes a certain half-life period, showing the time span for which the weight of a given attractiveness of a geographical point is cut in half. The parameter is estimated by stochastic models. The result is a half-life period of about 2 hours and 15 minutes for continental accessibility and a half-life period of about 10 hours for global accessibility. The nominal GDP is used as attractiveness parameter. Because the accessibility value is an abstract quantity, it is indexed.

The accessibility of the flight module consists of much more than just the flight connection (the traffic model underlining the accessibility index includes flight, train and street). This results in a more realistic accessibility picture. It is necessary to be able to compare travel by air to other travel types (road, train). Therefore, the following durations are explicitly considered:

1. Travel time from main station to the airport
2. Time from parking lot or bus station to check-in desk
3. Check-in
4. Duration of the flight including transfers
5. Transport time to the centre of a destination

The model uses the shortest travel time (considering different modes of travel: road, train, air traffic). Furthermore, the accessibility model considers different airports for departure. Additionally, the frequency of the connection is considered by assessing different time slots.

The inherent potential of the own region is included in the computation of the accessibility, because all regions of origin are also destinations. In other words Geneva's potential gives value to all other regions. Due to reasons of comparability, the potential needs to be included for Geneva itself. In BAK Economics' accessibility model, the access time to the inherent potential is zero. In big cities, the inherent potential accounts for approximately 5 percent of the accessibility index.

As mentioned, BAK Economics' accessibility model makes a distinction between destinations from within Europe and outside of Europe. The distinction between continental (destination within Europe) and global (destinations outside of Europe) is justified by different types of business travel. Business travel within Europe consists to a substantial extend of arrival in the early morning and departure in the evening. Intercontinental business travel commonly requires longer stays in the target area.

Although for intercontinentally trips air traffic is the only alternative, both models calculate the travel time intermodally. In other words the travel time contains the fastest route from main station to airport, as well as the fastest route from airport to the centre of the destination. The airport transfer's mode of travel is either train or road. The fastest connection between region of origin and destination is therefore not only the duration of the flight but contains all types of travel (modes). Furthermore, it is possible that the fastest connection does not include check-in at the nearest airport. The overall shortest travel time is used in the model.

3.2.2. Continental accessibility of Geneva and Switzerland

First, the total continental accessibility of Geneva is compared to every other European region, in order to get a first impression of Geneva's accessibility and Geneva's position in international competition in this important location factor. Figure 17 shows cartographically all European regions on the level of NUTS-2 (see Box 2). The blue coloured regions are equipped with a better than average accessibility, the red coloured regions are below average. The bigger the deviation from the European mean, the darker the colouring. The same is done in Figure 18 for Switzerland and its adjacent regions on the more intricate NUTS-3-level.

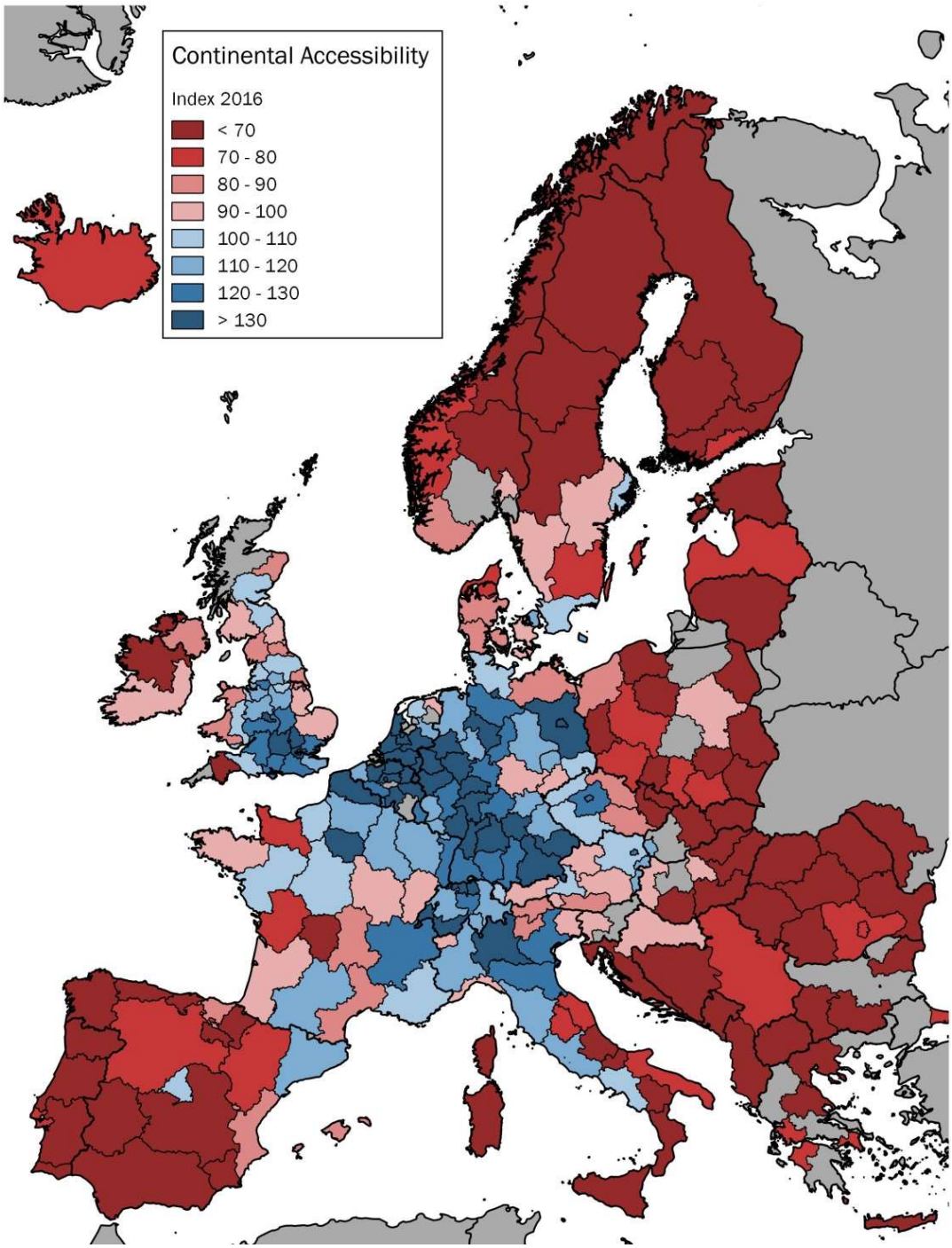
Box 2 NUTS Classification

NUTS (Fr. Nomenclature des unité territoriales statistiques = Classification of Territorial Units for Statistics) is a geocode standard for referencing the subdivisions of countries for statistical purposes in the European Union. The Swiss Federal Statistical Office uses NUTS as classification for the Swiss territorial units as well. In Switzerland the seven regions Lake Geneva Region, Espace Mittelland, Northwestern Switzerland, Zurich, Eastern Switzerland, Central Switzerland, and Ticino correspond to hierarchy level NUTS-2. The cantons form the level NUTS-3.

The canton of Geneva is well-connected within Europe

Geneva has 135.5 index points in continental accessibility and is therefore well above the average of all European regions (100= average in the accessibility model 2002). It puts Geneva in position 44 of the 411 regions of the accessibility model and consequently almost in the best 10 percent. This is a good result, especially considering Geneva's geographical position. For continental accessibility, it is of advantage to be located in or near the economic heart of Europe – Geneva is geographically somewhat on the edge of this heart. Given this mediocre starting position, Geneva achieves a quite good accessibility. The only city as far south as Geneva with a better score is Milan. Most regions in the top 10 percent are situated in a very central economic belt of Europe with high economic potential. Especially the Benelux countries and Western Germany occupy the best positions on the accessibility index ranking. Other regions nearby a big city with high self-potential and important airports fill the remaining top spots.

Figure 17: Continental Accessibility, 2016

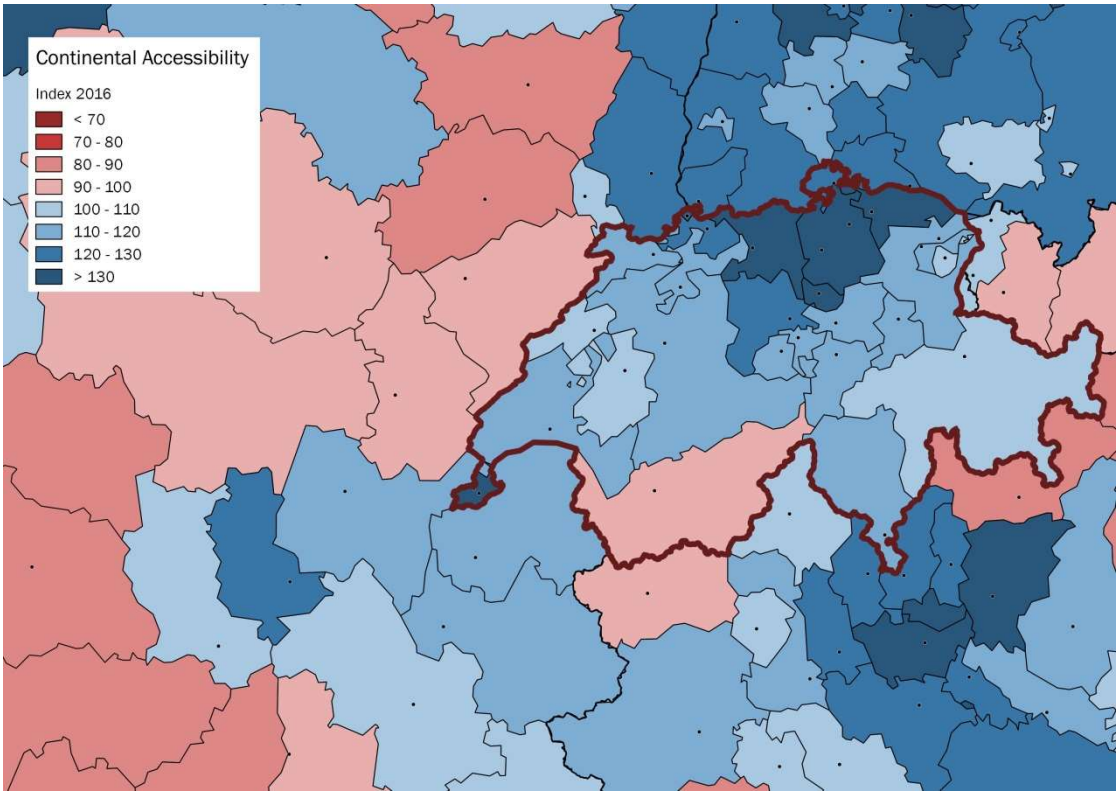


100 = Average of all regions in the accessibility model 2002; classification of territorial units by NUTS-2; grey: not available in the accessibility model.

Figure TransSol, BAK Economics

Domestically, only Zurich and Winterthur have a better continental accessibility than Geneva. Thus Geneva is slightly better than Basel (1.8 index points), which has an international airport of its own and drastically better than Bern (17 index points). The closest region outside of Switzerland with a higher continental accessibility than Geneva is the aforementioned Milan. With respect to close competitors, Geneva is almost 14 points better than Lyon. Figure 18 shows Switzerland and its surrounding regions. This shows that not only Geneva itself profits from the well-developed accessibility – it causes an improvement in its neighbouring regions as well. Vaud, Haute-Savoie, and Ain with 117, 119, and 114 index points, have a higher index than most of their adjacent regions.

Figure 18: Continental Accessibility, Switzerland 2016



100 = Average of all regions in the accessibility model 2002; classification of territorial units by NUTS-3; grey: not available in the accessibility model.

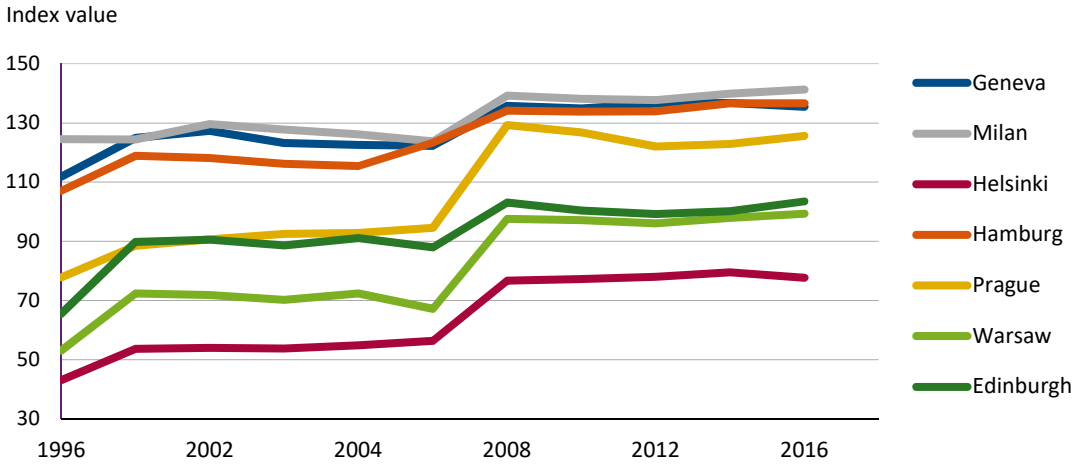
Figure TransSol, BAK Economics

Change in accessibility since 2000

Geneva has gained a few points since 1996. Particularly from 2006 to 2008 there was a big step forward in the continental accessibility, but this is true for almost all regions thanks to investments in rail services and more flights due to economic growth. Within Switzerland, Geneva

lost only a few points through the Swissair grounding after 2001, less than German-speaking regions. Consequently, it overtook Basel in the accessibility index.

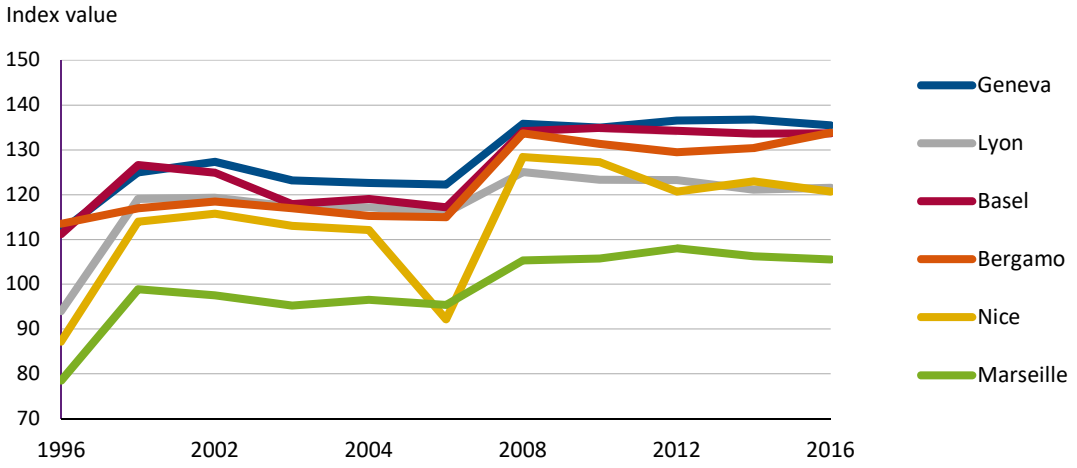
Figure 19: Continental accessibility index 1996 – 2016, international comparison, part 1



100 = Average of all regions in the accessibility model 2002

Figure TransSol, BAK Economics

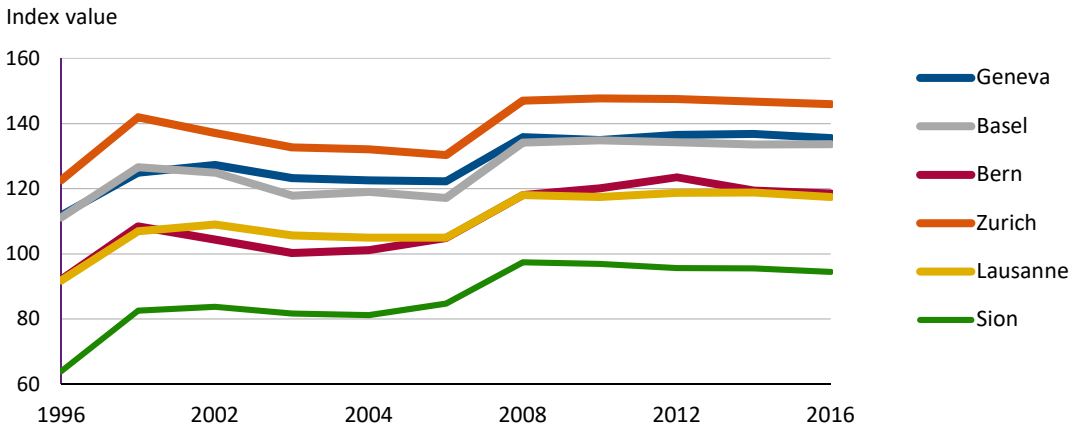
Figure 20: Continental accessibility index 1996 – 2016, international comparison, part 2



100 = Average of all regions in the accessibility model 2002

Figure TransSol, BAK Economics

Figure 21: Continental accessibility index 1996 – 2016, national comparison



100 = Average of all regions in the accessibility model 2002

Figure TransSol, BAK Economics

Geneva performs well in the BAK Economics accessibility model, compared to both domestic and international regions. Geneva is also very important for its adjacent regions.

Modal split shows the importance of air traffic and thus of Geneva Airport

What is the contribution of Geneva Airport to this satisfactory result? The so called modal split gives a first point of reference (see Box 3). The modal split splits the accessibility index into different types of transport (transport modes). It is not surprising that air traffic is by far the most important type of transport for continental accessibility. The weighted share of air traffic is between 87 percent and 97 percent for all national and international regions compared.

Box 3 Bar Chart / Modal Split in the Continental Model

The bar chart for the international and national comparison shows the total continental accessibility index and its decomposition by modes of transportation, i.e. by road, train, and flight (flight is attributed if a flight is involved, although travel is intermodal, i.e. including access to the airport on road or by train), and self-potential (so called modal split). The share of destinations that is accessed by a certain mode of transportation is weighted by the accessed potential. Furthermore, the flights can be split according to the first check-in airport (presented as "own share" (check-in at home airport) and "foreign share").

The depicted shares of air traffic in the modal split refer to the time slot from 5.30am to 9am. This time slot has been chosen because most of the business trips within Europe occur in the morning. In contrast, the indices of continental accessibility as shown for example in the

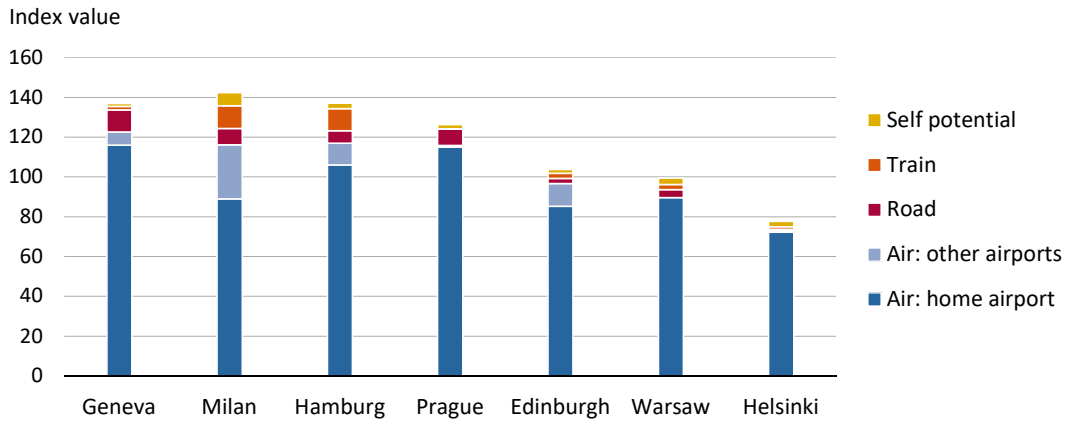
maps are composed as a weighted average of all time slots. Therefore, there may be small discrepancies between the different diagrams.

Air traffic is of huge importance for the location of Geneva. 126 of its 136 accessibility index points or 93.3 percent are by the mode of air traffic. Measured in index points only Zurich has a bigger contribution by intermodal air traffic in Switzerland. All other regions have a clearly smaller contribution by air traffic. Although having ten more accessibility index points, Zurich has barely more absolute points by air travel. This is due to the fact that Geneva's self-potential is lower and that road connections to economic potential regions are less attractive. Thus its air traffic share is really big (93.3%). No other Swiss region has an air traffic share as big as Geneva. There are some regions in the international benchmark sample that have a higher relative share of air traffic. Although it must be considered that a lot of these regions are peripheral regions, which means they collectively have a high air traffic share. It is clear from these figures that air traffic is particularly important for Geneva, indeed even more so given the fairly central geographical position.

The accounted contribution of air traffic comprises not only of flights departing at a region's own airport, but also of flights departing at different check-in airports. Geneva Airport contributes 116 accessibility index points to Geneva's accessibility or 85 percent of its overall points and 94.6 percent of its air traffic contribution. In Switzerland, this share is comparable only with Zurich, which has a slightly higher own-share to foreign-share ratio. In the international comparison, only peripheral locations like Helsinki and cities with no larger airport in close proximity like Warsaw, Prague, and Nice have a higher share of own check-ins. Regions in Romandie and Geneva's adjacent foreign regions are dependent on Geneva Airport. There are some German speaking regions profiting from Geneva Airport, including Bern, but regions around Zurich and Central and Eastern Switzerland do barely.

A further testimony to the importance of Geneva Airport is shown in Table 4. A lot of Geneva's connections are by direct flight. Not one region compared uses as many direct flight routes as Geneva.

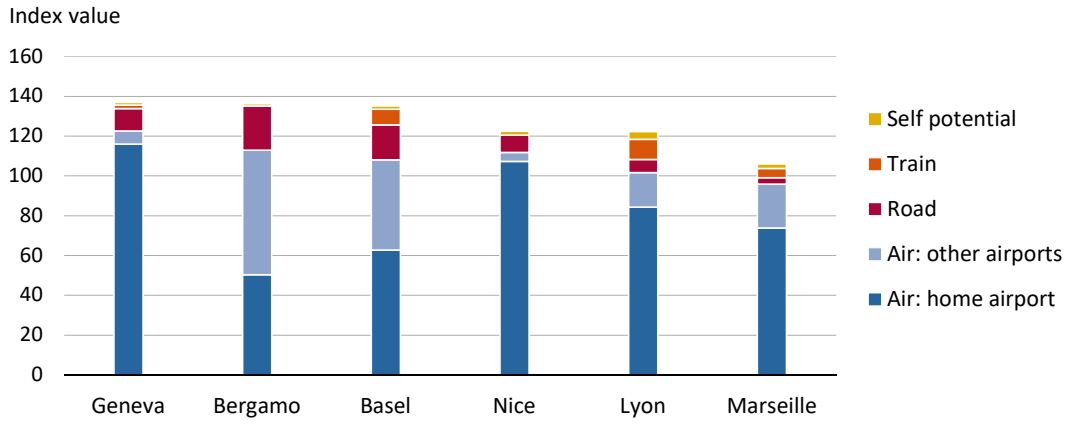
Figure 22: Continental accessibility, modal share, international comparison 2016, part 1



See Box 3 for description; air traffic is split into "Air: home airport" and "Air: other airports", where "home airport" contains index values that are contributed by connections that use the city's own airport as check-in airport; time slot 5.30am to 9am

Figure TransSol, BAK Economics

Figure 23: Continental accessibility, modal share, international comparison 2016, part 2



See Box 3 for description; air traffic is split into "Air: home airport" and "Air: other airports", where "home airport" contains index values that are contributed by connections that use the city's own airport as check-in airport; time slot 5.30am to 9am

Figure TransSol, BAK Economics

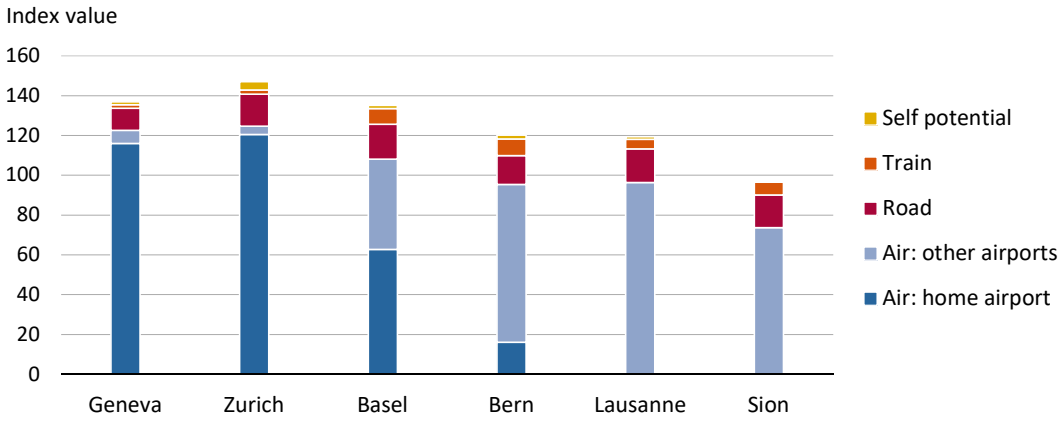
Table 4: Check-in airports: number of destinations

Check-in airports	No. of destinations
Geneva	119
Milan	117
Hamburg	117
Prague	114
Warsaw	110
Nice	107
Helsinki	106
Edinburgh	101
Lyon-Satolas	99
Marseille-Provence	89
Milano - Malpensa	77
Milano - Linate	64
Mulhouse-Bale	63
Bergamo (Orio al Serio)	37

See Box 4

Table TransSol, BAK Economics

Figure 24: Continental accessibility, modal share, national comparison 2016



See Box 3 for description; air traffic is split into “Air: home airport” and “Air: other airports”, where “home airport” contains index values that are contributed by connections that use the city’s own airport as check-in airport; time slot 5.30am to 9am

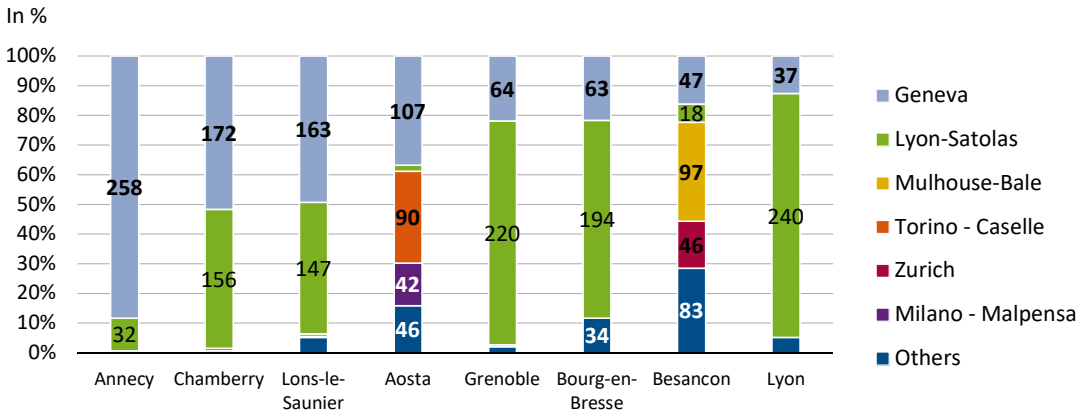
Figure TransSol, BAK Economics

Box 4 Table "Check-In Airports"

The table "Check-In Airports" shows for selected airports the number of destinations that are reached by a particular airport as check-in airport in BAK Economics' continental accessibility model. Destinations are airports where an air trip ends. Air routes are included only if they are faster than the corresponding road or railroad connection and therefore are incorporated in the accessibility index.

For Milan that has two airports the airports are listed separately, as well as the city considering both airports.

Figure 25: Check-in airports for continental flights from adjacent countries



Number of destinations within Europe, where the mentioned airports served as check-in airport and provided the fastest accessibility; flight schedule between 5.30am and 9.00am

Figure TransSol, BAK Economics

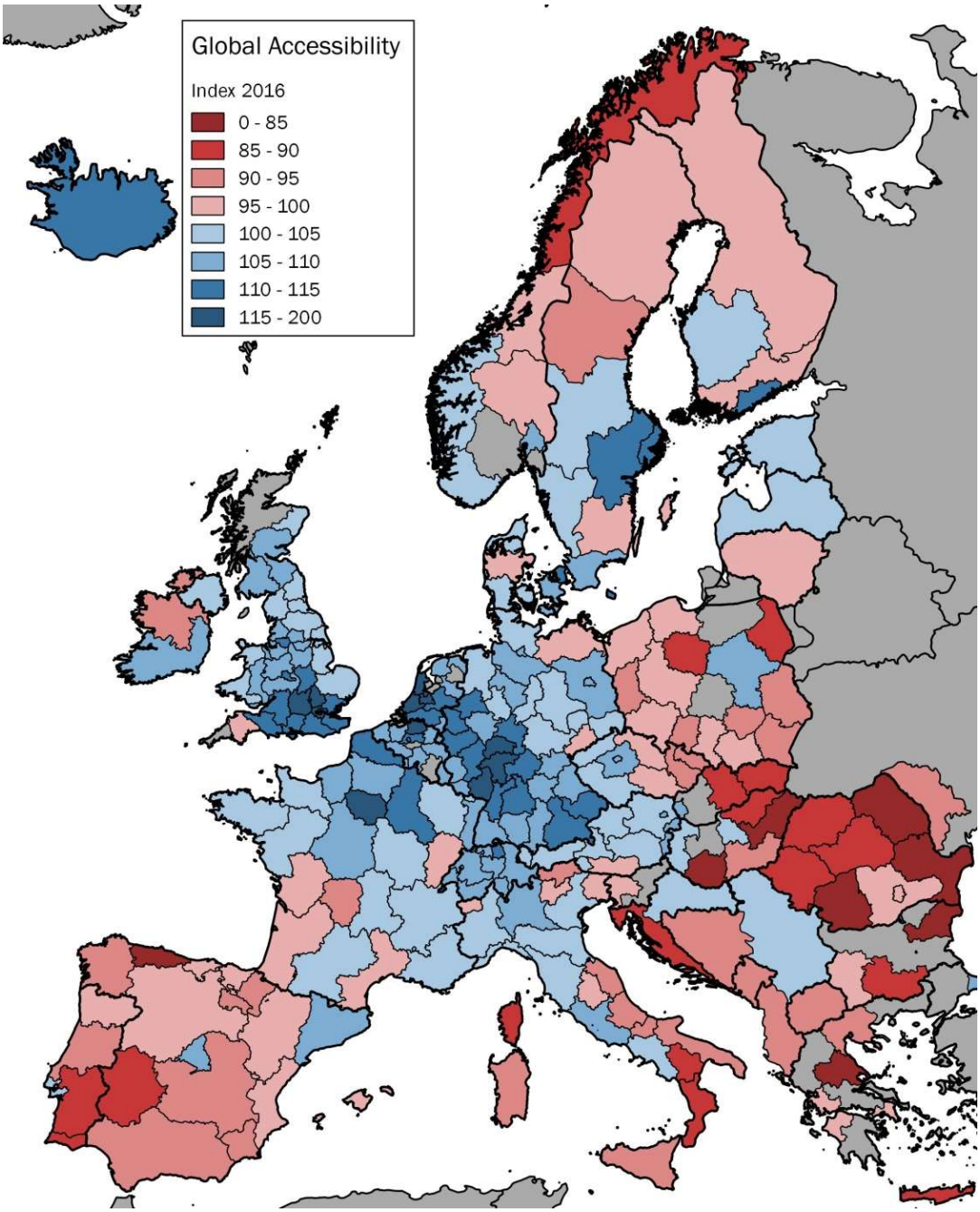
3.2.3. Global accessibility of Geneva and Switzerland

In Global accessibility, particularly locations close to one of the primary hub airports providing good connections to overseas have a better global accessibility. This is due to the fact that is global accessibility is solely based on air traffic – although intermodal traffic with other transport means (street, train) do play a role as well to access the airport. The importance of the primary hubs – in Europe London, Paris, Amsterdam and Frankfurt – is illustrated in the map in Figure 26. As in the continental model, accessibility peaks in the geographically centrally located regions from the Benelux countries to Western and Southern Germany. Self-potential has no impact on global accessibility, as destinations outside of Europe are considered only. Apart from these centrally located regions, only the cities with an international primary hub airport (London, Paris) have a high intercontinental accessibility score.

Geneva has a distinctly better than average global accessibility

As in the continental model, Geneva is in the best quarter of regions in the global accessibility model. It ranks 109th of all 414 European regions. Although losing some ranks in comparison to the continental index, Geneva still places quite high in the global index. This fairly good position is achieved even so Geneva is no primary hub itself and is not located close to a primary hub, too.

Figure 26: Global accessibility index 2016, Europe



100 = Average of all regions in the accessibility model 2002; classification of territorial units by NUTS-2; grey: not available in the accessibility model.

Figure TransSol, BAK Economics

Even so Geneva Airport is no primary hub in intercontinental traffic and provides a limited number of connects to destinations outside Europe only, it is by far the predominantly check-in airport for connections from Geneva to the 138 locations outside Europe which build the target destinations for the global accessibility model (see Figure 28). Only for two of the 138 destinations Geneva does not check-in at its own airport. Of course, in many cases this is a connecting flight only. But without Geneva Airport and the transport services offered travel times would be much longer.

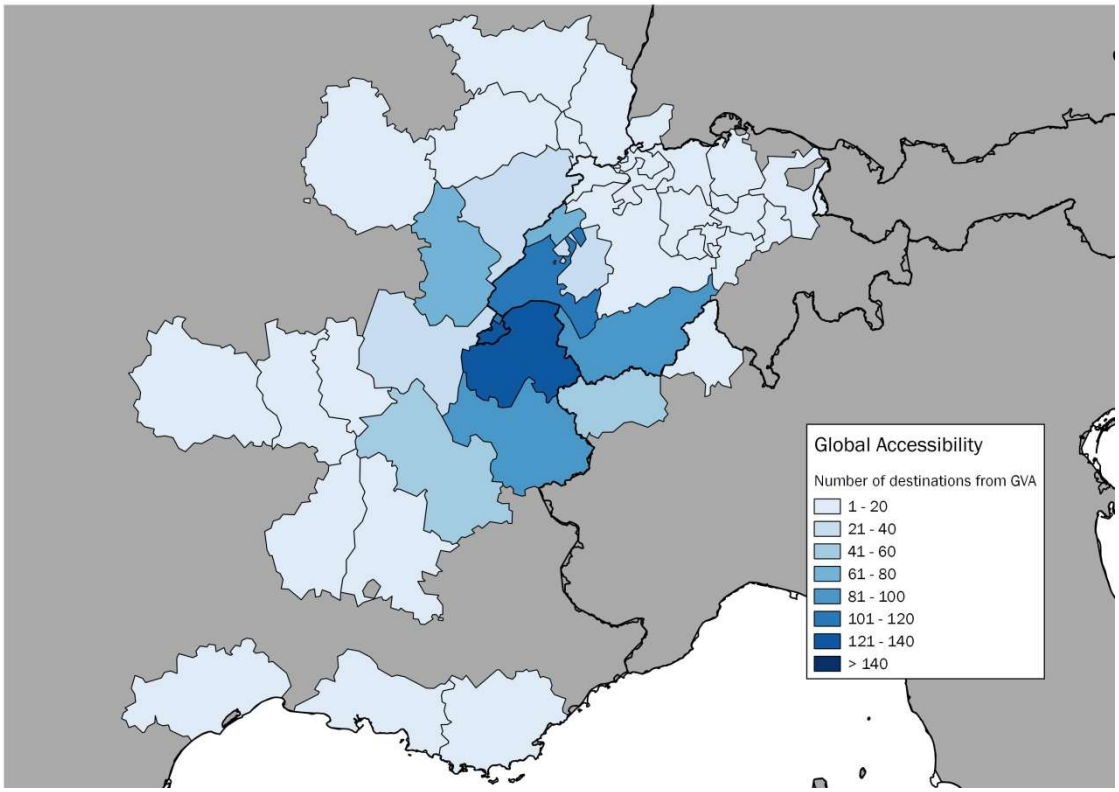
Swiss and foreign neighbour regions profit from Geneva Airport as well

It is not only Geneva but also its domestic and foreign adjacent regions which profit from Geneva Airport for their global accessibility. Figure 27 shows the importance of Geneva's Airport for Geneva and the surrounding region, within Switzerland as well as abroad. The darker the colourings, the more destinations outside of Europe are fastest reached via check-in at Geneva Airport. Apart from Geneva (136), Vaud (107) and Haute-Savoie (135) reach more than 100 of the 138 global destinations via check-in at Geneva Airport. Furthermore Valais, Savoie and Jura (FR) have more than half of their fastest connections starting in Geneva. Geneva is even check-in airport for St. Etienne and Lyon for 12 and 17 destinations respectively. Even regions in Italy, Eastern Switzerland and Germany as well as Liechtenstein have routes departing in Geneva.

Figure 28 and Figure 29 are another way to present this information, containing more details for selected regions. In the western parts of Switzerland, Geneva Airport is the most important check-in airport by far. Most of Lausanne's and Sion's fastest routes start in Geneva. Less dependent are Neuchâtel and Fribourg. But they still use Geneva Airport as their check-in airport for almost half of their fastest connections. For the rest of Switzerland, Zurich Airport is the predominant check-in airport for global connections. But even from Zurich, one destination's fastest route starts in Geneva. Note that the opposite is not the case: None of the two destinations which are reached faster by not checking in in Geneva Airport use Zurich as Check-in airport but rather Lyon.

Looking at foreign regions, Annecy, Chambéry, and the département of Jura profit the most from Geneva Airport. The shares of intercontinental flights departing in Geneva are 98.5, 78, and 64 percent. The sphere of influence also reaches Italy. A third of the flights from Aosta start in Geneva. And even from the southern French coast there are fastest routes using Geneva Airport.

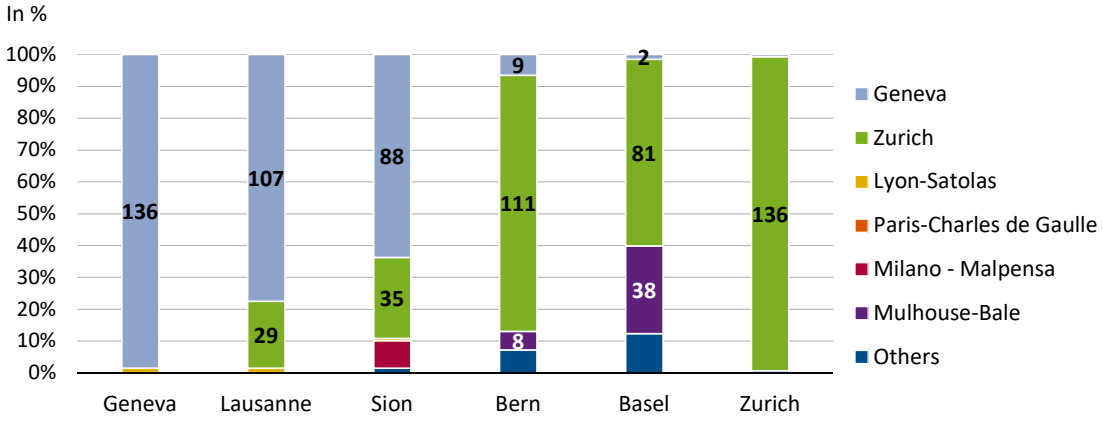
Figure 27: Geneva Airport as check-in airport for global flights



Number of destinations outside Europe, where Geneva Airport served as check-in airport; flight schedule on Monday; classification of territorial units by NUTS-3.

Figure TransSol, BAK Economics

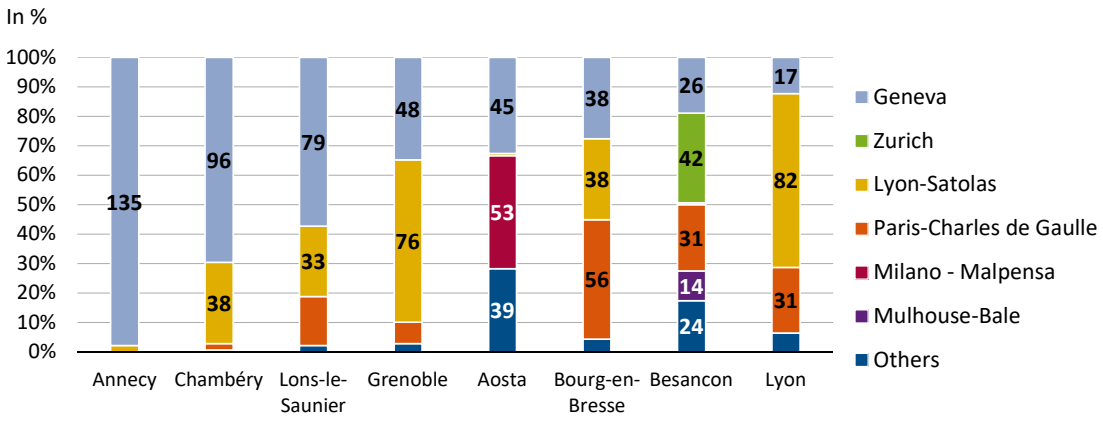
Figure 28: Check-in airports for global flights from Switzerland



Number of destinations outside Europe, where the mentioned airports served as check-in airport and provided the fastest accessibility; flight schedule on Monday

Figure TransSol, BAK Economics

Figure 29: Check-in airports for global flights from adjacent countries



Number of destinations outside Europe, where the mentioned airports served as check-in airport and provided the fastest accessibility; flight schedule on Monday

Figure TransSol, BAK Economics

3.2.4. Simulation “accessibility without Geneva Airport”

So far, the analysis focused on a description of the status quo. Although there are strong indications for the importance of Geneva Airport for the very well advanced accessibility of Geneva, it is not yet possible to make a quantitative statement about the importance of the airport for the accessibility.

One way to analysis this is the modal split, already presented for continental accessibility. Air traffic via Geneva Airport contributes 116 accessibility index points to a total of 136 points or 85 percent. Of course, if Geneva Airport were not available for traveling any more, this would not result in a loss of 116 index points. On the one hand many destinations affected would be reached via an alternative check-in airport. On the other hand some routes would be substituted by road or train (or a combination of all). This would in turn increase the index share of those modes. But as the attractiveness decreases with the time needed to reach a certain destination, the index value of these destination decreases too. Although some accessibility for Geneva would be lost, the loss will be much smaller than 116 index points due to the network properties of the transport system.

In order to estimate the effect of the airport, it is vital to set a counterfactual scenario against the status quo. This is achieved by a simulation in the accessibility model. All flights from and to Geneva were cancelled in the dataset of the year 2016. Afterwards the entire model is recalculated (continentally and globally). That means for each route in the model using one of the cancelled flights the model looks for the fastest replacement route, either by plane from another airport, by a different mode of travel (road or train), or by a combination of

them – depending on which is fastest. The accessibility index is recalculated for each region of origin using the alternative travel times.

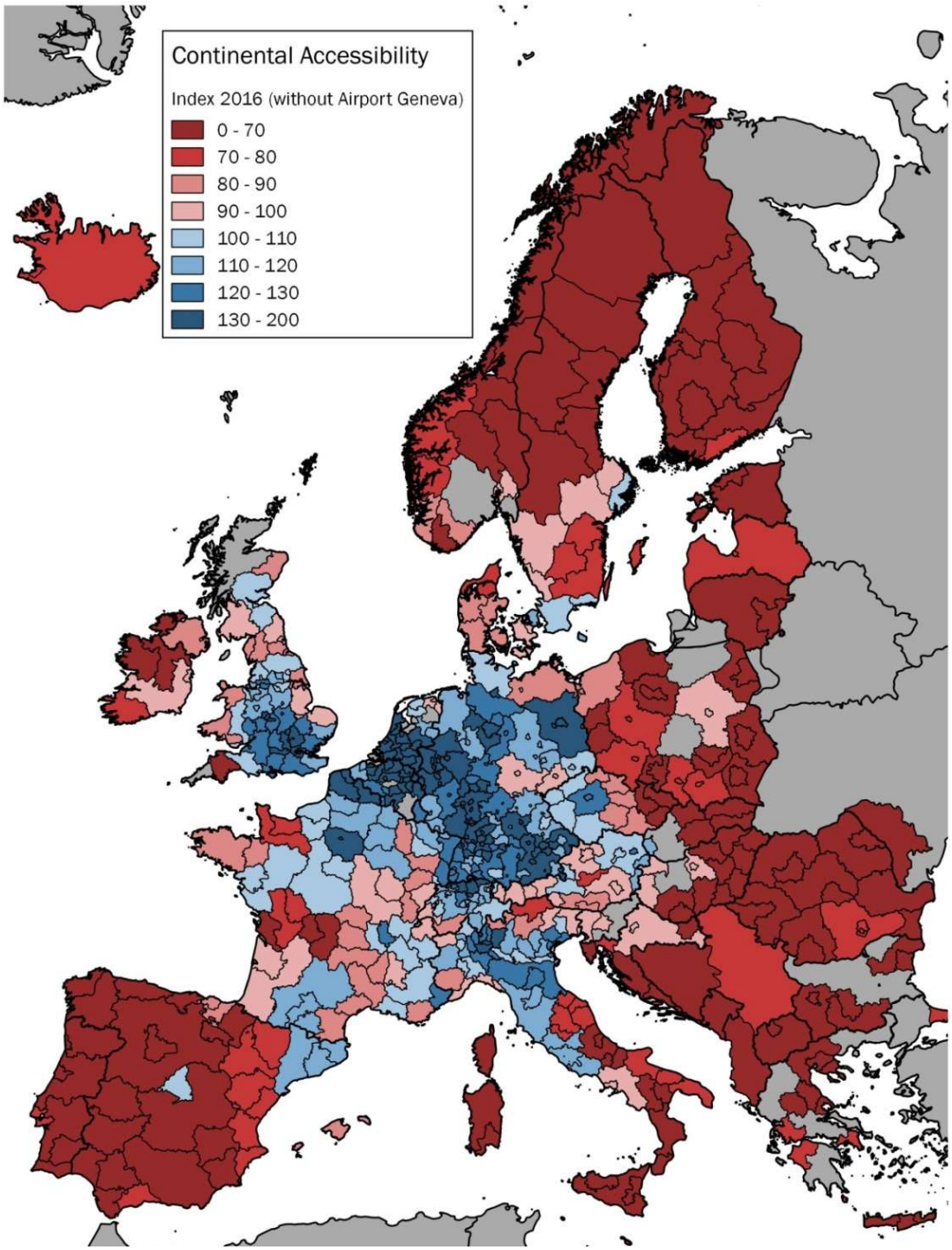
This simulation depicts an extreme, because no adjustments in the total transport system are allowed. It can be assumed that other check-in airports (e.g. Lyon) as well as railways would expand their offer. Such adaptations would moderate the loss in accessibility. At the same time such a loss in accessibility would weaken the growth outlook of the region and thus the inherent potential, as well as the incentives for investments in transport infrastructure. This would weaken the above-mentioned adaptation process in the long-run. Such dynamic processes cannot be quantified with the available resources. The results of the simulation show purely static effects and most probably overestimated the total long-run effect on accessibility somewhat. Still, it provides a quantified and confirmed counterfactual.

Continental accessibility without Geneva Airport

Figure 30 shows the indices of continental accessibility for the simulated scenario without Geneva Airport; Figure 31 shows a direct comparison of the maps presenting the index value in the reference scenario and in the simulation without the airport respectively.

Without Geneva Airport, Switzerland still mostly achieves an above-average continental accessibility. The only cantons that are affected strongly by this simulation are the cantons of Geneva, Vaud, and Valais. But Geneva for example loses substantially. In the continental accessibility ranking, Geneva drops 207 ranks and ends up in place 251, which is below the average of all European regions. In the national ranking too, the canton of Geneva is losing a lot of ranks. In the status quo, it is second within Switzerland after Zürich, but in the simulation the Canton of Geneva is third last, only followed by Vaud and Valais.

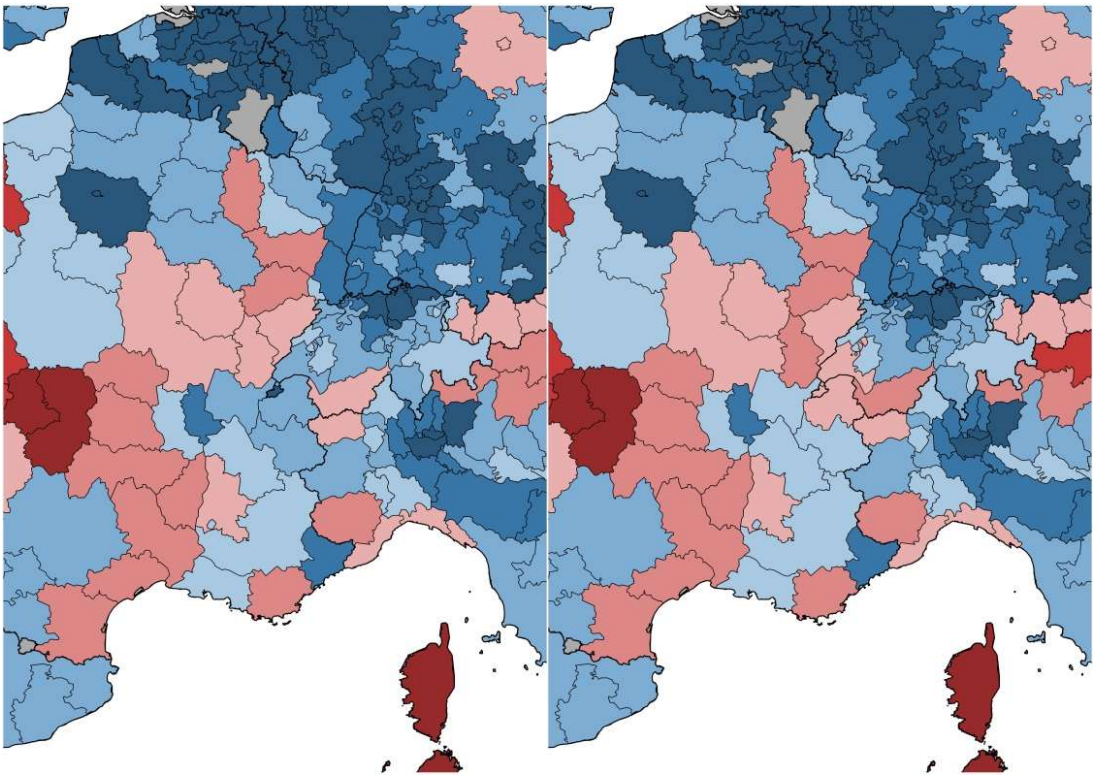
Figure 30: Scenario "without Geneva Airport": Continental accessibility 2016



100 = Average of all regions in the accessibility model 2002; classification of territorial units by NUTS-2; grey: not available in the accessibility model.

Figure TransSol, BAK Economics

Figure 31: Continental accessibility with and without Geneva Airport

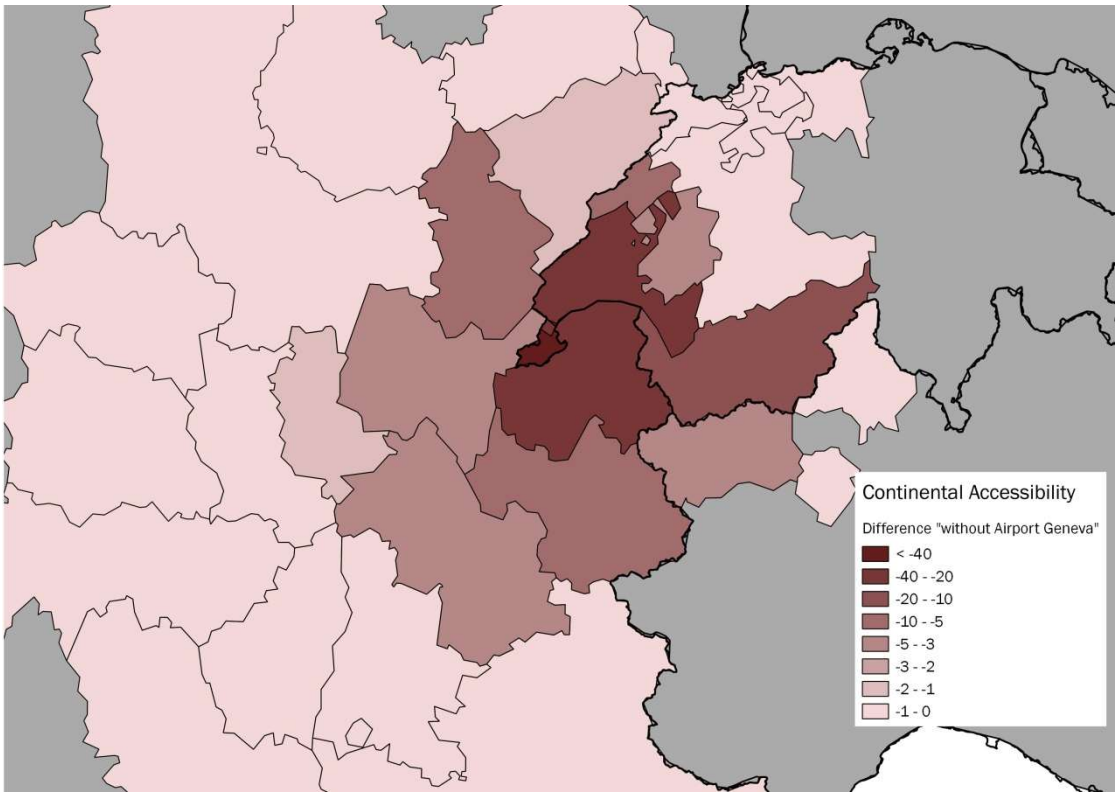


100 = Average of all regions in the accessibility model 2002; classification of territorial units by NUTS-2; grey: not available in the accessibility model; legend see Figure 30.

Figure TransSol, BAK Economics

The direct impact of a situation without Geneva Airport can be seen in Figure 32 where the loss of continental index points is displayed. Geneva would lose almost 43 continental index points or almost one third of its total points if it did not have its airport. The cantons of Vaud and Valais lose 26 and 14 index points each. This corresponds to an index point loss of over 20 percent and almost 15 percent respectively. Furthermore, Figure 32 also shows that not only Geneva, Vaud, and Valais are affected. Indeed, the negative impact reaches much further, and far wider into the French territories than into Switzerland. Already in Lucerne there is no negative impact anymore. This comes from the proximity of the Zurich Airport. It indicates that people who live close enough to Zurich do not rely on Geneva as a check-in airport for continental accessibility. But on the French side, even Lyon has a loss of continental index points of 1.2, even though it has its own major airport.

Figure 32: "Without Geneva Airport": Loss of continental index points



Classification of territorial units by NUTS-3.

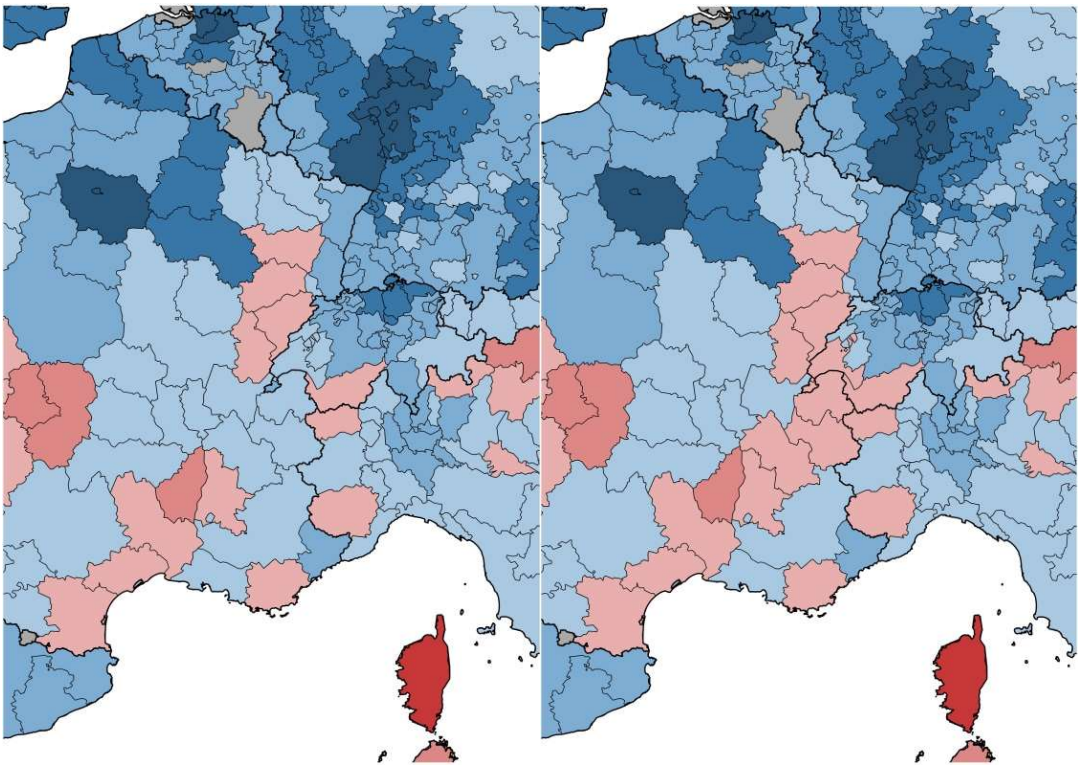
Figure TransSol, BAK Economics

Global accessibility without Geneva Airport

The comparison of global accessibility with and without the airport of Geneva provides a similarly devastating consequence for Geneva if Geneva Airport would not be available any more. The absence of the airport has an impact on an even larger number of regions, although in the case of global accessibility the larger losses of index points are more concentrated to regions close to Geneva Airport[14]. Still, in the global accessibility ranking Geneva loses "just" 186 ranks and ends up in place 295 out of 414 European regions.

[14] Note that a direct comparison of the number of index points lost in continental and global accessibility does not yield valid information. In global accessibility, the differences between the regions are small measured in index points. Therefore, a smaller loss of global index points can actually reflect a larger worsening of accessibility than in continental accessibility.

Figure 33: Global accessibility with and without Geneva Airport

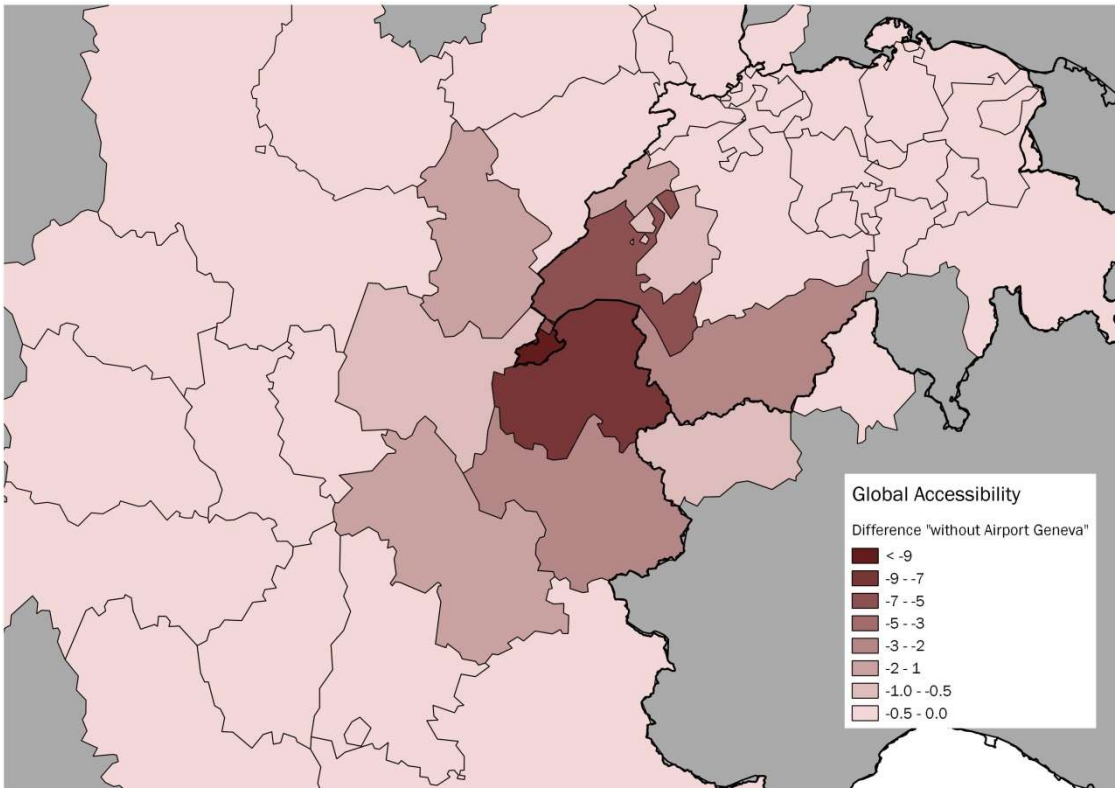


100 = Average of all regions in the accessibility model 2002; classification of territorial units by NUTS-2; grey: not available in the accessibility model; legend see Figure 30.

Figure TransSol, BAK Economics

Figure 34 shows a map with the losses of global index points. Without its airport, Geneva loses almost 10 points which is equivalent to an almost 10 percentage point loss of index points. This is much less than in the case of continental accessibility. Aside from the fact that continental accessibility has a much broader variation between regions, this indicates that Geneva Airport is more important in the continental context. Like in the continental model apart from Geneva the cantons Vaud and Valais are mostly affected. They have to cope with a loss of index points of 5.5 and 2.9 respectively. Neuchâtel has a loss of 1.2 points, all other cantons loose less than one index point. The administrative division of Rhône-Alpes again has the biggest loss in France.

Figure 34: "Without Geneva Airport": Loss of global index points



Classification of territorial units by NUTS-3.

Figure TransSol, BAK Economics

Illustration of the consequences of accessibility losses

With the help of the isochrones (see Box 5), the index points as they were discussed above can be translated into travel time and reachable potential. While the index points and the corresponding rankings of European regions are well suited to show the change of position in the international competition of regions, the isochrones provide a better illustration of the consequences for Geneva as a business hub.

Isochrones provide the information, how much of European economic power can be reached in a given travel time. For example, half of European GDP (51.5%) can be reached within a travel time of four hours or less (point A in Figure 35). Geneva's isochrone is in the status quo among the highest ones of the selected locations. Edinburgh is always lower than Geneva, while Hamburg and Prague are sometimes above or below it, depending on the travel time. A higher position of Geneva's isochrones means that from Geneva a higher share of European economic potential can be reached in the same time frame as from the benchmarking locations.

The isochrone for Geneva is shifted to the right substantially in the scenario without Geneva Airport. This makes it possible to quantify the time and potential loss. As already stated, in the status quo, more than half (51.5%) of the European GDP can be reached within a travel time of four hours (point A in Figure 35). If Geneva Airport were not there, the potential which could be reached within the same travel time shrinks to 16.9 percent of European GDP (point C). This is a dramatic decrease.

Note that the travel time of 4 hours in the example above was not chosen randomly. The accessibility model values the different travel times continuously. But for a typical business trip, around four hours might be something like a turning point: This travel time is about the maximum amount of time a journey can take in order to be able to carry out a business trip within one day. If Geneva Airport were not there, the potential which could be reached within one day would shrink from half the European GDP to just 16.9 percent.

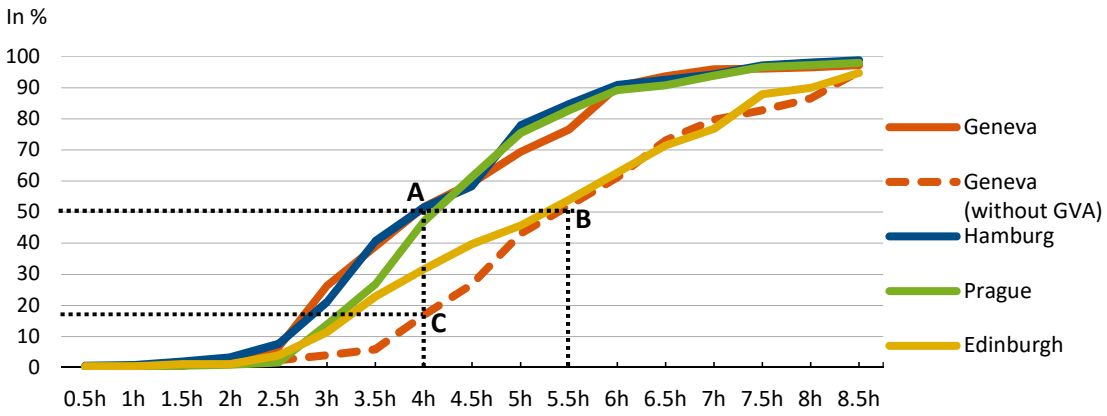
The isochrones also allow a different perspective: In four hours, you can reach half of Europe's GDP from Geneva. To reach the same potential without the airport a travel time up to five and a half hours (one way) has to be accepted without Geneva Airport (point B).

Box 5 Isochrones

Isochrones[15] are curves on a map that show all destinations from where you need the same travel time to reach a specific place of origin. They are usually depicted on a map (like for example contour lines). BAK Economics' accessibility model also incorporates the accessible potential (normally the gross domestic product). Therefore, the chosen representation (line chart) shows the share of the European total gross domestic product (y-axis) that is reached within a certain amount of time (x-axis). The higher a curve lies on the diagram, the more potential is accessible per unit of time or the faster a certain amount of potential is accessible, respectively.

[15] From Greek iso = same and chronos = time

Figure 35: Isochrones of continental travel times

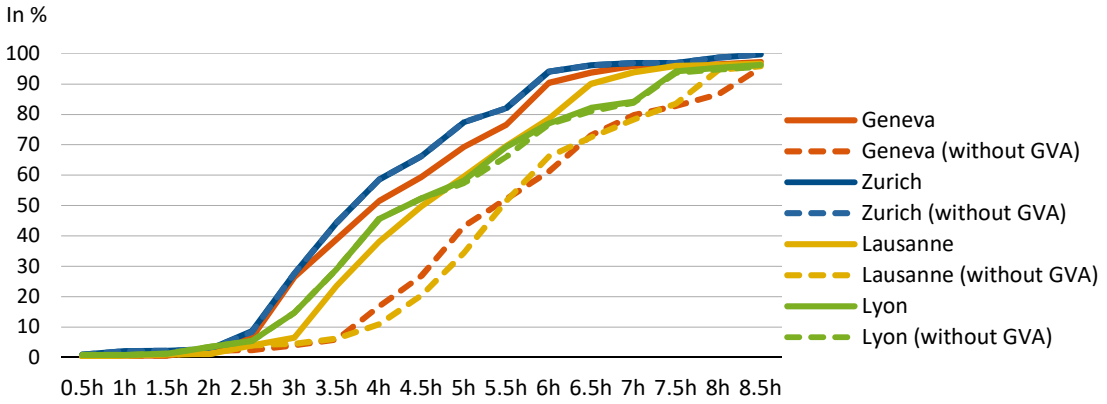


Percentage share of European GDP that is reached within x hours (time slot 5.30am to 9am on weekdays)

Figure TransSol, BAK Economics

In the national comparison, the continental index point loss can also be seen for other Swiss locations (see Figure 36). Zurich's isochrone is not affected though. Lausanne has a remarkably lower isochrone compared to the status quo. Interestingly, the deviation to the status quo only begins after 2.5 hours of travel time. Smaller distances with shorter travel times are not affected by the cancellation of Geneva Airport. Journeys with shorter travel times are made by train or on the streets because the time to reach the airport alone is over 30 minutes and therefore makes the plane not attractive anymore for these short distances.

Figure 36: Isochrones of continental travel times



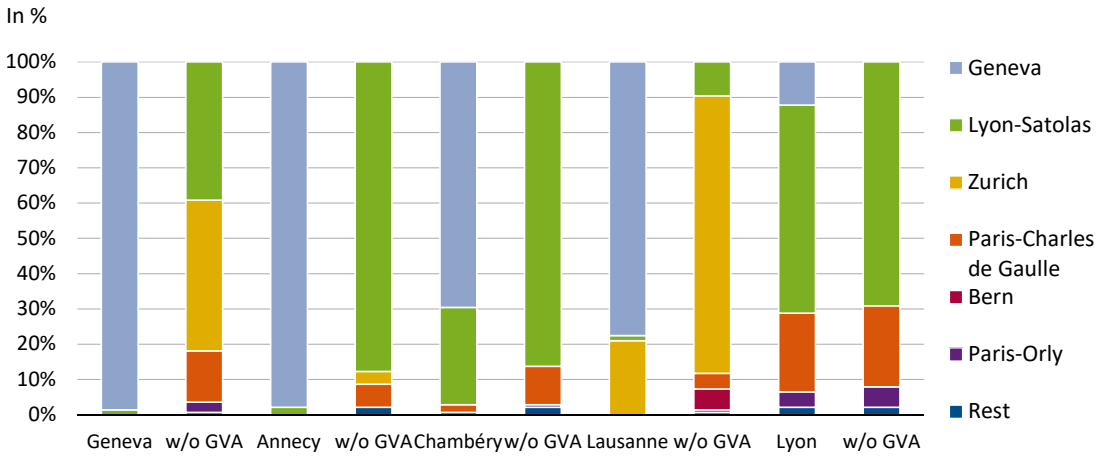
Percentage share of European GDP that is reached within x hours (time slot 5.30am to 9am on weekdays)

Figure TransSol, BAK Economics

1,910 of the 112,000 connections in the continental model in the reference scenario take place over Geneva Airport. In the scenario without the airport, the bulk of the connections are replaced by routes over other airports (97.8%). Only 1.3 percent of the routes would be replaced by train and 0.9 percent by a connection using roads. The airport which would profit most from the lack of Geneva Airport would be Lyon-Satolas. 30 percent of the new routes in this scenario would use Lyon as a check-in airport. 16.7 percent of them would use Zurich, 3.5 percent Bern, and only 3.3 percent Basel-Mulhouse.

Figure 37 shows which alternative check-in airports would benefit for global flights if the airport of Geneva did not exist. Depending if the departure location is in France or Switzerland either Lyon or Zurich would benefit from the missing airport in Geneva. Passengers from Annecy and Chambéry – which are in France – would mostly substitute their flights from Geneva with flights leaving from Lyon and some with flights from Paris-Charles de Gaulle. Passengers from Lausanne would mostly substitute their flights from Geneva with flights from Zurich. In the reference scenario passengers from Geneva use Geneva Airport as check-in airport to reach 136 destinations outside Europe and only use the airport of Lyon-Satolas for 2 destinations. But if their airport did not exist they would use Zurich in 59 cases as their check-in airport, for 54 destinations Lyon, for 20 destinations Paris-Charles de Gaulle, and only for one destination Milan. It is interesting to see that Basel-Mulhouse would almost not benefit from the lack of airport in Geneva.

Figure 37: Check-in airports for global flights



Number of destinations outside Europe, where the mentioned airports served as check-in airport providing the fastest route; flight schedule on Monday

Figure TransSol, BAK Economics

3.3. Conclusion

Airports provide their users with important services such as transportation and connections to the world. From the perspective of a region the services provided by the airports lead to an important location factor: accessibility. Regions need to be well accessible as they need to be attractive for companies: in questionnaires of companies assigning the quality of a location, accessibility regularly results as one of the most important factors regarding relocation decisions. Accessibility is an important location factor for businesses.

Accessibility is not only relevant because of its direct advantages for businesses. It is also an important factor for the population's quality of life, especially in a society that is becoming ever more mobile. Particularly for expatriates and for the so called "high potentials", which get ever more important in regional competition, accessibility is a regional asset.

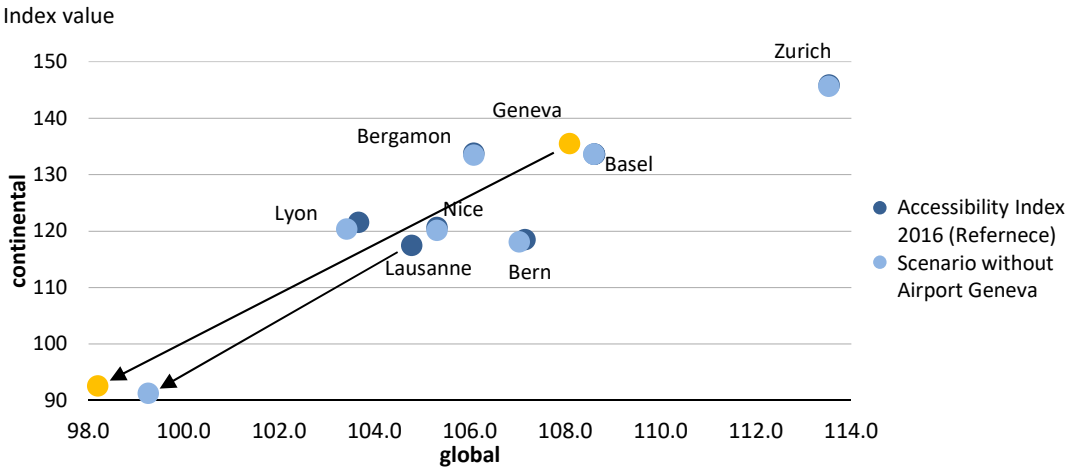
Empirical studies confirm the importance of accessibility. Furthermore, studies dealing with industry specific effects show that especially the high-tech industries such as Life Sciences and the knowledge-based services such as the financial sector or the consulting services profit highly from accessibility. Not only are those industries more productive and more innovative than the average economy, but they are central for the Geneva economy. Therefore, these industries are crucial for future growth and to ensure the high level of wealth. A well-developed accessibility contributes to the medium to long-term economic success. Therefore, an active and attractive location policy is well advised to take care of the location factor accessibility – generally but even more so in the case of Geneva.

Geneva has a very good level of accessibility today, according to the BAK accessibility model. This is true for its continental accessibility which measures the access to other European regions as well as the global accessibility reflecting the connections to destinations outside Europe. Out of 411 European regions analysed, the Canton of Geneva ranks 44th regarding continental accessibility and achieves rank 109 in global accessibility. Within Switzerland, only the cities of Zürich and Winterthur perform better. Internationally, in a sample of competing regions, Geneva shows the best accessibility in nearly all cases.

Geneva Airport contributes a great deal to this affirmative result. From all 136 index points Geneva achieves in the European model, 116 index points or 85 percent are due to connections via the Geneva Airport. Globally, only two of the 138 destinations are faster reached by a check-in airport which is not Geneva Airport. The Geneva Airport is the central knot in the transportation network guaranteeing the very good accessibility of Geneva. It is noteworthy that in Geneva, the essential importance of the airport in the transportation network is higher than for the majority for the regions analysis: connections via the Geneva Airport contribute a higher share of accessibility index points and provide more connections as in other regions, even as in Zürich.

But Geneva Airport is not only important for Geneva. The accessibility provided by the airport is crucial for a much larger geographical area. This is true for the cantons of Vaud and Valais, but even for locations such as Berne, Geneva Airport makes them more accessible. Neighbouring foreign regions such as Haute-Savoie, Savoie, and Jura (FR) profit from the airport as well. This is illustrated by the check-in airport for global connections: Of the 138 destinations travellers from Haute-Savoie use in 135 cases Geneva Airport. More than half of the fastest global connections for Savoie and Jura (FR) are starting in Geneva, while actually for St. Etienne and Lyon this figure is 12 and 17 destinations respectively. Even regions in Italy, Eastern Switzerland and Germany as well as Liechtenstein have routes departing in Geneva.

Figure 38: Accessibility index with and without Geneva Airport (2002 = 100)



100 = Average of all regions in the accessibility model 2002

Figure TransSol, BAK Economics

The advantageous position of Geneva and all the surrounding regions regarding accessibility should not be taken for granted. As a simulation without Geneva Airport shows, they would fall back substantially. Geneva loses 207 ranks in continental accessibility and ends up in place 251 of the 414 European regions. In the global context it loses “just” 186 ranks and ends up in place 295 in Europe. Even more, almost all its competitors in the international location completion amongst regions would overtake Geneva in this case.

4. Module III: Economic Importance of Geneva Airport on incoming tourism in Switzerland

The following section focusses on the quantitative importance of Geneva Airport for tourism both in the Canton of Geneva and in Switzerland as a whole. In particular, it is shown how many foreign visitors enter Switzerland via Geneva Airport, both in absolute numbers and in relation to the total number of tourist arrivals. Furthermore, the revenue that is generated by foreign overnight guests entering Switzerland via Geneva Airport is assessed.

4.1. Methodological Approach

In order to assess the economic importance of Geneva Airport for Switzerland and the Canton of Geneva, in a first step the number of foreign visitors entering Switzerland via Geneva Airport must be estimated. This estimation is done using a triangulation of three different sources of data: The passenger statistics of Geneva Airport, the Swiss tourist accommodation statistics and the Tourism Monitor Switzerland. Furthermore, to asses monetary aspects Tourism Balance of Payments and Tourism Satellite Accounts are exploited as well.

4.1.1. Passenger statistics of Geneva Airport

For the evaluation of the importance of the Geneva Airport for tourism, transfer and transit passengers are of no interest. Furthermore, to exclude double counting, the focus is on arriving passengers excluding transfer/transit. Departing passengers are not taken into account, even though some particular departures might be relevant, namely those of persons on a round trip who did not arrive via Geneva Airport but departed from there. This group of tourists cannot be numbered here, but it can be assumed that their share is rather small.

But not all arriving passengers with final destination at Geneva Airport are relevant for tourism. Passengers might just as well live in Switzerland or in the neighbouring foreign regions i.e. in the airport's catchment area, returning from a trip. Subsequently, it is estimated which share of the arrivals stems from those persons rather than from incoming tourists. The aim of this step is to estimate the number of foreign visitors arriving at Geneva Airport.

4.1.2. Swiss tourist accommodation statistics (hesta)

The tourist accommodation statistics of the Swiss Federal Statistical Office gathers data of foreign visitors as a whole. The hesta allows for analysing the number of arrivals, overnight stays and the length of stays segmented by the visitors' country of residence. But the hesta does only contain complete data on guests in hotels and spa facilities. Other accommodation like camping, group accommodation, holiday apartments, youth hostels etc. are not included.

Therefore, this information needs to be estimated based on information gathered from the Tourism Monitor Switzerland (see below).

4.1.3. Tourism Monitor Switzerland (TMS)

The third important source of information is the Tourism Monitor Switzerland (TMS). The TMS data is based on a national representative survey of the marketing organisation Swiss Tourism (ST). At the time of creating this report, the last survey was conducted in winter 2012/2013 and summer 2013 at 180 Swiss destinations. About 14,000 tourists participated. The results are available for 31 markets of origin. Among other things, the participants have been asked about their accommodation, their travel and spending behaviour, the means of transport used to enter Switzerland and, in case they came by plane, about the airport of arrival. This alternative source for information on the means of transport for arrival in Switzerland does not significantly differ from the picture given in the passenger statistics of Swiss airports on the aggregated level. Hence, it can be assumed that an analysis of the TMS yields plausible results and that the detailed information of the TMS can be used in the analyses.

Another purpose of using the TMS is the estimation of arrivals and overnight stays in non-hotel accommodation, already mentioned above. The participants of the TMS-survey are asked about their chosen type of accommodation. Therefore, the TMS contains the share of guests who chose to stay in non-hotel accommodation. This information is given for all markets of origin and for all Swiss tourism regions separately, as long as the sample size is sufficient. In the combination of these shares and the information on arrivals respectively overnight stays derived from hesta, the number of arrivals and overnight stays in non-hotel accommodation can be estimated.

Furthermore, the TMS data concerning spending behaviour is used to estimate the revenue which stems from foreign guests arriving in Switzerland at Geneva Airport. This is done by multiplying the daily expenses of foreign guests with the number of overnight stays for each market of origin and type of accommodation. The revenue that is estimated this way can subsequently be compared with the total revenue of foreign guests. The extrapolation is conducted in the following process steps:

- Creation of a matrix containing the daily expenses for each market of origin and type of accommodation.
- The Tourism Balance of Payments (see below) is used in order to normalize the daily expenses for each market of origin and each type of accommodation. This is done to ensure that the total revenue generated by foreign overnight guests in Switzerland equals the corresponding value in the Tourism Balance of Payments (see below), as the later one is consid-

ered more reliable than the TMS which covers only a sample and is based on voluntary questionnaires.

- Calculation of the number of overnight stays for each market of origin and type of accommodation.
- Extrapolation of the revenue stemming from foreign guests for each market of origin and type of accommodation.
- Analysis of the tourism balance of payments and the tourism satellite accounts (see below) which are created by the Swiss Federal Statistical Office in order to assess the total touristic revenue of foreign guests in Switzerland.

4.1.4. Tourism Balance of Payments and Tourism Satellite Accounts

For monetary aspects of tourism further sources are exploited. The Swiss Federal Statistical Office offers several statistics concerning the revenue generated by tourists and their demand for goods and services. Within this study, the following monetary statistics are used:

- Tourism Balance of Payments (TBP): The TBP includes data concerning the tourism revenue generated by foreign guests in Switzerland. The latest data refers to the year 2016. The TBP distinguishes between overnight guests, day tourists and cross border commuters. It can be assumed that the TBP data concerning tourism revenue on an aggregated level is more accurate than the corresponding TMS results which are determined by tourist interviews.
- Tourism Satellite Accounts (TSA): The TSA contains data concerning touristic demand of foreign guests in Switzerland. Within this study, it is used in order to get an estimate for the travel costs of foreign overnight guests. The latest data available refers to 2011. Hence, the travel costs for 2016 have to be estimated. This is done by updating the data based on the price index for flight services and the development of the number of passengers.

4.2. Foreign guests arriving at Geneva Airport

4.2.1. Estimation of the Number of incoming tourists based on passenger statistics

In order to estimate the number of foreign guests which enter Switzerland via Geneva Airport, the passenger statistics are analysed as a first step[16]. This allows for insights into the total number of arrivals, as well as the place of departure of passengers and the market share of airlines.

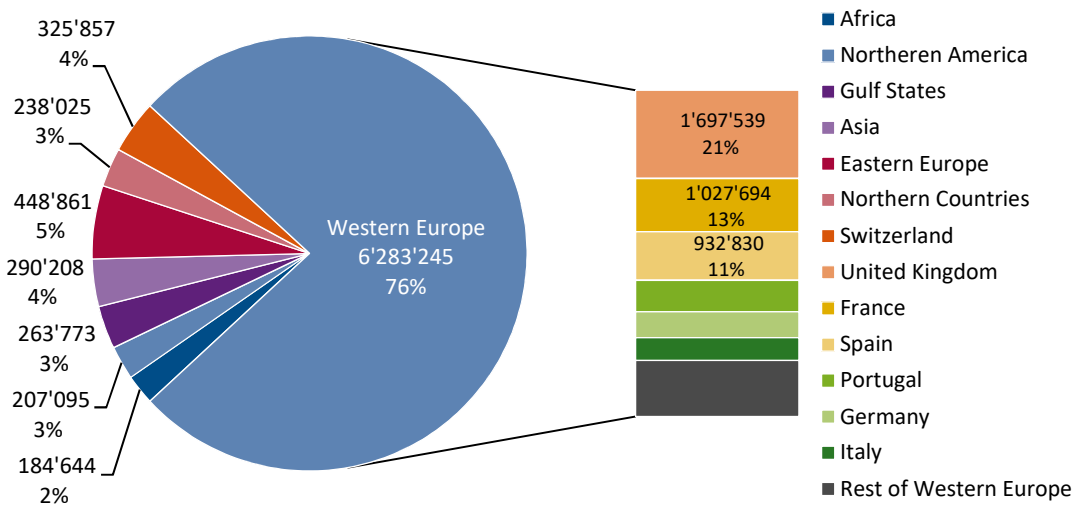
In 2016, more than 8.2 million passengers arrived at Geneva Airport. The passenger statistics reveal that about three-quarters of these came from an airport within Western Europe. This illustrates the focus on inner-European connections of Geneva Airport. 37 percent or 3.0

[16] See also Genève Aéroport (2016): Annual Report 2016

million of these 8.2 million passengers depart in the Romanic countries France, Italy, Spain or Portugal. Flights from the UK account for 1.7 million arriving passengers or 21 percent of all arriving passengers. This might be partially explained by a high number of business tourists, for instance due to the internationally closely linked financial sector and the high number of international organizations and companies based in Geneva.

Long-haul destinations are less important, since Zurich Airport offers more long-distance connections than Geneva. Nevertheless, 11.5 percent of all incoming passengers (0.9m passengers) came from Africa, Asia, the Gulf States or North America. In particular, the number of passengers coming from the Gulf States has grown rapidly in recent years.

Figure 39: Arrivals at Geneva Airport by region of departure

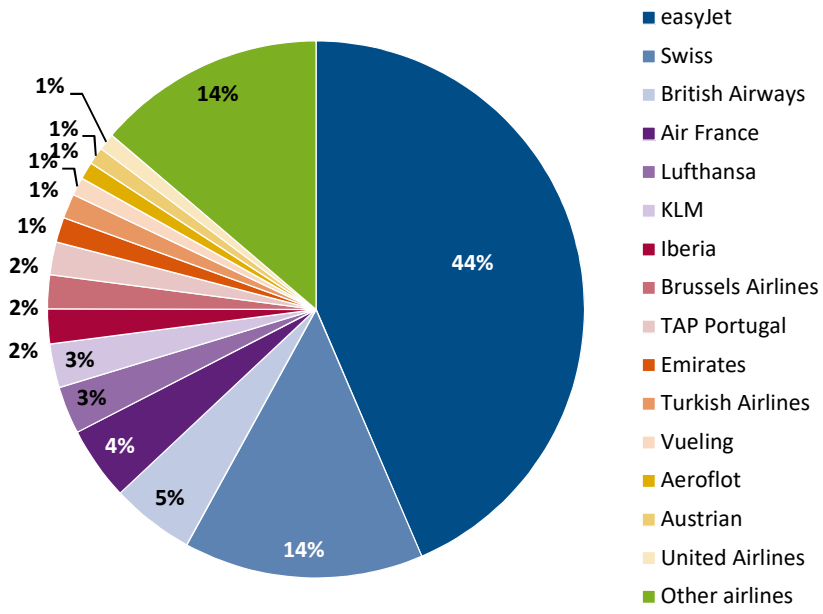


Passenger arrivals by region of departure, total number and. in %

Figure Genève Aéroport, BAK Economics

A look at the number of passenger movements by airline illustrates the strong presence of easyJet at Geneva Airport. The carrier operates in Switzerland mainly from Geneva Airport and the EuroAirport Basel Mulhouse Freiburg. 44 percent of all passengers took an easyJet flight. Swiss, which is by far the largest carrier in Zurich, only accounts for 14 percent of all passenger movements in Geneva. A variety of carriers share the remaining 42 percent. Among them are British Airways (5%), Air France (4%), Lufthansa (3%), KLM (3%) and Iberia (2%).

Figure 40: Passenger movements at Geneva Airport by airline



Passenger movements by airline in %

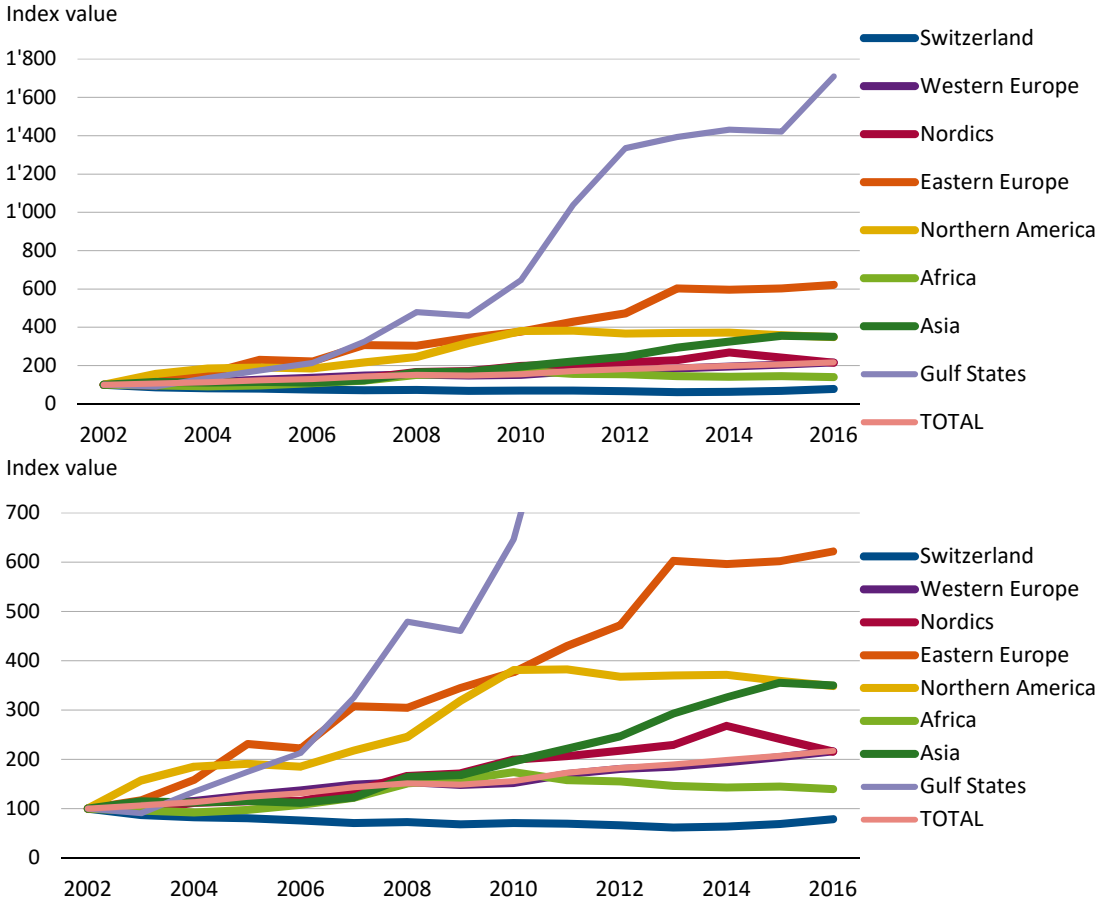
Genève Aéroport, BAK Economics

4.2.2. Development of passenger movements at Geneva Airport

In 2016, the number of passengers arriving at Geneva Airport was more than twice as high as in 2002 (see Figure 41). In particular, arrivals from the Gulf States rocketed and grew seventeen-fold. One reason for this finding might be the expansion strategy of many Gulf carriers in recent years.

However, the growth of arrivals stems from all markets of origin except for Switzerland. The number of passengers arriving from Eastern Europe increased six fold. Arrivals from North America and Asia were three and a half times as high as in 2002 and arrivals from Western Europe and the Nordics have more than doubled.

Figure 41: Development of arrivals at Geneva Airport by market of origin



2002 – 2016; indexed: 2002 = 100

Figure Genève Aéroport

4.2.3. Arrivals of incoming tourists at Geneva Airport

As mentioned, more than 8.2 million passengers arrived at Geneva Airport in 2016. However, this figure cannot be equated with the number of arrivals of incoming tourists who enter Switzerland via Geneva Airport. The importance of an airport for tourism depends on the latter though. In order to estimate the number of incoming tourists arriving at Geneva Airport, only passengers who do not live in the catchment area of the airport may be taken into account.

Geneva Airport determines the share of passengers living outside of the catchment area by conducting passenger interviews. In 2016, 50 percent of all arriving passengers were not living in the catchment area. Hence, 4.1 million incoming tourists arrived at Geneva Airport in 2016. This is equivalent to 11,000 incoming tourists per day.

4.3. Overnight stays of tourists in the Canton of Geneva and Switzerland

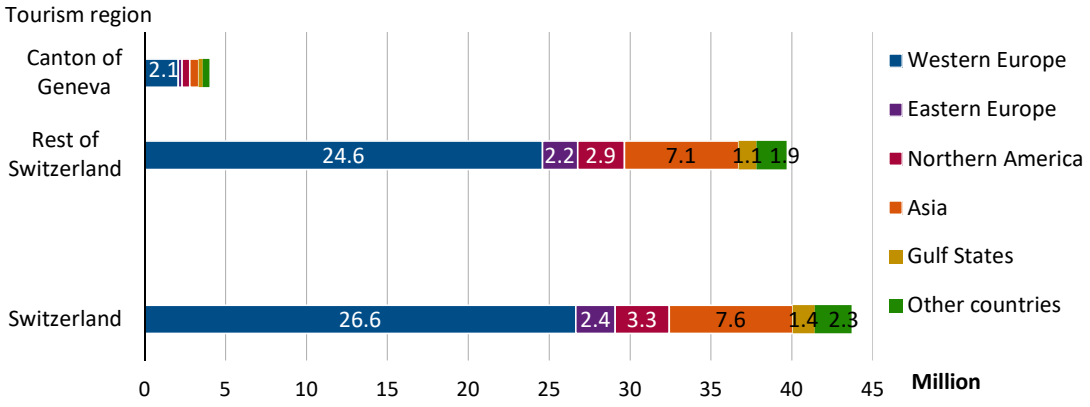
Based on the analysis of the preceding section, we obtained the number of foreign guests who entered Switzerland via Geneva Airport. In order to interpret this number, it is helpful to compare it to the number of all foreign guests. Therefore, the following focusses on the total number of all arrivals and overnight stays of foreign guests in 2016, regardless of their travel mode. Furthermore, it differentiates between the Canton of Geneva and the rest of Switzerland. This allows for revealing differences regarding the development of tourism in Geneva and Switzerland.

The tourist accommodation statistics (hesta) contains precise data for arrivals and overnight stays of foreign guests in hotels and spa facilities[17]. Combining this data with the TMS results yields the total number of arrivals and overnight stays, including non-hotel accommodation. Overall, 45 percent of all overnight stays in Switzerland took place in hotels and spa facilities, while non-hotel accommodation accounted for 55 percent in 2016 (see Figure 45).

In 2016, a total of 43.7 overnight stays can be assigned to foreign guests in Switzerland (see Figure 42). About every tenth of these guest nights took place in the Canton of Geneva. By far the most important market of origin is Western Europe, both in the Canton of Geneva (52 percent of all overnight stays) and to even larger extent in the rest of Switzerland (62 percent). It is notable that the share of guests from the UK of all Western European guests is much higher in the Canton of Geneva than it is in the rest of Switzerland (see Figure 44). This finding is consistent with the high share of British passengers (see Figure 38) and may be explained by the fact that a variety of international organisations and companies is based in Geneva, as well as traditionally strong linkages. The high share of guests coming from France is hardly surprising. German guests, on the contrary, who constitute the biggest single group of foreign tourists in Switzerland as a whole, account for only 10 percent of all Western European guests in the Canton of Geneva.

[17] The tourist accommodation statistics only include robust data for these two categories. However, there are other types of accommodation whose economic importance should not be underrated: camping sites, group accommodation, youth hostels, rented and owned holiday apartments or accommodation provided by friends or relatives. These are estimated based on the TMS.

Figure 42: Number of overnight stays by market of origin 2016 – in million

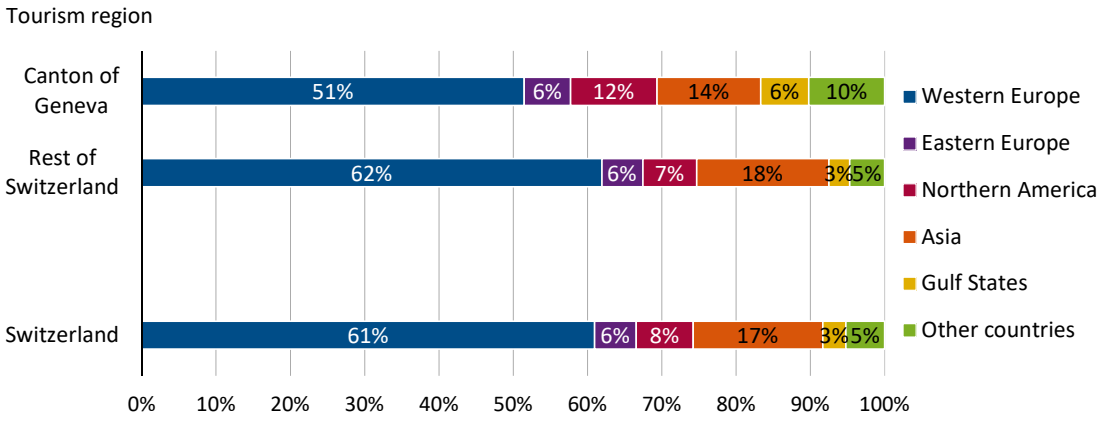


2016, number of overnight stays by foreign guests in million

Figure Hesta, TMS, calculations BAK Economics

Guests coming from other destinations than Western Europe account for a little less than half of all overnight stays in the Canton of Geneva (48%) or 38 percent in the rest of Switzerland (see Figure 43). The biggest group of non-Europeans are Asian tourists, who more often travel on leisure and tend to prefer round travels and rural regions over cities in general. This is illustrated by the significantly higher share of overnight stays of Asian guests in the rest of Switzerland (17 percent) than in the Canton of Geneva (12%). The exact opposite holds for guests from North America and the Gulf States: they account for a higher share of guest nights in Geneva (North America: 11%; Gulf States: 7%) than in the rest of Switzerland (7% and 3%, respectively).

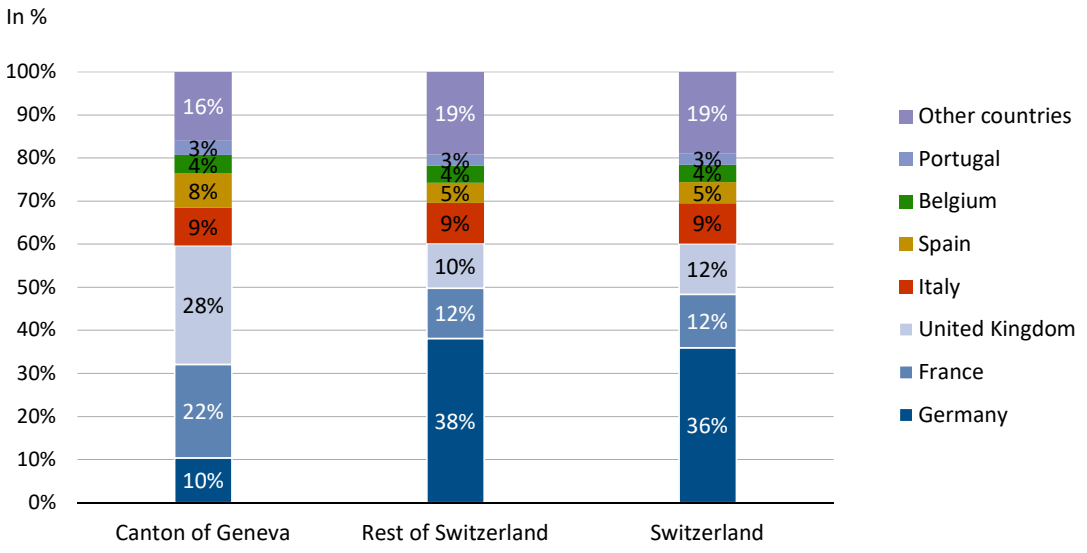
Figure 43: Share of overnight stays by market of origin 2016 – in %.



2016, share of overnight stays by market of origin in %

Figure Hesta, TMS, calculations BAK Economics

Figure 44: Country of origin of Western European guests by tourism region 2016 – in %.



2016, share of country of origin of Western European guests by tourism region in %

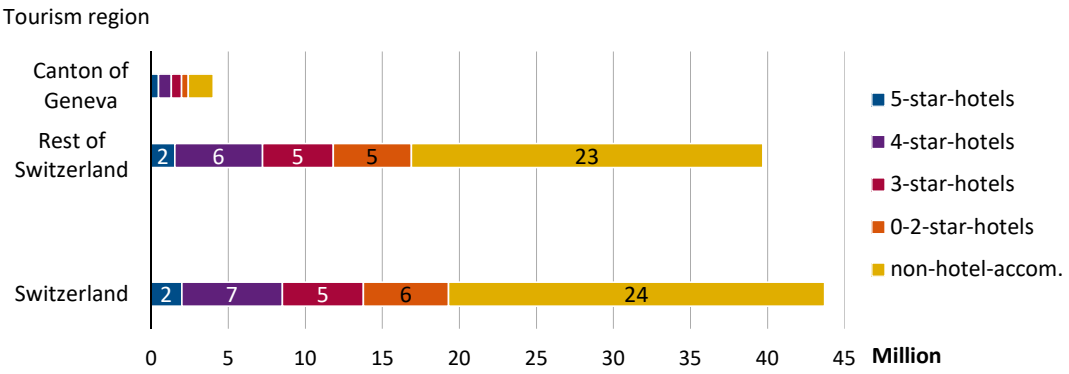
Figure Hesta, TMS, calculations BAK Economics

It is also of interest to study the number of overnight stays segmented by the type of accommodation. The accommodation chosen by guests is an important indicator for their purchasing power[18]. The comparison of the Canton of Geneva and the rest of Switzerland yields significant differences: 32 percent of all overnight stays by foreign guests visiting Geneva take place in four or five-star Hotels, while this share is only 18 percent in the rest of Switzerland. The considerably higher significance of the first-class hotel segment can be considered as favourable for the Canton of Geneva, since it indicates more prosperous guests and thus higher touristic revenues.

Overall, the share of guest nights in hotels is much higher in the Canton of Geneva (60 percent) than in the rest of Switzerland (43 percent). Since guest nights in non-hotel accommodation generate lower revenue than guest nights in hotels, this finding is advantageous for the Canton of Geneva as well.

[18] This fact will also be applied later in the analysis in the estimation of monetary importance of the tourists entering Switzerland via Genève Aéroport.

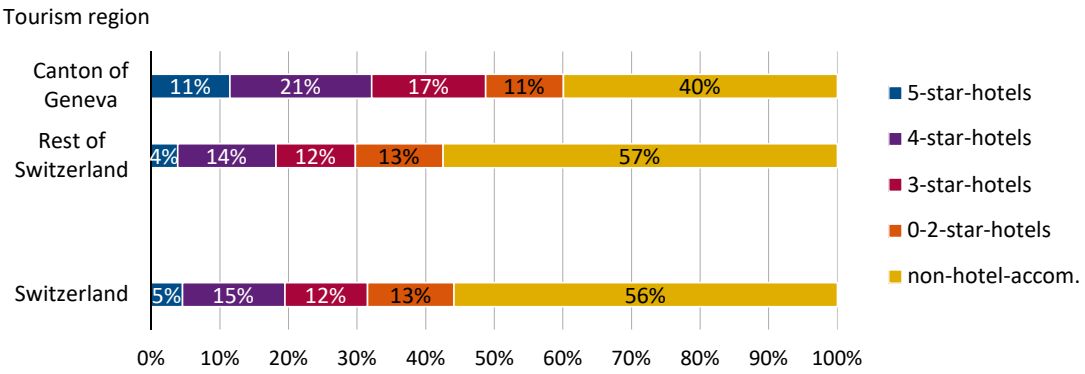
Figure 45: Number of overnight stays by type of accommodation 2016 – in million



2016, number of overnight stays of foreign guests by type of accommodation in million

Figure Hesta, TMS, calculations BAK Economics

Figure 46: Structure of overnight stays by type of accommodation 2016 – in %



2016, share of overnight stays of foreign guests by type of accommodation in %

Figure Hesta, TMS, calculations BAK Economics

4.3.1. Development of tourism in the Canton of Geneva and Switzerland

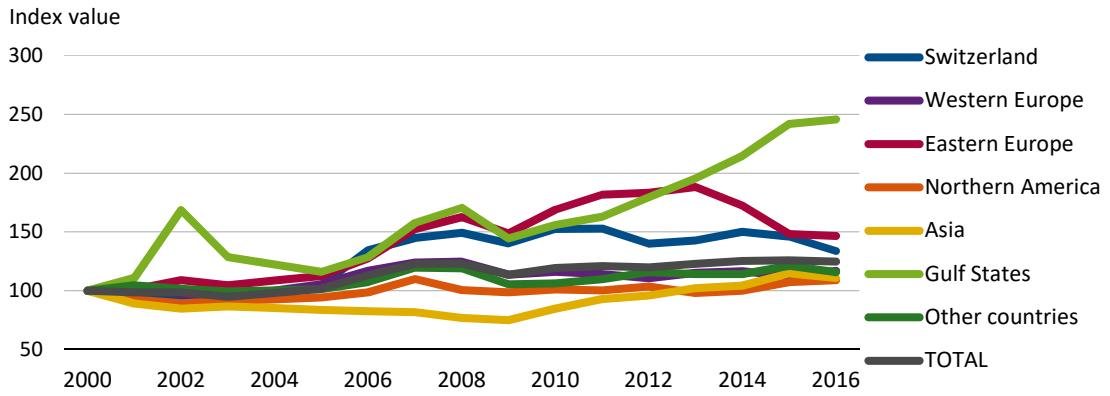
An examination of the development of guest nights over time[19] offers not only insights into the dynamics of the tourism sector as a whole, but shows also how the importance of particular markets of origin changed over time.

Considering limiting factors such as the strength of the Swiss Franc, the tourism industry in the Canton of Geneva performed quite well. It is especially notable that the number of guest nights by Western European tourists did not plummet in recent years but stayed rather con-

[19] The TMS has been used in order to estimate overnight stays in non-hotel accommodation. Since the TMS does not include data over time, the analysis of the development of guest nights is based on the hesta and thus does only include hotels and spa facilities.

stant since 2009. Overnight stays by Asian guests declined between 2000 and 2009 but grew rapidly again since then (2009-2016: +5.8% p.a.). Guest nights of tourists from the Gulf States increased strongly since 2000 (2000-2016: +5.8% p.a.). In 2016, guests from the Gulf States accounted for 8.6 percent of all guest nights. This rise may partially be due to several new flight connections. Overnight stays from Eastern European guests dropped since 2013. A possible explanation might be the weakness of the Russian rouble in recent years. The number of guest nights from North American guests stayed rather constant between 2008 and 2013 but has increased since then (2013-2016: +3.6% p.a.).

Figure 47: Development of overnight stays in the Canton of Geneva by market of origin 2000-2016 – indexed (2000 = 100; only overnight stays in hotels and spa facilities)



2000 – 2016; indexed: 2000 = 100, only overnight stays in hotels and spa facilities

Figure Hesta, calculations BAK Economics

The comparison of overnight stays in the Canton of Geneva and Switzerland additionally emphasises the positive development of Geneva's tourism (see also Figure 49). Swiss tourism had to cope with a challenging environment in the years since 2008. This was due to the economic and currency crisis and the appreciation of the Swiss Franc which occurred subsequently. As a consequence, visiting Switzerland became more expensive for foreign guests, in particular for those coming from euro countries or the UK[20]. Since guests from Western Europe constitute the biggest group of tourists in Switzerland, the decline of guest nights of Western European tourists affected Swiss tourism strongly (see Figure 48).

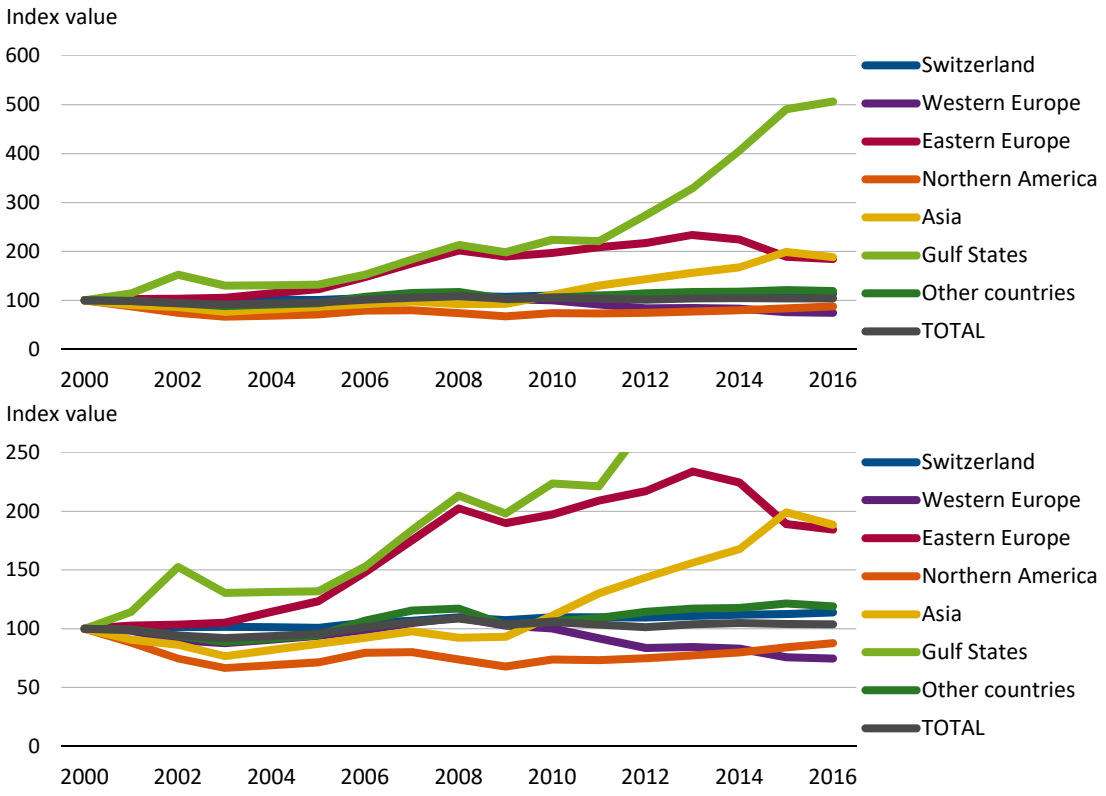
However, tourism in Geneva was less affected: while the total number of overnight stays stagnated in Switzerland, it increased in the Canton of Geneva. This undifferentiated view does not tell the whole story: the stagnation of guest nights in Switzerland is the result of two op-

[20] See also KOF (2011): Die Wechselkursabhängigkeit der Schweizer Wirtschaft

posing developments. On the one hand, Switzerland became more popular among Asian tourists, which led to a steep rise in guest nights (2009-2016: +10.6% p.a.)[21]. On the other hand, Switzerland became more expensive and thus less attractive for tourists coming from the euro countries, due to the disadvantageous euro-franc exchange rate. This resulted in a decline of overnight stays generated by Western European tourists (2009-2016: -4.4% p.a.).

Similar to the Canton of Geneva, guest nights by tourists from the Gulf-States increased rapidly and quintupled since 2000 in Switzerland. The number of overnight stays from Eastern European guests rose until 2013 and dropped afterwards.

Figure 48: Development of overnight stays in Switzerland by market of origin 2000-2016 - indexed (2000 = 100; only overnight stays in hotels and spa facilities)

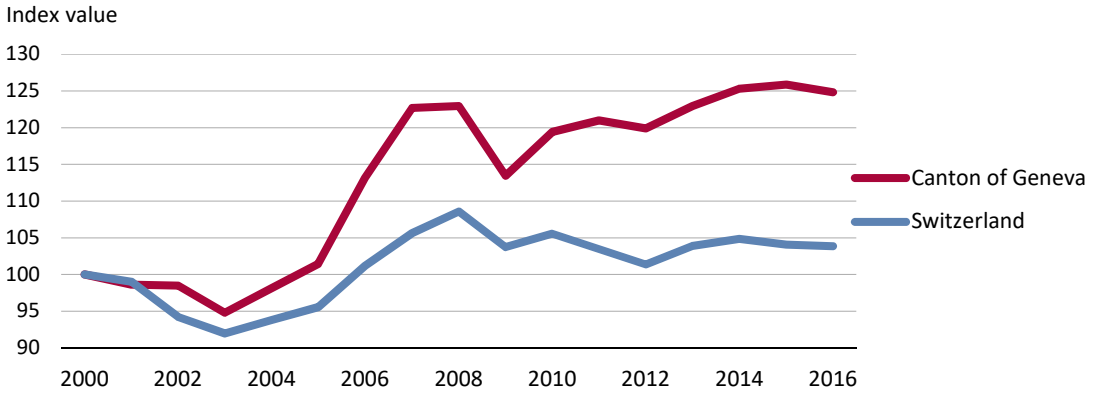


2000 – 2016; indexed: 2000 = 100, only overnight stays in hotels and spa facilities

Figure Hesta, calculations BAK Economics

[21] See also Schmid (2012): Die neuen Entdecker: Wie Gäste aus Asien dem Schweizer Tourismus neuen Schub verleihen

Figure 49: Development of overnight stays in the canton of Geneva and Switzerland 2000-2016 – indexed (2000 = 100; only overnight stays in hotels and spa facilities)



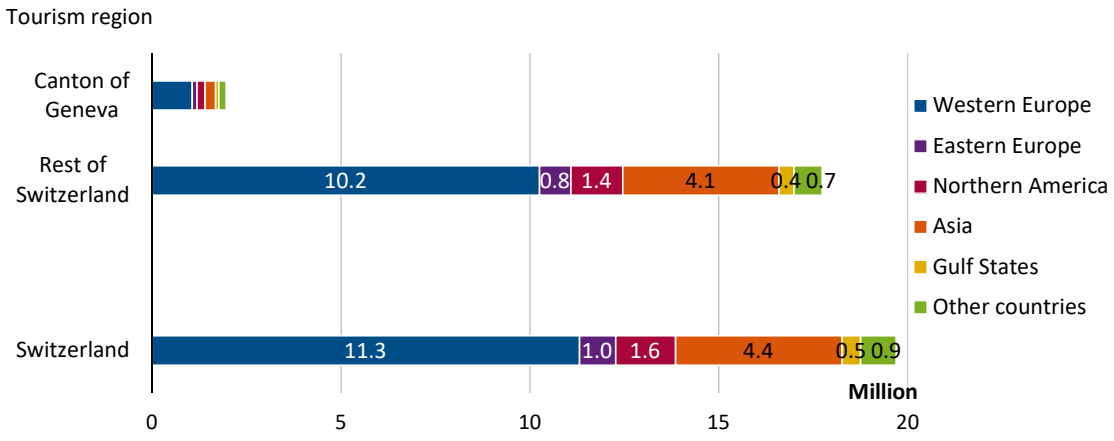
2000 – 2016; indexed: 2000 = 100, only overnight stays in hotels and spa facilities

Figure Hesta, calculations BAK Economics

4.3.2. Arrivals of foreign guests in the Canton of Geneva and Switzerland

In addition to the analysis of overnight stays, it is possible to look at the number of arrivals of foreign guests. In 2016, 19.7 million arrivals of foreign guests (including non-hotel accommodation) were registered. 10 percent of these took place in the Canton of Geneva (see Figure 50). Again, the share of arrivals of Asian guests is much lower in the Canton of Geneva (14%) than in the rest of Switzerland (23%, see Table 5).

Figure 50: Arrivals by market of origin 2016 – in million



2016, number of accommodation arrivals of foreign guests by market of origin in million

Figure Hesta, TMS, calculations BAK Economics

Table 5: Arrivals by market of origin 2016 – in million resp. in %

	Canton of Geneva		Rest of Switzerland		Switzerland	
Western Europe	1.1	54%	10.2	58%	11.3	57%
Eastern Europe	0.1	6%	0.8	5%	1.0	5%
Northern America	0.2	11%	1.4	8%	1.6	8%
Asia	0.3	14%	4.1	23%	4.4	22%
Gulf States	0.1	5%	0.4	2%	0.5	3%
Other countries	0.2	10%	0.7	4%	0.9	5%
Total	2.0	100%	17.7	100%	19.7	100%

2016, number of accommodation arrivals of foreign guests by market of origin in million resp. in %

Table Hesta, TMS, calculations BAK Economics

4.4. Means of transport to enter Switzerland

In order to estimate the share of foreign guests who arrive at Geneva Airport, the TMS data is used. In combination with the total number of guests this share provides a good estimate for the relative importance of Geneva Airport for Swiss tourism and tourism in the Canton of Geneva in particular.

Unsurprisingly, the TMS data shows that tourists coming from the neighbouring countries Germany, France and Italy mostly enter Switzerland by land: more than ninety percent of the survey participants from these countries stated that (see Figure 51). Obviously, entry by air is of higher relevance for tourists coming from European countries further away: for instance, more than two thirds of guests coming from the Nordics, Portugal, Spain or Great Britain came by plane.

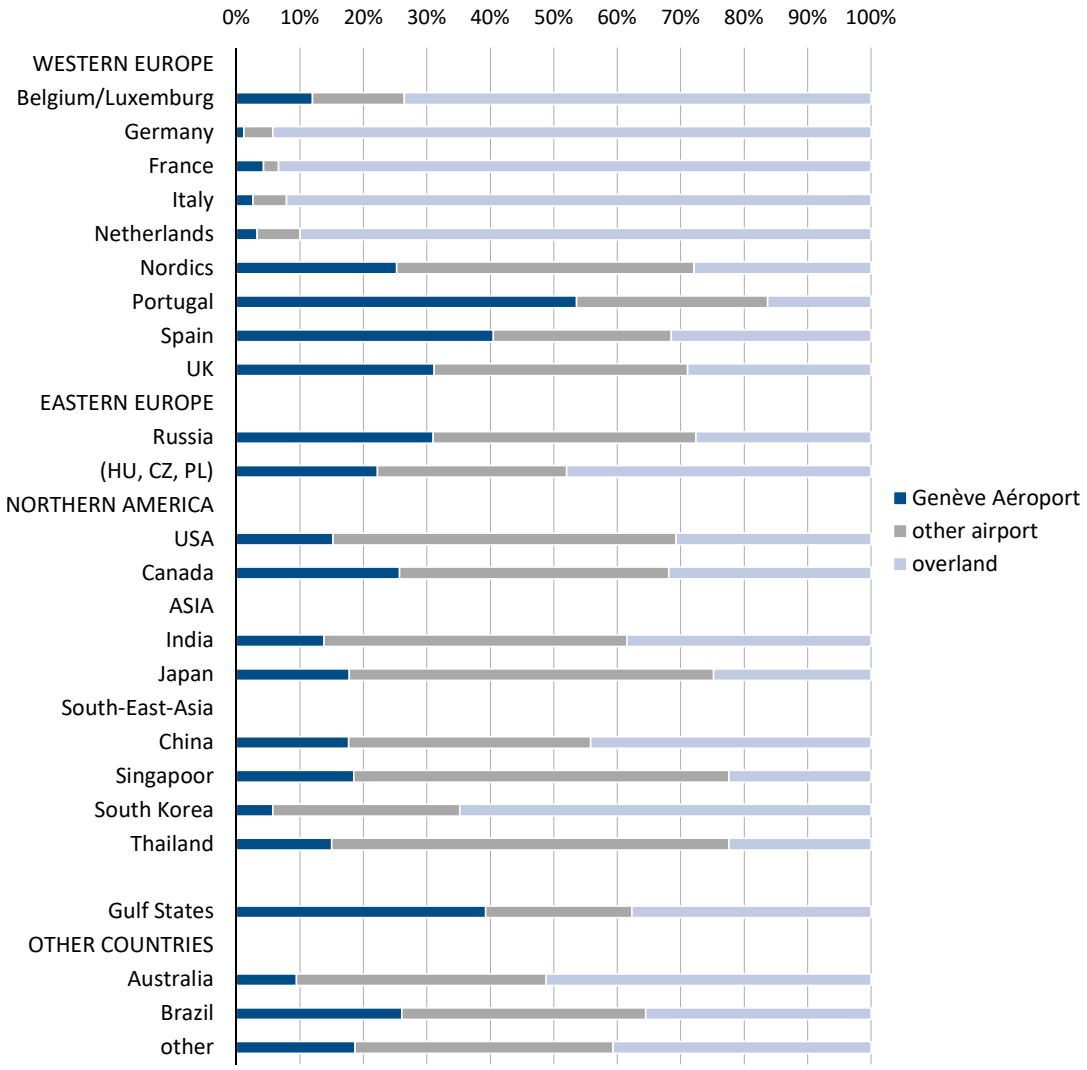
The same holds for distant markets of origin such as Russia, the United States, Canada, the Gulf States and most of the Asian countries. It is notable that the share of guests from China or South Korea coming by land is relatively high. This might be due to the popularity of round trips within Europe (see Figure 66), whose starting point is not necessarily Switzerland.

Additionally, the TMS data allow for insights concerning the importance of Geneva Airport for Swiss air traffic. The airport seems to be particularly popular among guests coming from Portugal, Spain and the UK. The market shares are lower for most long-haul destinations, such as India, Japan, China or the USA.

According to the TMS, the share of guests from the Gulf States arriving at Geneva Airport is remarkably high. Almost four out of ten survey participants stated they landed at this airport[22].

[22] Within the TMS survey, more than 60 percent of all travellers coming from the Gulf States and entering Switzerland via an airport stated they landed at Genève Aéroport. However, this result is not consistent with the passenger statistics of Genève Aéroport and Zurich Airport, which show similar numbers of passengers coming from the Gulf States. The high market share of

Figure 51: Means of transport to enter Switzerland by market of origin 2013 – in %



2013, in %

Figure TMS, calculations BAK Economics

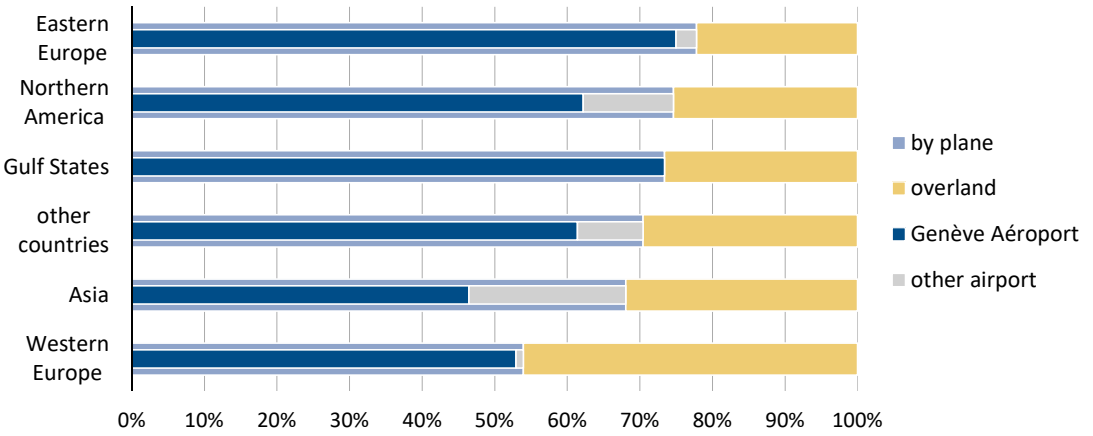
Based on the TMS data, it is also possible to identify differences concerning the travel behaviour of foreign guests in the Canton of Geneva and the rest of Switzerland[23]. This analysis shows that the majority of foreign guests arriving in Geneva choses to come by plane (see Figure 52). This holds not just for guests coming from distant countries but even for those guests

Genève Aéroport among guests from the Gulf States in the TMS might be a statistical artefact due to the comparably small sample size (105 participants from the Gulf States).

[23] Due to the smaller sample size for Guests in Canton of Geneva the analysis is not as detailed with regard to origin of the guests as the analysis for Switzerland.

coming from Western Europe. Geneva Airport seems to have quite a strong position among guests in the Canton: the vast majority of air travellers coming to Geneva lands at Geneva Airport.

Figure 52: Means of transport to enter the Canton of Geneva by market of origin 2013 – in %



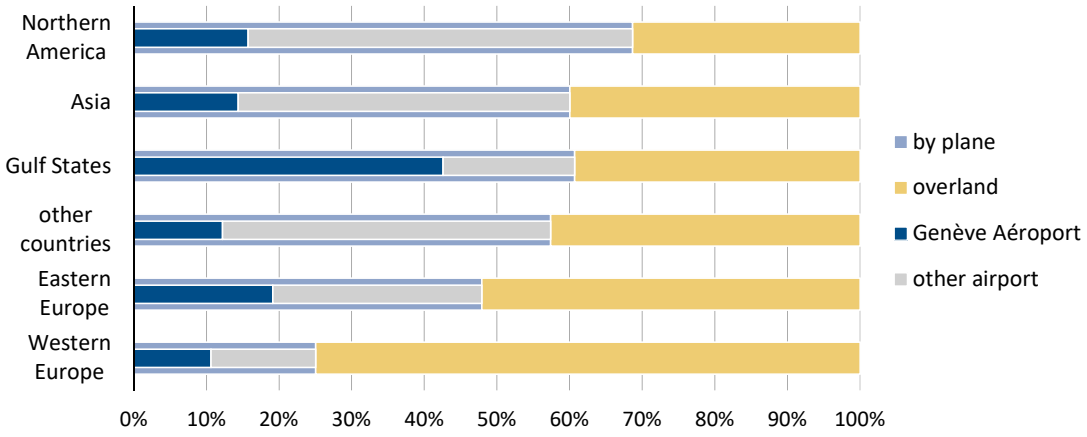
2013, in %

Figure TMS, calculations BAK Economics

A comparison with the travel behaviour of foreign visitors in the rest of Switzerland, i.e. all of Switzerland except for the Canton of Geneva, reveals two major differences (see Figure 52 and Figure 53). Firstly, these tourists chose more often to come by land. Western European guests, in particular, predominantly enter Switzerland overland. Secondly, Geneva Airport plays less of a role for air travellers visiting the rest of Switzerland. This holds particularly for guests coming from distant regions: only 14 percent of all Asian guests and 16 percent of all North American guests staying in the rest of Switzerland landed at Geneva Airport. Considering the fact that Zurich Airport offers more long-haul connections than the airport of Geneva, this finding is of little surprise. In contrast to North Americans and Asians, quite a high share of air passengers from the Gulf States stated they landed at Geneva Airport[24].

[24] See footnote 22 for possible statistical limitations of this result.

Figure 53: Means of transport to enter the rest of Switzerland by market of origin 2013 – in %



2013, in %

Figure TMS, calculations BAK Economics

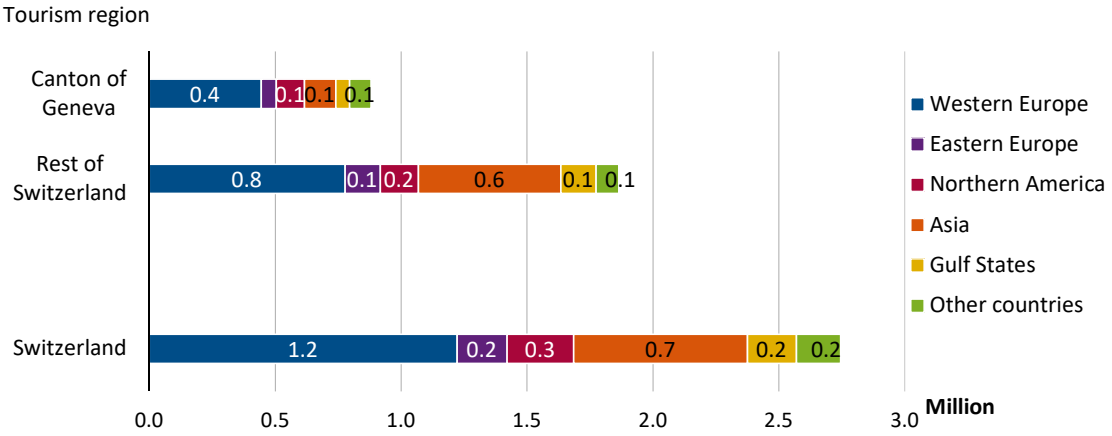
4.5. Number of foreign guests arriving at Geneva Airport

By combining the different information sources analysed above the number of arrivals of foreign guests who entered Switzerland via Geneva Airport can be estimated. This analysis can be done separately for all markets of origin. Furthermore, it is possible to quantify the number of those foreign guests who stay in the Canton of Geneva and those who spend their stay anywhere else in Switzerland. Unfortunately, the available data does not allow the same kind of analysis for (foreign) tourists staying in France but arriving via Geneva Airport; the analysis is limited to guest staying in Switzerland.

In 2016, more than 2.7 million arrivals can be traced back to foreign guests who entered Switzerland via Geneva Airport. Hence, foreign guests who arrived at Geneva Airport were responsible for 13.9 percent of the 19.7 million accommodation arrivals that were registered in 2016.

Western European guests were by far the largest group of tourists arriving via Geneva Airport: around 1.2 million of these 2.7 million arrivals (45%) were generated by guests coming from Western European countries. The second largest group were Asian guests who generated 0.7 million accommodation arrivals (see Figure 54).

Figure 54: Arrivals of foreign guests who entered Switzerland via Geneva Airport by market of origin 2016 – in million



2016, number of accommodation arrivals of foreign guests who entered Switzerland via Geneva Airport by market of origin in million

Figure Hesta, TMS, calculations BAK Economics

Table 6: Arrivals of foreign guests who entered Switzerland via Geneva Airport by market of origin 2016 – in million

	Canton of Geneva	Rest of Switzerland	Switzerland
Western Europe	0.4	0.8	1.2
Eastern Europe	0.1	0.1	0.2
Northern America	0.1	0.2	0.3
Asia	0.1	0.6	0.7
Gulf States	0.1	0.1	0.2
Other countries	0.1	0.1	0.2
Total	0.9	1.9	2.7

2016, number of accommodation arrivals of foreign guests who entered Switzerland via Geneva Airport by market of origin in million

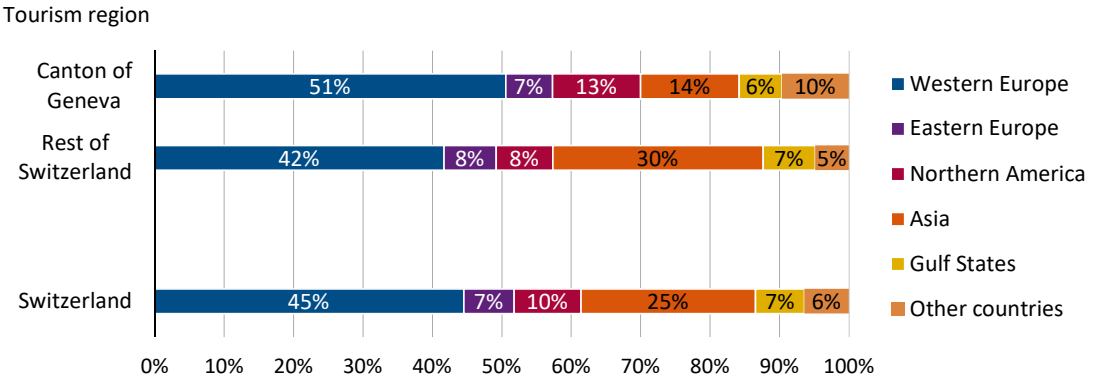
Table Hesta, TMS, calculations BAK Economics

Separating the guest arrivals in the Canton of Geneva and in the rest of Switzerland reveals a number of differences (see Figure 55). Of all guests who arrived at Geneva Airport and stayed in the Canton of Geneva, 51% came from Western Europe. The corresponding figure for the rest of Switzerland is substantially lower (42%). The opposite is true for guests from Asia: In the Canton of Geneva 14% of all guest arrivals entering Switzerland via Geneva Airport are from Asia, while in the rest of Switzerland Asian guests make up 30% of these group of guests.

These differences are probably much more driven by the typically differing guest behaviour from various markets than by specific offers of Geneva Airport: Asian guest are much more likely to complete round travels and prefer visiting rural regions in Europe over cities in general, while Western European guest are much more likely to be on a business trip, particularly when visiting Geneva. This hypothesis is confirmed by North American guests: in Geneva, they played a bigger role (13% of all arrivals) than in the rest of Switzerland (8%).

In combination with the analysis on the means of transport to enter Switzerland by all guest presented above this results are consistent with an airport strategy serving specifically the needs of tourist visiting the Canton of Geneva and the Geneva region. The next section will investigate this further.

Figure 55: Structure of arrivals of foreign guests who entered Switzerland via Geneva Airport by market of origin



2016, share of accommodation arrivals of foreign guests who entered Switzerland via Geneva Airport by market of origin in %

Figure Hesta, TMS, calculations BAK Economics

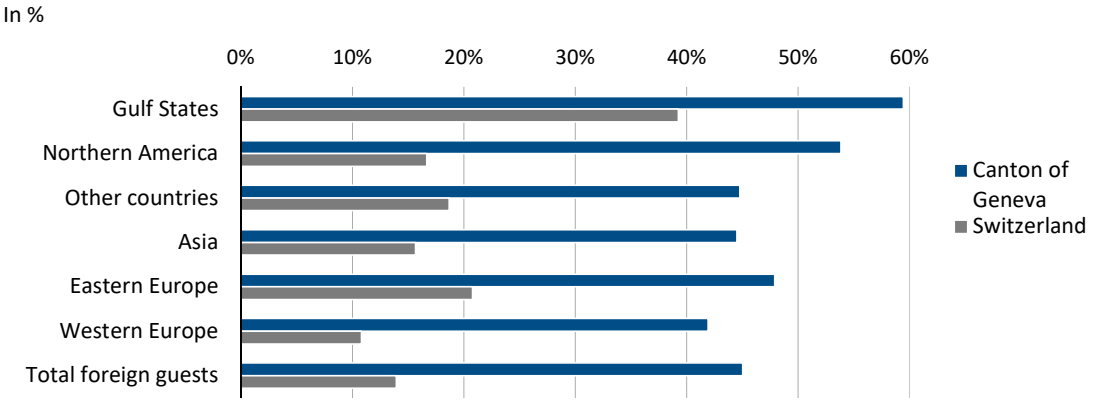
4.5.1. Importance of Geneva Airport for foreign guests

Taking a different perspective, the figures assessed in the preceding section allow as well determining the share of accommodation arrivals which was generated by foreign guests who entered Switzerland via Geneva Airport. These shares can be considered as an indicator for the importance of Geneva Airport for guests coming from different world regions.

The findings show that Geneva Airport is of exceptional importance for foreign guests coming to the Canton of Geneva (see Figure 56). Around 45 percent of all accommodation arrivals of foreign guests were generated by tourists who arrived at Geneva Airport. It is notable that this figure is above 40 percent for all groups of tourists including guests from Western Europe. The importance of Geneva Airport for foreign guests who stay in the rest of Switzerland is – not surprising – much lower. Again, Geneva Airport seems particularly to provide the services

needed in the region, whereas its services are important for the rest of Switzerland as well but to a lesser extent than in Geneva.

Figure 56: Share of arrivals of foreign guests who entered Switzerland via Geneva Airport 2016 – in %



2016, share of accommodation arrivals of foreign guests who entered Switzerland via Geneva Airport relative to total number of accommodation arrivals of foreign guests, by market of origin in %

Figure Hesta, TMS, calculations BAK Economics

4.5.2. Importance of Geneva Airport for adjacent French regions

Geneva Airport is not only of great importance for Swiss tourism, but also for the neighbouring tourist regions in France, i.e. Auvergne-Rhône-Alpes and Bourgogne-Franche-Comté. Due to its proximity to the French border, Geneva Airport is a convenient option for tourists travelling to these French regions. In order to assess the airport's impact on these two tourist regions, one must look at the number of tourists coming from Geneva Airport. Unfortunately, the lack of official figures makes it impossible to estimate the exact impact. Therefore, an indirect approach is used for estimation.

The total number of incoming tourists at Geneva Airport was 4.1 million in 2016 (see p. 81). But tourists arriving via Geneva Airport accounted for 2.7 million accommodation arrivals in Switzerland only. Applying the – restrictive – assumption that each incoming tourist traveling via Geneva Airport generated only one accommodation arrival[25], this leaves 1.4 million tourists which did generate an arrival in Switzerland. This leads to the conclusion that a substantial number of incoming tourists did not stay in Switzerland after arriving at Geneva Airport, but

[25] This assumption is rather restrictive. The actual number of accommodation arrivals should be higher, based on the fact that tourist entering Switzerland via Genève Aéroport in a substantial number of cases will generate more than one arrival in Switzerland (multi-stop or round trips). Unfortunately, there is no information available on the number of arrivals per tourist visit.

went to France most probably[26]. Most probably, this means that in 2016 approximately 1.4 million arrivals of guest in France are accounted for by the Geneva Airport[27].
In 2016, the two adjacent French tourist regions Auvergne-Rhône-Alpes and Bourgogne-Franche-Comté registered 4.4 million accommodation arrivals of foreign guests and 14.0 million of French guests. Assuming that French guests coming to Auvergne-Rhône-Alpes or Bourgogne-Franche-Comté do predominantly not enter these regions via Geneva Airport would imply that the 1.4 million incoming tourists coming via the airport are foreign guests. Under these assumptions it can be concluded that about one third of all hotel arrivals of foreign guests in Auvergne-Rhône-Alpes and Bourgogne-Franche-Comté can be traced back to tourists who arrived at Geneva Airport.

4.6. Tourism revenue related to Geneva Airport

The economic importance of foreign guests depends not only on their number or on the number of overnight stays they generate, but also on the amount of money they spent in the host country. It can be given as granted that expenditures vary wildly for different tourists. Hence, it yields valuable insights to estimate the revenue arising from tourists in Switzerland and, more specifically, the revenue from tourists who entered Switzerland via Geneva Airport. This is done in the following section.

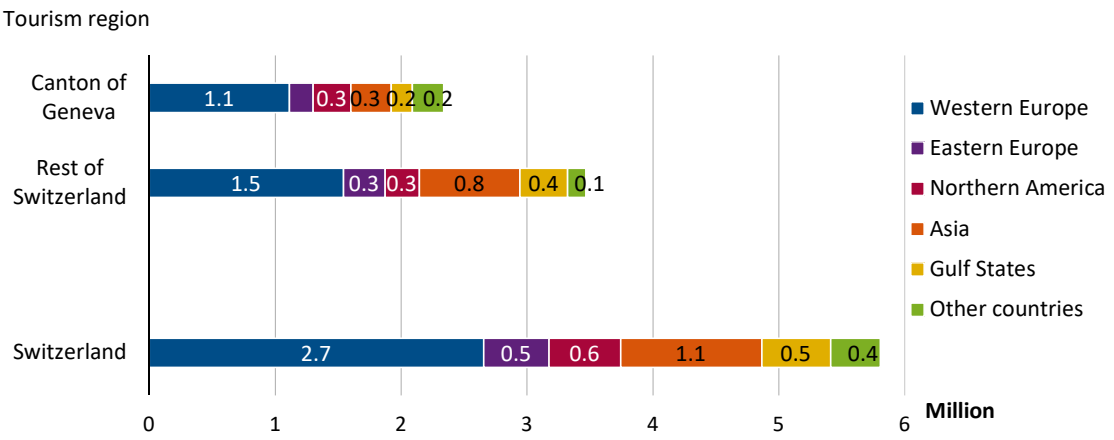
4.6.1. Number of overnight stays of foreign guests who arrived at Geneva Airport

The touristic revenue from a guest can be broken down in two components: the number of overnight stays and the daily expenses. Hence, in a first step, the number of overnight stays of foreign guests who arrived at Geneva Airport is estimated.

The number of overnight stays of foreign visitors who arrived via Geneva Airport is estimated at 2.4 million in the Canton of Geneva and at 3.4 million in the rest of Switzerland. Hence, the total number of overnight stays by foreign tourists which can be traced back to Geneva Airport is 5.8 million (see Figure 57).

[26] Of course, this might also include passengers who travel directly to other countries as well as guest traveling back the same day. Based on the geographical location of Genève Aéroport it is likely that the first figure is rather small, but there is no information available on the number of day trips.
[27] In the combination of the two issues explained in the two previous footnotes, one of which leads to an underestimation of the number of arrivals generated in France and the other one to an overestimation, it seems appropriate to ignore both given the fact that no further information is available. But it has to be noted that these calculations provide only a rough estimate with substantial uncertainty.

Figure 57: Overnight stays of foreign guests who entered Switzerland via Geneva Airport by market of origin 2016 – in million

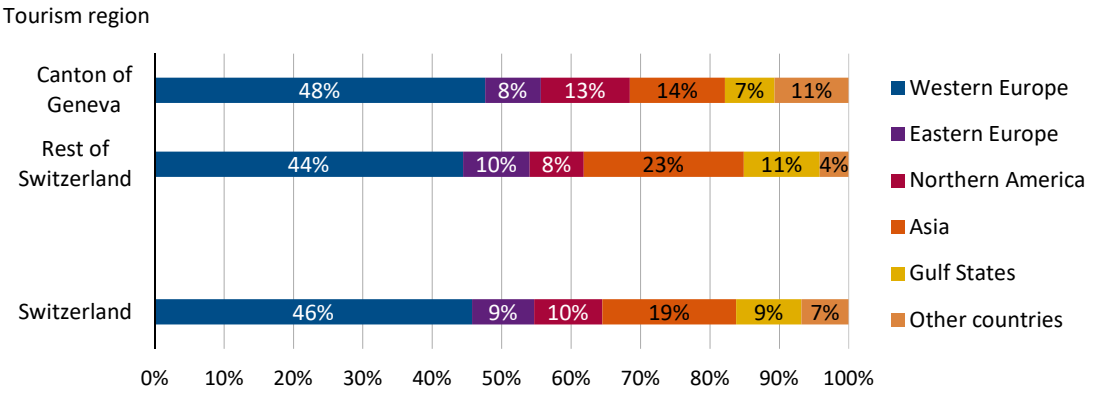


2016, number of overnight stays of foreign guests who entered Switzerland via Geneva Airport by market of origin in million

Figure Hesta, TMS, calculations BAK Economics

With regard to the relative importance of the markets of origin, only small differences exist between the Canton of Geneva and the rest of Switzerland (see Figure 58). The share of overnight stays by foreign guests from Asia and the Gulf States is smaller in Geneva, while North American guests and guests from other countries account for a higher share of overnight stays than in the rest of Switzerland. Also note that these shares for overnight stays do not differ substantially from the corresponding figure for arrivals (see Figure 55). Therefore, there are no great differences in the average duration of the stay.

Figure 58: Share of overnight stays of foreign guests who entered Switzerland via Geneva Airport by market of origin 2016 – in %



2016, share of overnight stays of foreign guests who entered Switzerland via Geneva Airport by market of origin in %

Figure Hesta, TMS, calculations BAK Economics

4.6.2. Daily expenditure

In addition to the number of overnight stays, daily expenditure is required in order to estimate the total tourism revenue generated by guests. Daily expenditure as assessed in the TMS is defined as the costs for accommodation and all other goods and services during the stay. The costs for traveling to Switzerland and leaving the country again are not included. Based on the TMS data, the average daily expenses can be estimated for each market of origin as well as for each type of accommodation. Furthermore, it is possible not only to calculate this for Switzerland but to differentiate between the Canton of Geneva and the rest of Switzerland.

In order to achieve a robust estimation for the revenue, the Tourism Balance of Payment is used as a second source of data. The Tourism Balance of Payment (TBP) is published by the Swiss Federal Statistical Office and contains the total revenue generated by foreign overnight guests in Switzerland (see section 4.1.4 for more information on the TBP). According to the TBP, the total revenue of foreign overnight guests in Switzerland was 10.3 billion in 2016.

This figure is used in order to normalize the daily expenses. This is done by multiplying the daily expenses for each market of origin and each type of accommodation with an appropriate factor which ensures that the total revenue generated by foreign overnight guests in Switzerland equals the corresponding value in the TBP.

The calculations yield that the average daily expenditure of overnight guests was 225 CHF in Switzerland in 2013[28]. However, there are considerable differences depending on the markets of origin of guests. For instance, guests coming from the Gulf States spent significantly more money than guests from Western Europe (Gulf States: 543 CHF/day, Western Europe: 182 CHF/day).

It is of little surprise that differences in spending behaviour exist depending on the type of accommodation: the more exclusive the hotel, the higher the expenditure. Guests staying in 5-star hotels spent more than twice as much as any group of guests staying in other hotel categories, regardless of their place of origin (e.g. guest from Switzerland: 895 CHF/day in 5-star hotels compared to 372 CHF/day in 4-star hotels).

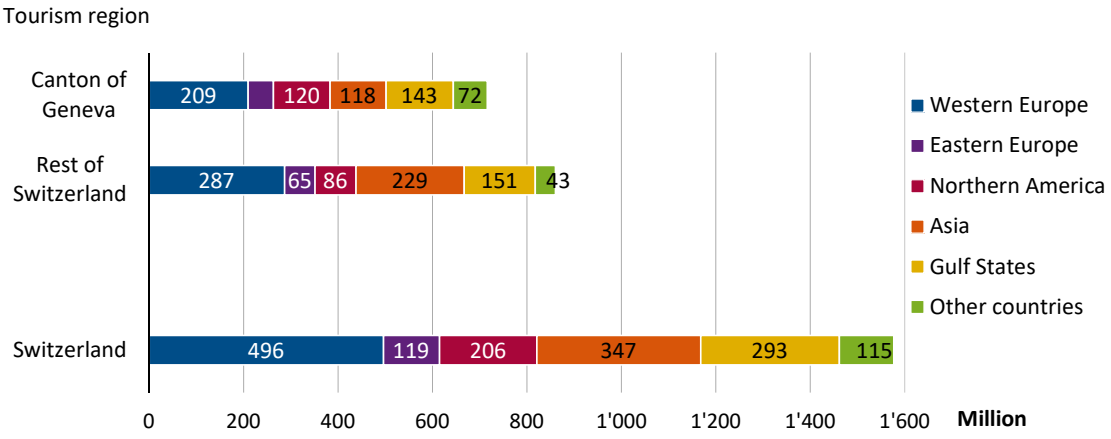
The Canton of Geneva benefits from considerably higher daily expenditure by tourists than in the rest of Switzerland. This is both due to higher costs for most types of accommodation and the higher market share of more exclusive accommodation in Geneva. In total, the average daily expenditure of tourists is 341 CHF in Geneva compared to 217 CHF in the rest of Switzerland.

[28] The latest TMS data available at the time this study was created referred to the year 2013

4.6.3. Tourism revenue generated by guests arriving at Geneva Airport

Multiplying the number of overnight stays by the daily expenditure yields the revenue which is generated by guests entering Switzerland via Geneva Airport (see Figure 59).

Figure 59: Revenue generated by guests arriving at Geneva Airport by market of origin 2016 – in million CHF



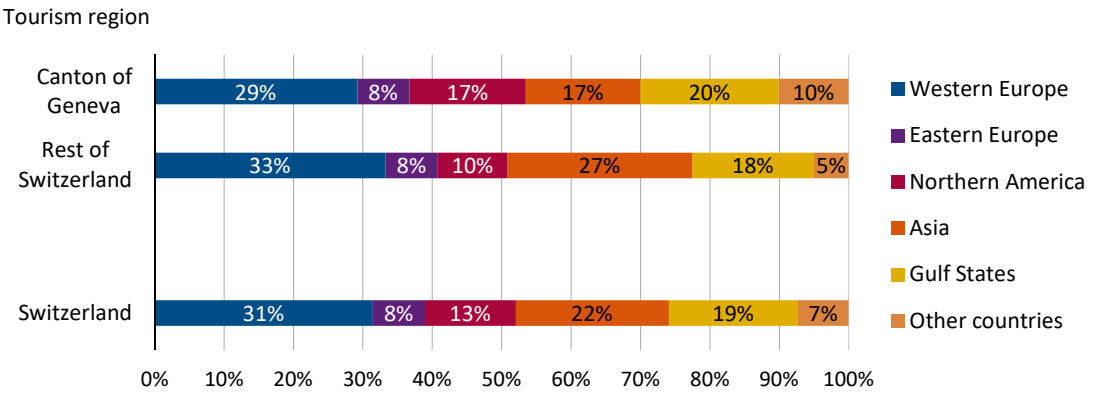
2016, revenue generated by foreign guests entering Switzerland via Geneva Airport by market of origin, in million CHF

Figure hesta, TMS, TBP, calculations BAK Economics

The total revenue generated by foreign tourists who entered Switzerland via Geneva Airport was 1.6 billion CHF in Switzerland. About 716 million CHF of this sum were spent in the Canton of Geneva, 860 million CHF in the rest of Switzerland.

A look at the structure of these revenues shows that tourists from Western Europe account for the highest share of revenue both in the Canton of Geneva (29%) and the rest of Switzerland (33%; see Figure 60). Even though the total number of guests from the Gulf States is comparatively small, this group of tourists generates a considerable share of tourism revenues – due to their high spending behaviour (GE: 20%; rest of Switzerland: 18%). Guests coming from North America generate a bigger share of revenues in the Canton of Geneva (GE: 17%; rest of CH: 10%); vice versa Asian guests account for a higher share of revenues in the rest of Switzerland (GE: 17%; rest of CH: 27%).

Figure 60: Share of revenue generated by guests arriving at Geneva Airport by market of origin 2016 – in %



2016, share of revenue generated by foreign guests entering Switzerland via Geneva Airport by market of origin, in %

Figure hesta, TMS, TBP, calculations BAK Economics

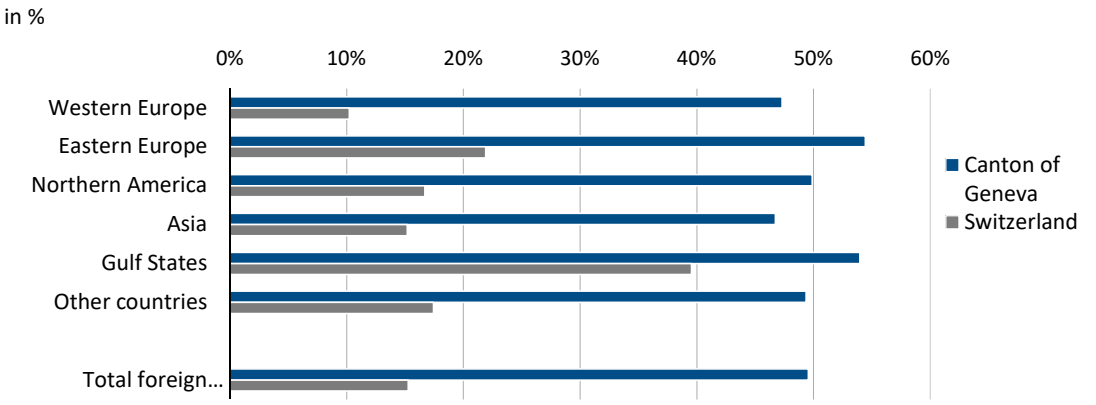
4.6.4. Importance of tourism revenue by guests arriving at Geneva Airport

The relative importance of Geneva Airport for tourism in the Canton of Geneva and Switzerland can be evaluated by comparing the revenue generated by foreign overnight guests who arrived at the airport with the tourism revenue of foreign overnight guests in total.

The results illustrate the high importance of Geneva Airport especially for tourism in the Canton of Geneva (see Figure 61). The total revenue of foreign overnight guests in the Canton of Geneva is approx. 1445 million CHF. Half of this revenue is generated by foreign overnight guests who came via Geneva Airport (716 million CHF). This finding holds more or less for all markets of origin.

The importance for Swiss tourism as a whole is lower but still substantial: tourists who arrived at Geneva Airport account for about 15 percent (or 1576 million CHF) of the total revenue generated by foreign overnight guests in Switzerland (10.3 billion CHF).

Figure 61: Revenue of guests arriving at Geneva Airport compared to revenue of all foreign overnight guests 2016 – in %



2016, revenue of foreign guests entering Switzerland via Geneva Airport relative to revenue of all foreign overnight guests, by market of origin, in %

Figure Hesta, TMS, TBP, calculations BAK Economics

4.6.5. Travel expenses

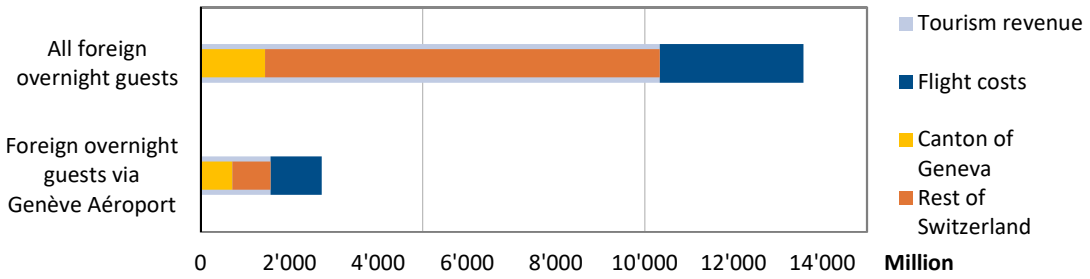
The revenue discussed in the preceding sections excludes all touristic expenses except costs which arise for reaching the travel destination and going back. However, travel expenses are of relevance as well, since they imply additional revenue generated by tourists. Hence, these costs are included in the following. For this purpose, the flight costs are added both to the total touristic revenue and to the revenue generated by guests arriving at Geneva Airport (see Figure 62).

The flight costs of foreign overnight guests coming to Switzerland are estimated to be 3.2 billion CHF[29] (based on TSA). Adding these costs to the tourism revenue excluding flight costs yields total revenues of 13.6 billion CHF generated by foreign overnight guests.

The flight costs of those guests who came to Switzerland via Geneva Airport are estimated to be 1.15 billion CHF, based on the share of passenger movements of the airport[30]. As shown in the preceding section, the revenue generated by foreign overnight guests arriving at Geneva Airport was 1.58 billion CHF. Hence, the total revenue generated by foreign overnight guests arriving at Geneva Airport including flight costs is 2.72 billion CHF.

[29] Regardless of the airport these guests arrived at.
[30] Based on the TMS, 35 percent of all foreign overnight guests entered Switzerland via Genève Aéroport.

Figure 62: Revenue of all foreign overnight guests and those arriving at Geneva Airport 2016 – in million

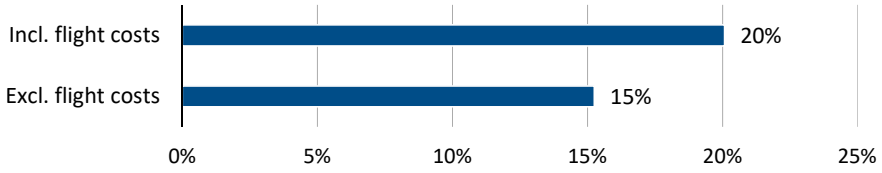


2016, revenue of all foreign overnight guests and those arriving at Geneva Airport, in million CHF

Figure Hesta, TMS, TBP, calculations BAK Economics

These calculations show that 15 percent of the total tourism revenue by foreign overnight guests stems from tourists who entered Switzerland via Geneva Airport if flight costs are excluded (1.58 of 10.3 billion CHF). When including flight costs, this share is as high as 20 percent (2.72 of 13.6 billion CHF). In other words, more than one in seven francs stems from guests arriving at Geneva Airport excluding flight costs or more than one in five francs including flight costs (see Figure 63).

Figure 63: Share of revenue by guests arriving at Geneva Airport (incl. and excl. Flight costs) of total revenue by foreign overnight guests in Switzerland



2016, revenue of all foreign overnight guests arriving at Geneva Airport relative to total revenue of foreign overnight guests, in %

Figure Hesta, TMS, TBP, TSA, calculations BAK Economics

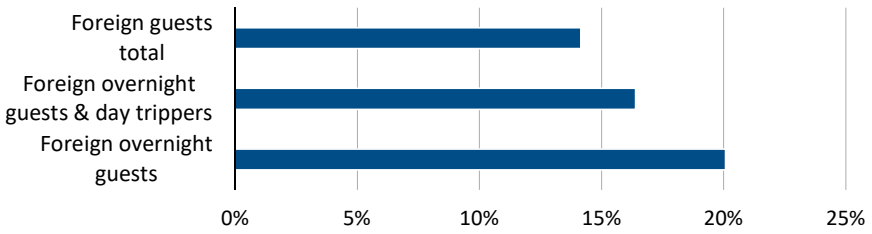
4.6.6. Day tourism, cross-border commuters, short-term residents

The revenue generated by foreign overnight guests arriving at Geneva Airport including flight costs (2.72 billion CHF) can be compared to further revenue figures which are available in the Tourism Payment Balance, in order to further assess the relative importance of Geneva Airport for Swiss tourism (see Figure 64). As stated in the previous section, the estimated 2.72 billion CHF accounted for 20 percent of the total revenue generated by foreign overnight guests in

Switzerland in 2016. However, not all foreign guests stay overnight: cross-border commuters and short-term residents are not included in the revenue generated by foreign overnight tourists.

If the revenue by foreign day travellers is added, the revenue generated by foreign overnight guests arriving at Geneva Airport accounts for 16 percent of this revenue. If cross-border commuters and short-term residents are added as well, this share drops to 14 percent. In other words, one seventh of the total revenue stemming from foreign guests in Switzerland is related to Geneva Airport.

Figure 64: Share of revenue by guests arriving at Geneva Airport of TBP revenues



2016, revenue by guests arriving at Geneva Airport relative to total revenue of foreign guest, incl. and excl. day trippers, including flight costs, in %

Figure Hesta, TMS, TBP, TSA, calculations BAK Economics

4.7. Alternatives to Geneva Airport

It cannot be empirically verified whether a similar number of foreign guests would visit Switzerland in general and the Canton of Geneva in particular if Geneva Airport did not exist. Nevertheless, a number of qualitative considerations are possible.

4.7.1. Business travellers depend on good connections

Business tourism is an important part of tourisms. Particularly for an economically strong in interconnected city like Geneva business tourism builds an important part of the tourism demand. This is further emphasized by the strong presence of international organisations in Geneva.

Business travellers are usually highly dependent on brief travel times and frequent connections, since companies cannot afford to send their employees on unnecessarily long trips. Hence, the nearest French airports, such as Lyon Saint-Exupéry, or Zürich cannot be considered as fully feasible alternatives.

Concerning business tourism, Geneva holds an exceptional position: more than thirty international organizations are based in Geneva, as well as numerous multinational companies. Geneva Airport is of particularly high importance for these organisations and firms. Consequently, Geneva is visited by high numbers of international employees, their relatives and business partners. Geneva benefits from the revenues generated by these guests. It is likely that Geneva would not have been able to become the "capital of expats" it is today without Geneva Airport.

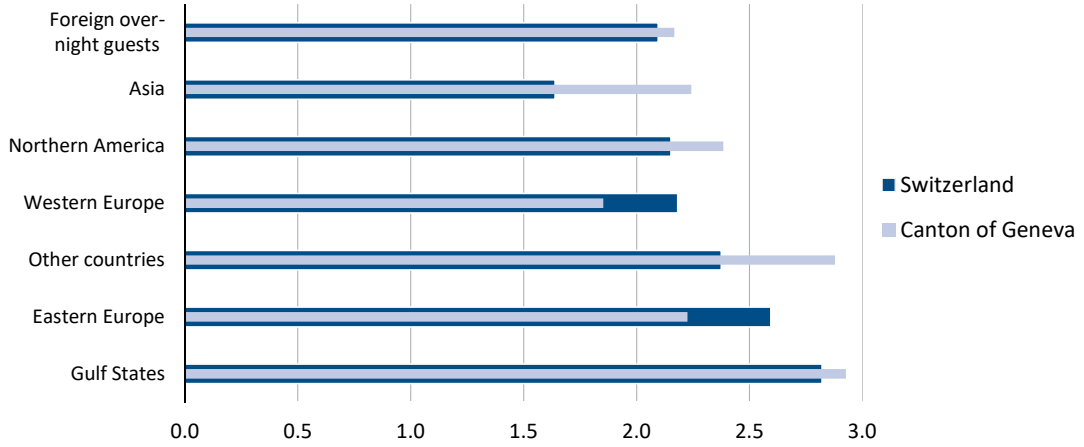
4.7.2. City trips: Short travel times essential for short-term tourism

Cities are particularly attractive for weekend vacationers, a section of tourism increasing above-average. Indeed, this trend is considered as one of the reasons for the positive development of urban tourism in Switzerland.

The average length of stay by foreign guests in Switzerland was 2.1 days in 2016. In particular, guests from Asia (1.6 days), North America (2.2 days) and Western Europe (2.2 days) had short durations of stay (see Figure 65). The average length of stay in the Canton of Geneva was only negligibly higher than in Switzerland (2.2 days). The short durations of stay illustrate the relevance of short-term tourism.

Tourists who spend more time in the region might be more flexible concerning their travel route and the airport of arrival. But for short-term tourists, it is not indubitable that the number of these guests in Geneva would be drastically lower without the airport. Just as for business travellers, good connections are crucial for short-term visitors.

Figure 65: Average length of stay by market of origin 2016 - length of stay in days



2016, length of stay in days, refers only to hotels and spa-facilities

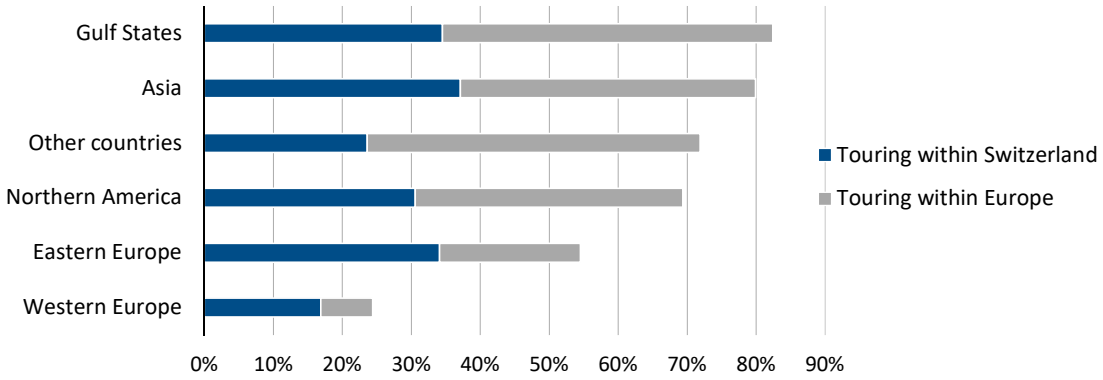
Figure Hesta, calculations BAK Economics

4.7.3. Round trips are more likely to persist with alternative airports

A further indication on the importance of a particularly airport can be derived from travel behaviour. Particularly, guest planning a round trip through Switzerland or through Europe are more likely to be willing to use alternative entry points for their trip, particularly when they are able to reorganize their trip accordingly. Guests planning to visit only one particular place are bound to be less flexible.

In the following, the importance of round trips for tourist visiting Switzerland is assessed. A round trip is defined as touring within Switzerland or Europe.

Figure 66: Share of foreign guests on a round trip 2013 – in %



2013, round trips within Switzerland and Europe, in %

Figure TMS, calculations BAK Economics

The TMS data shows that the share of guests on a round trip is particularly high for those who come from distant countries (see Figure 66): 82 percent of all guests from the Gulf States, 80 percent of all Asian guests and 69 percent of tourists from North America said they were on a round trip. For the majority of these guests, Switzerland is not the only country that is visited. Guests from Western Europe more often visit one place only: just one quarter said they were on a round trip.

It can be concluded that a relatively high share of foreign non-business guests do visit Switzerland in the course of a round trip, particularly guests from distant countries. Of these, particular guests touring through Europe have the option of beginning or ending their journey at another airport. But it has been shown that Geneva Airport has a high number of Western European guests for whom such alternatives might look less attractive.

4.8. Conclusion

Good transport links and accessibility are vital for Swiss tourism. Geneva Airport plays an important role in ensuring these both for the Canton of Geneva and all of Switzerland. For Geneva, almost one in two Francs spent by foreign guests can be traced back to arrivals via Geneva Airport.

Geneva Airport serves an increasing number of passengers

Passenger traffic has risen considerably at Geneva Airport within recent years. The number of arriving passengers was 8.2 million in 2016. Compared to 2010, this is equivalent to an increase of 39 percent. Arrivals from all the world's regions rose except for Africa and North America.

Tourism in Geneva performs better than Swiss tourism in general

The challenging market conditions in recent years are a considerable challenge for Swiss tourism. So journeys in Switzerland became more expensive due to the appreciation of the Swiss franc. This is particularly true for guests from the euro countries and the UK. Only the strong rise of overnight stays by Asian guests prevented a severely declining of the total number of overnight stays. Overnight stays generated by guests from Western Europe declined drastically since 2008.

In contrast to Switzerland, Geneva tourism has recorded a significant increase of guest nights since 2008. Particularly for guests from Asia and the Gulf States Geneva became an increasingly attractive destination. At the same time it can be observed that the numbers of visitors from Western Europe was not decreasing.

Geneva Airport provides an important infrastructure for tourism

The high number of hotel arrivals by guests who entered Switzerland via Geneva Airport indicates that the positive development of tourism in Geneva has been strongly supported by Geneva Airport. In 2016, guests arriving at Geneva Airport accounted for 0.9 million hotel arrivals in the Canton of Geneva. Nearly every second hotel arrivals in the Canton of Geneva could be traced back to tourists coming via Geneva Airport (45%). A relatively short average length of stay by foreign guests indicates a high share of business and short-term tourists. Short travel times are vital in order to be attractive for these tourist groups.

But Geneva Airport is important not only for tourism in the Canton of Geneva. Guest traveling via Geneva Airport accounted for 1.9 million tourist arrivals in the rest of Switzerland outside the Canton of Geneva. This is equal to 15% of all guest arrivals in Switzerland. Furthermore, the Geneva Airport contributes substantially to the touristic success of the surrounding French regions as well: it can be estimated that roughly 1.4 million arrivals are generated in

Auvergne-Rhône-Alpes and Bourgogne-Franche-Comté, resulting in about one third of all foreign arrivals there.

Foreign guests coming via Geneva Airport generate high revenues

Tourism constitutes an important economic sector both in Switzerland and the Canton of Geneva. Within this study, the revenue generated by foreign tourists who entered Switzerland via Geneva Airport was estimated to be 1.6 billion CHF in total. About 716 million CHF of this sum were spent in the Canton of Geneva and 860 million CHF in the rest of Switzerland. In other words, almost one in two Francs spent by foreign guests in the Canton of Geneva can be traced back to guests arriving via Geneva Airport.

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