

Calculating the socio-economic impact of Copenhagen Airport on the Danish economy

Methodology report

20-09-2023

Centre for Regional and Tourism Research



Title: Calculating the socio-economic impact of Copenhagen Airport on the Danish economy

Authors:

Kathrine Lindeskov Johansen (Chief Consultant – CRT),
Rasmus Vendelboe (Economist, Research Assistant – CRT)
and Thomas Thessen (Chief Economist – Copenhagen Airport)

Contact:

kathrine.johansen@crt.dk, +45 3085 5179

CRT Copenhagen

c/o Aalborg Universitet

A. C. Meyers Vænge 15

2450 København SV

Head office:

CRT – Centre for Regional and Tourism Research

Bymarken 12

3790 Hasle

Telephone +45 5644 1144

E-mail: crt@crt.dk

www.crt.dk

Content

1	Project outline.....	4
1.1	Purpose.....	4
1.2	Scope.....	4
1.3	This report.....	6
2	Data and model.....	6
2.1	The regional databank and regional model SAM-K/LINE®.....	6
2.2	Administrative data and registerbased statistics in Denmark.....	9
2.3	Airport access cards.....	10
3	Methodology.....	10
3.1	Estimating the direct effects of Copenhagen Airport.....	11
3.1.1	Employment population.....	11
3.1.2	Economic activities.....	13
3.2	Compiling the total effects of Copenhagen Airport.....	13
4	Results.....	13
4.1	Main tables.....	14
	Litterature.....	25
	Appendix.....	26

1 Project outline

The project aims to model and compile the national and regional impact of aviation via Copenhagen Airport on the Danish economy.

The purpose is to provide a consistent model- and data driven framework as fact led knowledge base for the discussions on the socioeconomic impact of the activities at Copenhagen Airport.

The compilation is carried out using CRT's regional economic model, SAM-K/LINE[®], an interregional input-output model based on a set of coherent social accounting matrices of Denmark's municipalities. Hence, an essential feature of the model is that it can calculate socioeconomic effects of a given scenario shock to the economy at a municipality level.

Another vital feature of the model is that it's detailed data foundation and projection results match with Denmark's official, national statistics and forecasts for the Danish economy (e.g., GDP, employment, tourism satellite accounts). This ensures that the results produced for Copenhagen Airport in this project, is comparable to the national figures of Denmark and enables comparability to other aspects compiled within the framework of the model.

The economic variables we focus on in this phase of the project, are the national accounts key items: gross value added (GVA), employment and tax revenues. The social demographic impact is focused on variables such as age, gender, education, and residency of employment attained to activities at Copenhagen Airport.

1.1 Purpose

As mentioned above, the purpose of the project is to provide a consistent model- and data driven framework as fact led knowledge base for the discussions on the socioeconomic impact of the activities at Copenhagen Airport. Hence, at this phase in the project, we have not modeled for instance the corresponding emission effects (Copenhagen Airport are reporting data on their environmental impact separately, please see <https://www.cph.dk/om-cph/baeredygtighed>).

The aim is to model and compile the national and regional impact of aviation via Copenhagen Airport to the Danish economy, and the first focus is to get a more in-depth picture of the socioeconomic effects for the local region of Copenhagen airport, for businesses residing in Denmark and residents and non-residents employed due to aviation activities attained from Copenhagen Airport.

1.2 Scope

The socioeconomic impact of a given economic activity can be considered abstract and wide. In the case of aviation to and from an international airport as Copenhagen Airport in a country such as Denmark whose territory consists of a main peninsula surrounded by islands, the socioeconomic impact is certainly wide.

In this phase of the project, we focus on the most tangible effects measurable: the *direct* effects and the *derivative* effects of Copenhagen Airport and not the full *catalytic* effects. Definitions of the different scopes are explained in the following.

The direct effects can be summarized to the measured economic activity directly attributed to sustaining, developing, and operating the airport. Or in other words, economic activity, or value generated immediately by the presence of Copenhagen airport. Thus, the immediate activity or value that is generated at the airport directly dependent on the industries conducting business on the airport grounds and/or directly due to the airport's existence.

Derived effects consist of so called *indirect* and *induced* effects. Indirect effects are ascribed the activity of the suppliers to the businesses at the airport since the suppliers are acquiring goods and services as well to meet the demand of the businesses at the airport as input in their economic activity at the airport grounds. The employees at the industries engaging in direct and indirect activities generate income that can spawn demand for goods and services for household consumption. This can in turn lead to an increase in employment for the industries engaged in meeting the rising demand of the household sector. The activity initiated by income prompted household demand are often referred to as induced effects.

Apart from the direct effects and their derived effects, there are other socioeconomic effects with broader societal range, namely the catalytic effects of the presence of a given institution (private or public) or governance structure that facilitate additional economic activity. In the case of Copenhagen Airport, that facilitates local and international transportation of travelers and goods, the catalytic socioeconomic effects of the presence of the airport can be summarized to facilitate tourism and business activity across Denmark and between nations, enabling people and business partners forming and maintaining relations.

The catalytic effects are not covered in this part of the compilation and methodology report, however, in a supplementary compilation VisitDenmark¹ has carried out an estimate of the catalytic effects on tourism in Denmark attributed to the presence of Copenhagen Airport. For this assessment and the official Danish assessment of the socioeconomic value of tourism in Denmark, VisitDenmark use CRT's regional databank and model SAM-K/LINE as compilation tool, hence the compilations are retrieved within a consistent data- and methodology framework. SAM-K/LINE will be described in further chapters.

Of course, there are other important effects not included within the scope of the project. The consequential environmental impact of the airport and air transport, the research and development of aviation and the effects of bringing people together across nations are only a few of many major areas to consider in this context.

The economic variables we focus on in this phase of the project, are the national accounts key items: gross value added (GVA), employment and tax revenues in

¹ VisitDenmark is the national tourism organization in Denmark engaged in the marketing of Denmark as a travel destination, as well as national and international coordination and analysis work. They are responsible for the official Danish assessment of the socioeconomic value of tourism in Denmark.

accordance with the concepts, methodologies and accounting in the Danish national accounts, and hence the EU legislative manual, [European system of accounts 2010²](#).

1.3 This report

This report seeks to explain and document the compilation of the direct and indirect socioeconomic effects of Copenhagen Airport on the Danish economy. Chapter 2 describes the main data sources and generic methodology aspects of SAM-K/LINE. Chapter 3 describes the design of the compilation for Copenhagen Airport and chapter 4 summarizes the results.

2 Data and model

The compilation is carried out using CRT's regional economic model, SAM-K/LINE®, an interregional input-output model with integrated demography dimensions based on a set of coherent social accounting matrices at Denmark's most decentralized governmental level, municipalities (*kommuner*). Hence, an essential feature of the model is that it can calculate socioeconomic effects of a given incident to the economy at a municipality level.

Another vital feature of the model is that its detailed data foundation and projection results match with Denmark's official, national statistics and forecasts for the Danish economy (e.g., GDP, employment, tourism satellite accounts). This ensures that the results produced for Copenhagen Airport in this project, is comparable to the national figures of Denmark and enables comparability to other aspects compiled within the framework of the model.

SAM-K/LINE is built around a set of consistent made data from several different data sources that describe the Danish economy and the labor market. In this chapter, the background characteristics of SAM-K/LINE and Denmark's register-based employment statistics are provided as well as background on the data retrieved through Copenhagen Airport's access card databank to their grounds.

2.1 The regional databank and regional model SAM-K/LINE®

SAM-K/LINE consists of sets of local social accounts matrices (SAM-K) and a regional economic model compilation (LINE).

A **social accounting matrix** (SAM) extends the classic input-output framework. This means that data is expanded with socio-economic or demographic characteristics. For example, are background variables on gender, age, education and place of residence incorporated for the population, and their place of employment if employed. Another example is households' expenditure on private consumption is shown for different household types (single or multi person families, with or without children). This

²GVA is for this use comparable to GDP, however, GDP can not be decomposed on an industry level. Employment follows the definitions in ESA2010 and hence the production boundary of the national accounts and the ILO guidelines on measuring employment. Tax revenues are calculated on the following selected revenue sources: Duties and taxes on products (e.g. VAT), corporate taxes, central government and municipality taxes and church taxes.

information is not available in classic input-output tables (Stahmer, 2004), and therefore cannot be extracted from calculations with a standard input-output model.

SAM-K data make use of a wide range of different data and statistics supplies, e.g.:

- ▶ Register data from administrative sources in Denmark, for instance on labor market status, income, education, age, place of residence, commuting etc. for the population of Denmark
- ▶ Detailed supply-use tables for the commodity balancing underlying the Danish national accounts and input-output tables
- ▶ Denmark's regional accounts at a municipality level (NUTS-3 level)
- ▶ Detailed household budget survey data

All data/statistics are official figures of Denmark provided by Statistics Denmark and made accessible either through CRT's research engine or are customized assignments commissioned and paid for by CRT carried out by Statistics Denmark.

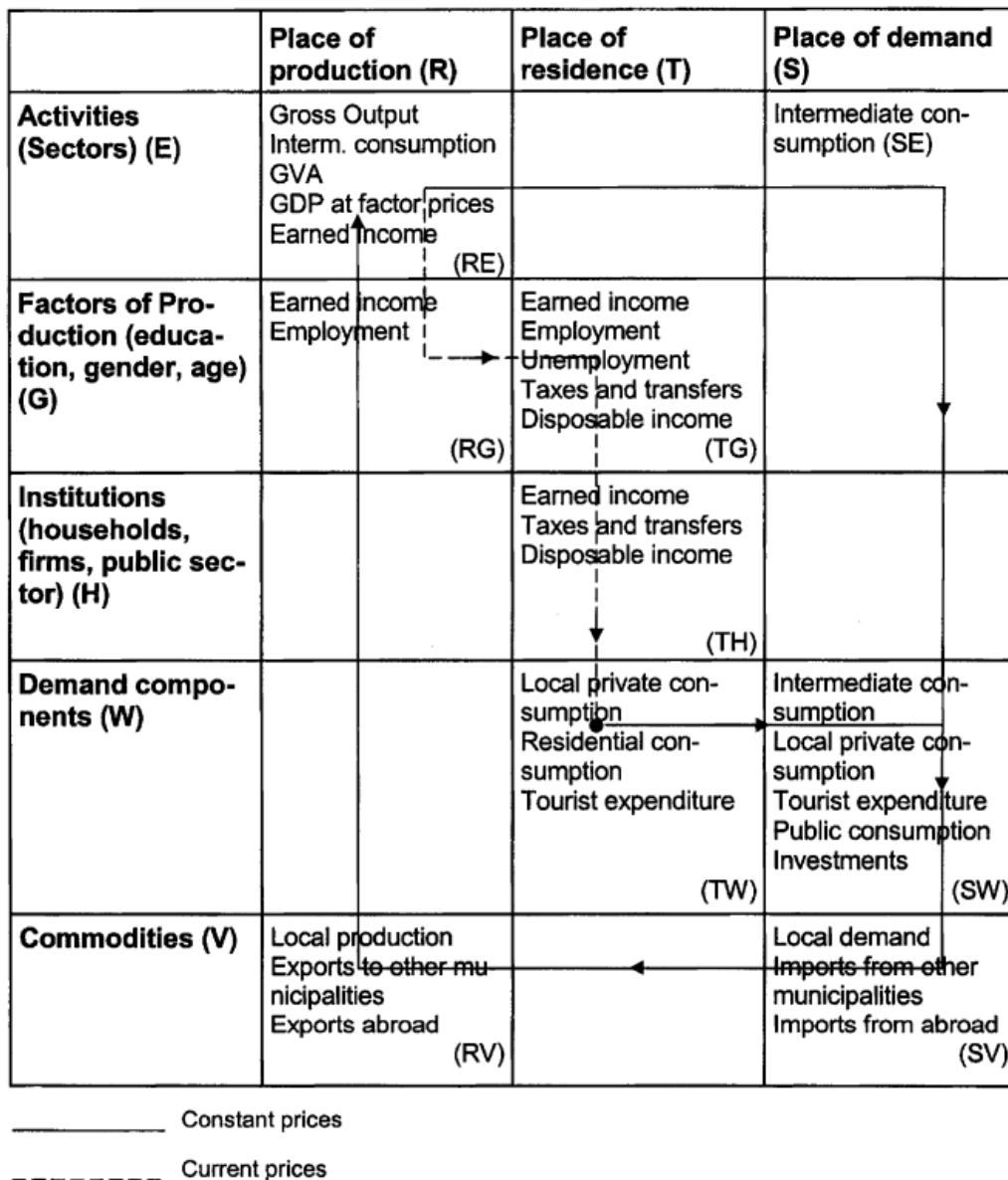
Hence both macro statistics and micro data is loaded and made comparable, which is necessary in relation to a regional macroeconomic model where not all source statistics can be retrieved at a micro or individual level.

The model uses this data to set up supply-use tables at a NUTS-3 level (Madsen and Jensen-Butler, 1999), which is necessary for the regional, macroeconomic model to capture the interdependence across the municipalities of Denmark.

Since not all data is available to set this up at the municipal level, it is necessary to carry out supplementary estimates. This applies, for example, to the compilation of interregional trade, which is estimated in the model using a gravity model. This ensures that the municipal supply-use tables are not only municipal, but also inter-municipal. This data makes it possible to analyze how the economic activity in one municipality affects the economic activity in other municipalities in the country.

LINE[®] denotes *Linear Interregional Economic model* and is the core regional economic calculation model when standing alone. LINE enables calculations of the interregional direct and derived (indirect and induced) effects of a given shock to the economy. The shock can be designed as changes in demand (e.g., if a new construction project is to be built or more tourists are expected to visit a given area), the shock can also be designed to directly affect the supply (e.g., what are the derived effects if the production value of an industry in a municipality increases).

Figure 1. Illustration of LINE



Source: Madsen & Jensen-Butler (2004).

Figure 1 shows an illustration of how the model calculates the effects of a given shock. The outbound arrows illustrate the indirect effects. For example, if the production value in a given industry must increase (box RE), then the demand for the types of raw materials or bought services that are used as inputs in their production (box SW) will increase. This demand can both be produced within the same municipality, in other municipalities or imported from abroad (box SV), and thus increase production for these goods and services within the municipality and other municipalities in Denmark (box RV) and in the industries that normally produce these goods (box RE).

The inbound arrows in Figure 1, illustrates the induced effect. For the sake of simplicity, we continue from the previous example with a shock where production in a given industry increases (box RE). This will also increase the need for labour input in the production (box RG) and increase employment or/and hours worked, which in turn will increase the wages and salaries paid to the employees (box TG). The increased income will generate income taxation and disposable income (box TH), and part of the disposable income is spent on consumption (box TW) that can be consumed by the households within their municipality of residence or outside – in Denmark or abroad (box SW). The demand of the households can be produced within the municipality, in other municipalities or imported from abroad (box SV) and consequently increase the production of these goods and services within the municipality and other municipalities in Denmark (box RV) and in the industries that produce these goods and services(box RE).

In practice, the model essentially runs ten iterations, as the effects hereafter become infinitesimally small.

The model uses the same assumptions that typically applies to input-output models. This entails, for example, that the model is initially linear, the derived effects of a given direct effect occur instantaneously and no capacity limitations are assumed (e.g., that there is unbound labour available if the demand for labour increases).

This is different from the assumptions in the national general equilibrium models and macro-econometric models that are predominant in Denmark, however, they do not have the complexity of an interregional dimension as LINE does.

2.2 Administrative data and registerbased statistics in Denmark

The databank for the model utilizes the unique data source presence in Denmark, the so-called registers, or administrative data, which are collected in Denmark when individuals (persons or firms) register for different life events, purposes or transactions.

The main sources are registers operated by the Danish central tax administration. For this project, a key source is Statistics Denmark's e-Income register, around which (among other registers) the register-based labour force statistics (RAS) is assembled and RAS is central for the design of the shock constructed for this project.

Data in the e-Income register is produced by the central customs and tax administration and the register is based on the information that employers and others who pay wages and salaries, remunerations, pensions etc. are required by Danish law to register, if they want to operate in Denmark.

For each employee, the pay declaration slip contains information regarding all employment including volume and type of income and the amount withheld to provisional tax³.

³ For further information on Denmark's registers, please visit <https://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics>

RAS is an annual labour market statistics based on the populations' connection to the labour market on the last working day in November⁴. Because the e-Income register is based on employers operating from Denmark, register data is also collected for employees residing outside Denmark, that being the case. This is coherent with the labour input according to national accounts principles, which includes all employment engaging in production processes within the production boundary of the Danish national accounts (and hence comparable to GDP, GVA, real growth etc.)⁵.

The employment in the Danish national accounts and hence the employment in SAM-K is (with few exceptions) based on the Danish registers as well as RAS. Except for the employment estimates that is labour input to the unregistered production within the production boundary of the national accounts – undeclared work and specific intentional, yet illegal transactions between voluntary market actors.

CRT subscribe to Statistic Denmark's research engine and therefore have access to individual data (micro data) when available. This means that when applicable background data on a microlevel can be merged and made coherent in the SAM-K databank. Hence, information on an employed person's employer's ID (company ID), place of work residence, place of home residence, level of education, age and sex can be constructed.

2.3 Airport access cards

Employed personnel who have business to conduct at Copenhagen Airport are assigned with a personal identity card, that works as a physical key and provides access to the airport grounds. To obtain an airport access card the employee must undergo a thorough security check with the Danish authorities. Each time personnel gain access to the security area, the airport access cards record personal identification, which includes information on their company ID. Generatable data on airport access cards for this project have been a count of active cards with company ID.

3 Methodology

To compile the socioeconomic impact of the activities at Copenhagen Airport within the scope described in chapter 1 and applying the features of SAM-K/LINE, the methodology principle is to set up a scenario calculating a counterfactual baseline: What if there were no international airport in the capital of Denmark? How would this affect the local area of the airport? How would this affect central figures of the Danish national accounts such as employment, GVA and tax revenues?

Consequently, and finally, to capture the impact of the activities at Copenhagen Airport, subtract the counterfactual baseline from the current picture of the Danish economy accounted for (observed, historical data), and the difference can be

⁴ RAS is compiled according to the international guidelines from ILO (International Labour Organization) for classification of the population's affiliation to the labour market. The classification is called ICSE (International Classification of Status in Employment).

⁵ For further national accounts definition, please see ESA2021 under literature.

interpreted as the total effects of Copenhagen airport. As described in chapter 1, the total effects covered in this report, does not include catalytic effects. VisitDenmark have defined and carried out a catalytic effects compilation regarding tourism using SAM-K/LINE.

3.1 Estimating the direct effects of Copenhagen Airport

A scenario calculation for historical data using SAM-K/LINE implies in this project, a shock to the economy that entails removing the airport activities that can be seen as the direct activities and hereafter let LINE compile the corresponding derived effects (indirect and induced effects⁶).

Hence, the first phase of the project compilation is to assess the direct economic activity at the grounds of Copenhagen Airport. These activities are defined as the economic activities directly attributed to the existence of the airport, or in other words, activities that wouldn't have had taken place, if there hadn't been an airport. They include Copenhagen Airport's own activities and activities in the immediate extension of Copenhagen Airport, which are located primarily on site due to the infrastructure, administration, facilities and institutions of the airport.

In the case of Copenhagen Airport, it can be assumed that the direct activity of the airport is the one taking place at the airport grounds, and hence the labour input in the direct production can be encircled utilizing data from the airport access cards registration system. When an assessment of the direct employment at the airport has been made consistent to national accounts standards, the subsequent economic activities can be estimated, applying the national accounts linkage between production value and employment from the national accounts.

3.1.1 Employment population

From the airport access card data, information on the public company ID can be obtained. A company can have one or more workplaces and thus employment, that does not concern Copenhagen Airport. An equivalent public company code is a class variable in the register-based labour market status statistics (RAS); however, the code is masked for the sake of privacy.

Workplaces are also a class variable in RAS and merged with their place of operations (by municipalities). Workplaces are characterized as local kind of activity units in national accounts and can be classified into industries comparable to those of the national accounts.

The public company IDs are register report items and perceived as solid. Workplace IDs are also reported on by companies, but the workplace IDs undergo a less restrictive validation process when not relevant for taxation purposes. Therefore, it can occur that a company in the registers can be classified uneven for statistical purposes at the workplace level.

A selection rule algorithm based on airport access card data was applied to the masked RAS-data with the purpose of extracting the direct employment as defined

⁶ See chapter 1 for definitions.

above. An in-depth analysis of the public company IDs from the airport access card data led to the following selection assumptions:

- ▶ Activity in industries exclusively concerning aviation in the Capital Region of Denmark is fully ascribed to take place at Copenhagen Airport.
- ▶ Public company IDs from airport access card database that are validated as exclusively concerning aviation in the Capital Region of Denmark regardless of the industry classification of their workplaces.
- ▶ Activities in industries that cannot be classified exclusively concerning aviation are identified via airport access cards through company IDs that do not belong in the above categories but in selected industries for workplaces in addresses that could be assigned to municipalities of Copenhagen Airport (Tårnby and Dragør).
- ▶ A supplementary estimate for direct employment regarding construction was made, because the above procedure captured an unplausible low number. Often, employed personnel in the construction industry work from different sites and projects and often their workplace is reported as the same as their head office, which is true from the viewpoint that they are based there, but for statistical purposes, when you want to measure where in the country they are operating from, the report cannot be used⁷.

The direct employment selected are employees and self-employed persons with primary status (and job) in the RAS-register fulfilling the selection rules. RAS employment is a stock measure at the end of November, and the national accounts employment measures the average employment of the year. For the selected population we found that there was no significant difference, and the two measurements could be used interchangeably.

The RAS population was kept wide and inclusive of non-Danish residents consistent to the employment population in the national accounts.

There is no reason to think that it is necessary to include estimations for undeclared work at Copenhagen Airport.

The above concludes for the sake of transparency and verifiability, that the employment compiled based on the RAS-register can be viewed as best practice estimate and a solid proxy of the estimation of direct employment comparable with concepts of the national accounts and the relevant employment population to use as basis for the shock design of the counterfactual scenario: The Danish economy without activities on the grounds of Copenhagen Airport.

⁷ For a more detailed description of the methodology of the estimation on the direct employment concerning construction, please go to the appendix.

3.1.2 Economic activities

The corresponding national accounts production value associated with the attained direct employment is then compiled using the detailed data from SAM-K.

For example, if 1 employed person in industry i and workplace municipality m produces y value according to SAM-K, then that is the value ascribed for all employment uncovered in this category combination.

Hence, the labor productivity per employed person is assumed to be constant for each industry \times municipality combination.

3.2 Compiling the total effects of Copenhagen Airport

The scenario calculation for historical data using SAM-K/LINE implies removing the direct airport activities in SAM-K and let LINE compile the corresponding derived effects (indirect and induced effects⁸). The shock is designed to occur on the supply side of the economy and is introduced for the production values representing the direct economic activity.

Based on SAM-K the corresponding intermediate consumption is calculated using assumptions on fixed input shares to production. Tax revenues are either calculated using fixed tax-shares or when available for income taxation, based on register data.

When the model has finished iterating (10 iterations⁹) the baseline has been established. And the difference between the counterfactual baseline and the observed, historical data of the Danish economy, can then be said to constitute total economic effects of Copenhagen Airport.

Combined with the demographic characteristics of the labour input in SAM-K, analogous records of the socioeconomic impact of Copenhagen Airport are thus made accessible.

4 Results

The economic variables are the national accounts key items: gross value added (GVA¹⁰) and corresponding employment across industries and municipalities.

Tax revenues are a sum of duties and taxes on products (e.g. VAT), corporate taxes, central government and municipality taxes and church taxes. The total tax revenues are compiled across municipalities and dependent on the type of taxation the municipality can be viewed as the place of production (corporate taxes), place of commerce (VAT) and place of residence (income taxes).

The social demographic impact is focused on variables such as age, gender, education, and residency of employment attained to activities at Copenhagen Airport.

⁸ See chapter 1 for definitions.

⁹ See chapter 2 for the description of iterations with LINE.

¹⁰ GVA is for this use comparable to GDP, however, GDP can not be decomposed on an industry level.

4.1 Main tables

Summery table

Employment (head count)	2019	2020	2021
Direct effect of CPH	19.300	14.800	13.800
Derived effect of CPH	15.800	12.100	13.000
Total effect of CPH	35.100	26.900	26.800
Grand total for DK	3.005.500	2.973.000	3.030.200
CPH share of DK (pct.)	1,2	0,9	0,9
Gross value added (m DKK)			
Direct effect of CPH	14.000	7.100	8.500
Derived effect of CPH	11.400	8.200	10.100
Total effect of CPH	25.500	15.300	18.600
Grand total for DK	2.011.600	2.019.000	2.175.800
CPH share of DK (pct.)	1,3	0,8	0,9
Tax revenue (m DKK)			
Direct effect of CPH	6.000	4.100	4.700
Derived effect of CPH	3.100	2.300	2.900
Total effect of CPH	9.200	6.300	7.600
Grand total for DK	905.400	930.300	1.028.200
CPH share of DK (pct.)	1,0	0,7	0,7

Gross value added by industries

CPH (m DKK)	2019	2020	2021
A. Construction, manufacturing etc.	2.100	1.600	1.800
B. Trade	2.200	1.700	1.900
C. Transportation	11.800	5.500	6.900
D. Hotels, restaurants, entertainment etc.	1.100	500	600
E. Other service	7.200	4.900	5.900
F. Authorities etc.	1.100	1.100	1.400
Total	25.500	15.300	18.600

Grand total (m DKK)

A. Construction, manufacturing etc.	507.800	496.400	505.500
B. Trade	258.600	277.300	303.900
C. Transportation	108.000	110.700	167.900
D. Hotels, restaurants, entertainment etc.	62.600	40.700	49.500
E. Other service	650.500	658.200	693.300
F. Authorities etc.	424.100	435.700	455.600
Total	2.011.600	2.019.000	2.175.800

CPH share of grand total (pct.)

A. Construction, manufacturing etc.	0,4	0,3	0,4
B. Trade	0,8	0,6	0,6
C. Transportation	10,9	5,0	4,1
D. Hotels, restaurants, entertainment etc.	1,8	1,2	1,3
E. Other service	1,1	0,7	0,8
F. Authorities etc.	0,3	0,2	0,3
Total	1,3	0,8	0,9

Employment by industries

CPH (head count)	2019	2020	2021
A. Construction, manufacturing etc.	3.000	2.500	2.500
B. Trade	4.000	3.100	3.000
C. Transportation	14.600	11.500	10.800
D. Hotels, restaurants, entertainment etc.	3.600	2.700	2.600
E. Other service	8.000	5.400	5.900
F. Authorities etc.	1.900	1.700	1.900
Total	35.100	26.900	26.800

Grand total (head count)

A. Construction, manufacturing etc.	587.800	579.900	591.300
B. Trade	488.600	488.600	498.600
C. Transportation	148.000	141.400	142.400
D. Hotels, restaurants, entertainment etc.	210.200	192.900	196.500
E. Other service	662.200	656.300	669.300
F. Authorities etc.	908.700	914.000	932.200
Total	3.005.500	2.973.000	3.030.200

CPH share of grand total (pct.)

A. Construction, manufacturing etc.	0,5	0,4	0,4
B. Trade	0,8	0,6	0,6
C. Transportation	9,9	8,2	7,6
D. Hotels, restaurants, entertainment etc.	1,7	1,4	1,3
E. Other service	1,2	0,8	0,9
F. Authorities etc.	0,2	0,2	0,2
Total	1,2	0,9	0,9

Gross value added by industries for Tårnby and Dragør municipalities

CPH (m DKK)	2019	2020	2021
A. Construction, manufacturing etc.	300	200	300
B. Trade	700	400	400
C. Transportation	10.100	3.900	4.300
D. Hotels, restaurants, entertainment etc.	700	200	300
E. Other service	2.000	1.000	1.300
F. Authorities etc.	700	800	1.100
Total	14.500	6.400	7.900
Grand total (m DKK)			
A. Construction, manufacturing etc.	1.200	1.200	1.200
B. Trade	2.100	1.500	1.600
C. Transportation	9.800	4.200	4.100
D. Hotels, restaurants, entertainment etc.	1.100	400	500
E. Other service	3.700	2.900	3.100
F. Authorities etc.	3.200	3.400	3.600
Total	21.100	13.600	14.100
CPH share of grand total (pct.)			
A. Construction, manufacturing etc.	25,6	18,4	26,6
B. Trade	31,2	24,0	26,1
C. Transportation	103,5	92,4	104,7
D. Hotels, restaurants, entertainment etc.	66,7	51,9	64,2
E. Other service	54,7	34,6	43,5
F. Authorities etc.	21,3	22,6	31,2
Total	68,8	47,2	55,6

Employment by industries for Tårnby and Dragør municipalities

CPH (head count)	2019	2020	2021
A. Construction, manufacturing etc.	500	400	500
B. Trade	1.300	900	800
C. Transportation	12.100	9.200	8.300
D. Hotels, restaurants, entertainment etc.	2.200	1.400	1.400
E. Other service	3.100	1.700	1.700
F. Authorities etc.	1.000	1.100	1.300
Total	20.200	14.600	14.000
Grand total (head count)			
A. Construction, manufacturing etc.	2.200	2.100	1.800
B. Trade	4.300	3.700	3.100
C. Transportation	11.700	9.900	8.000
D. Hotels, restaurants, entertainment etc.	3.500	2.600	2.200
E. Other service	4.600	3.700	3.100
F. Authorities etc.	6.100	6.300	5.300
Total	32.500	28.300	23.500
CPH share of grand total (pct.)			
A. Construction, manufacturing etc.	23,5	18,7	25,9
B. Trade	30,3	23,8	25,3
C. Transportation	103,0	92,3	104,3
D. Hotels, restaurants, entertainment etc.	62,9	53,3	63,8
E. Other service	65,6	46,4	56,1
F. Authorities etc.	16,8	17,0	23,6
Total	62,1	51,6	59,6

Regional gross value added

CPH (m DKK)	2019	2020	2021
Tårnby	14.400	6.400	7.800
Copenhagen	3.100	2.700	3.700
Gladsaxe	500	400	500
Hvidovre	500	400	400
Ballerup	400	300	300
Gentofte	400	300	400
Lyngby-Taarbæk	400	200	200
Høje-Taastrup	300	300	400
Aarhus	300	200	300
Frederiksberg	300	200	300
Tårnby and Dragør municipality	14.500	6.400	7.900
Copenhagen city	17.900	9.400	11.800
Copenhagen city area	21.200	12.000	14.800
Capital Region	22.300	12.800	15.600
Central Region	700	600	800
North Region	200	200	200
Zealand Region	1.200	900	1.000
Southern Region	1.000	700	900
Region not applicable	100	100	100
Total	25.500	15.300	18.600
Grand total (m DKK)			
Tårnby	19.300	11.800	12.200
Copenhagen	334.900	344.500	407.200
Gladsaxe	55.800	55.600	56.600
Hvidovre	19.600	19.800	21.600
Ballerup	53.900	53.800	57.500
Gentofte	36.700	40.400	51.400
Lyngby-Taarbæk	25.900	25.500	27.100
Høje-Taastrup	28.400	28.200	30.100
Aarhus	132.300	134.600	143.900
Frederiksberg	25.400	25.600	27.100
Tårnby and Dragør municipality	21.100	13.600	14.100
Copenhagen city	381.400	383.700	448.500
Copenhagen city area	677.300	682.800	773.200
Capital Region	819.900	827.900	925.300
Central Region	421.800	430.400	450.800
North Region	170.100	168.500	175.000
Zealand Region	201.700	200.800	209.200
Southern Region	377.700	379.000	399.400
Region not applicable	20.300	12.300	16.100
Total	2.011.600	2.019.000	2.175.800
CPH share of grand total (pct.)			
Tårnby	74,8	53,9	63,8
Copenhagen	0,9	0,8	0,9
Gladsaxe	0,9	0,7	0,8
Hvidovre	2,3	1,8	2,0
Ballerup	0,7	0,5	0,5
Gentofte	1,0	0,7	0,8
Lyngby-Taarbæk	1,4	0,9	0,8
Høje-Taastrup	1,2	1,1	1,2
Aarhus	0,2	0,2	0,2
Frederiksberg	1,0	0,9	1,0
Tårnby and Dragør municipality	68,8	47,2	55,6
Copenhagen city	4,7	2,4	2,6
Copenhagen city area	3,1	1,8	1,9
Capital Region	2,7	1,6	1,7
Central Region	0,2	0,1	0,2
North Region	0,1	0,1	0,1
Zealand Region	0,6	0,5	0,5
Southern Region	0,3	0,2	0,2
Region not applicable	0,7	0,5	0,6
Total	1,3	0,8	0,9

Regional Employment

CPH (head count)	2019	2020	2021
Tårnby	20.000	14.500	13.900
Copenhagen	3.700	3.000	3.200
Gladsaxe	600	500	500
Hvidovre	700	500	600
Ballerup	500	300	300
Gentofte	400	300	400
Lyngby-Taarbæk	500	300	300
Høje-Taastrup	400	400	400
Aarhus	400	300	400
Frederiksberg	400	400	400
Tårnby and Dragør municipality	20.200	14.600	14.000
Copenhagen city	24.300	18.000	17.600
Copenhagen city area	28.900	3.800	3.700
Capital Region	30.400	23.000	22.500
Central Region	1.200	1.000	1.200
North Region	300	300	200
Zealand Region	1.800	1.500	1.500
Southern Region	1.400	1.100	1.300
Region not applicable	0	0	0
Total	35.100	26.900	26.800
Grand total (head count)			
Tårnby	29.200	25.200	20.200
Copenhagen	455.000	442.700	451.700
Gladsaxe	39.600	39.700	40.600
Hvidovre	28.700	28.900	29.300
Ballerup	44.900	46.400	47.300
Gentofte	47.300	47.800	48.600
Lyngby-Taarbæk	38.700	38.600	38.700
Høje-Taastrup	38.200	37.300	37.800
Aarhus	211.000	211.900	216.800
Frederiksberg	45.900	44.700	44.400
Tårnby and Dragør municipality	32.500	28.300	23.500
Copenhagen city	533.300	515.800	519.600
Copenhagen city area	355.300	356.600	362.200
Capital Region	1.094.900	1.077.700	1.093.300
Central Region	677.900	675.800	690.600
North Region	286.800	284.000	289.200
Zealand Region	334.700	333.400	343.100
Southern Region	604.900	596.500	608.500
Region not applicable	6.100	5.500	5.400
Total	3.005.500	2.973.000	3.030.200
CPH share of grand total (pct.)			
Tårnby	68,5	57,7	68,7
Copenhagen	0,8	0,7	0,7
Gladsaxe	1,5	1,2	1,3
Hvidovre	2,4	1,8	2,0
Ballerup	1,1	0,7	0,6
Gentofte	0,9	0,6	0,7
Lyngby-Taarbæk	1,3	0,8	0,8
Høje-Taastrup	1,2	1,0	1,1
Aarhus	0,2	0,2	0,2
Frederiksberg	0,9	0,9	0,9
Tårnby and Dragør municipality	62,1	51,6	59,6
Copenhagen city	4,6	3,5	3,4
Copenhagen city area	8,1	1,1	1,0
Capital Region	2,8	2,1	2,1
Central Region	0,2	0,1	0,2
North Region	0,1	0,1	0,1
Zealand Region	0,5	0,5	0,4
Southern Region	0,2	0,2	0,2
Region not applicable	0,5	0,3	0,5
Total	1,2	0,9	0,9

Regional tax revenues

CPH (m DKK)	2019	2020	2021
Tårnby	2.100	1.200	1.800
Copenhagen	2.000	1.400	1.600
Gladsaxe	200	100	100
Hvidovre	200	100	100
Ballerup	100	100	100
Gentofte	300	200	200
Lyngby-Taarbæk	200	100	100
Høje-Taastrup	100	100	100
Aarhus	100	100	100
Frederiksberg	200	200	200
Tårnby and Dragør municipality	2.300	1.400	1.900
Copenhagen city	4.500	2.900	3.700
Copenhagen city area	6.100	4.000	5.000
Capital Region	7.000	4.700	5.700
Central Region	300	300	300
North Region	100	100	100
Zealand Region	1.200	900	1.000
Southern Region	400	300	400
Region not applicable	-	-	-
Total	9.200	6.300	7.600
Grand total (m DKK)			
Tårnby	7.200	7.000	7.800
Copenhagen	120.300	118.800	133.900
Gladsaxe	13.300	13.400	15.600
Hvidovre	7.200	7.500	8.100
Ballerup	9.500	9.700	11.200
Gentofte	23.500	23.400	25.800
Lyngby-Taarbæk	13.300	13.600	15.000
Høje-Taastrup	10.900	10.800	12.800
Aarhus	53.300	55.500	61.700
Frederiksberg	17.300	17.800	19.000
Tårnby and Dragør municipality	9.500	9.300	10.300
Copenhagen city	147.200	145.900	163.200
Copenhagen city area	253.500	253.600	285.000
Capital Region	340.100	343.000	383.000
Central Region	189.500	199.000	219.100
North Region	83.100	86.400	94.000
Zealand Region	115.400	120.600	131.400
Southern Region	176.700	180.900	200.200
Region not applicable	500	500	600
Total	905.400	930.300	1.028.200
CPH share of grand total (pct.)			
Tårnby	29,6	17,8	22,5
Copenhagen	1,6	1,2	1,2
Gladsaxe	1,2	0,9	0,9
Hvidovre	2,4	1,6	1,7
Ballerup	1,2	0,8	0,8
Gentofte	1,2	0,8	0,9
Lyngby-Taarbæk	1,3	0,8	0,8
Høje-Taastrup	1,4	1,0	1,1
Aarhus	0,2	0,1	0,2
Frederiksberg	1,4	1,0	1,1
Tårnby and Dragør municipality	24,4	14,8	18,5
Copenhagen city	3,1	2,0	2,3
Copenhagen city area	2,4	1,6	1,7
Capital Region	2,1	1,4	1,5
Central Region	0,2	0,1	0,2
North Region	0,2	0,1	0,1
Zealand Region	1,1	0,8	0,8
Southern Region	0,2	0,2	0,2
Region not applicable	0,1	0,1	0,1
Total	1,0	0,7	0,7

Regional employment (by place of residence)

CPH (head count)	2019	2020	2021
Copenhagen	9.000	6.500	6.400
Tårnby	3.800	3.100	2.800
Udlandet	3.300	2.200	2.300
Frederiksberg	1.100	800	800
Dragør	900	700	600
Hvidovre	700	600	500
Greve	700	500	500
Gentofte	700	500	500
Køge	600	500	500
Roskilde	600	500	500
Tårnby and Dragør municipality	4.700	3.800	3.500
Copenhagen city	14.700	11.100	10.700
Copenhagen city area	20.000	15.200	14.800
Capital Region	23.200	17.700	17.200
Central Region	1.400	1.200	1.400
North Region	500	400	400
Zealand Region	5.000	4.100	3.900
Southern Region	1.700	1.400	1.600
Outside Denmark	3.300	2.200	2.300
Total	35.100	26.900	26.800
Grand total (head count)			
Copenhagen	367.900	359.800	364.900
Tårnby	22.000	21.100	20.200
Udlandet	54.800	53.300	53.800
Frederiksberg	58.100	57.200	57.900
Dragør	7.200	7.000	7.000
Hvidovre	27.100	26.700	27.100
Greve	25.300	25.300	25.900
Gentofte	41.200	41.100	41.800
Køge	30.700	30.700	31.500
Roskilde	45.300	45.300	46.100
Tårnby and Dragør municipality	29.200	28.100	27.100
Copenhagen city	455.200	445.100	449.900
Copenhagen city area	733.200	720.600	729.700
Capital Region	984.900	970.700	985.800
Central Region	678.800	676.000	690.400
North Region	289.700	286.800	292.000
Zealand Region	398.800	395.800	405.700
Southern Region	598.500	590.400	602.400
Outside Denmark	54.800	53.200	53.700
Total	3.005.500	2.972.900	3.030.100
CPH share of grand total (pct.)			
Copenhagen	2,5	1,8	1,8
Tårnby	17,3	14,5	14,0
Udlandet	6,1	4,1	4,2
Frederiksberg	1,8	1,4	1,4
Dragør	12,0	10,4	9,2
Hvidovre	2,5	2,1	2,0
Greve	2,6	2,0	1,9
Gentofte	1,6	1,2	1,2
Køge	2,1	1,7	1,6
Roskilde	1,4	1,2	1,1
Tårnby and Dragør municipality	16,0	13,5	12,8
Copenhagen city	3,2	2,5	2,4
Copenhagen city area	2,7	2,1	2,0
Capital Region	2,4	1,8	1,7
Central Region	0,2	0,2	0,2
North Region	0,2	0,1	0,1
Zealand Region	1,2	1,0	1,0
Southern Region	0,3	0,2	0,3
Outside Denmark	6,1	4,1	4,2
Total	1,2	0,9	0,9

Employment by age

CPH (head count)	2019	2020	2021
29 and younger	8.700	5.900	6.100
30-59	22.700	17.700	17.500
60 and older	3.700	3.200	3.300
Total	35.100	26.900	26.800

Grand total (head count)

29 and younger	762.900	751.500	784.500
30-59	1.864.900	1.839.500	1.850.200
60 and older	377.700	382.000	395.500
Total	3.005.500	2.973.000	3.030.200

CPH share of grand total (pct.)

29 and younger	1,1	0,8	0,8
30-59	1,2	1,0	0,9
60 and older	1,0	0,8	0,8
Total	1,2	0,9	0,9

Employment by sex

CPH (head count)	2019	2020	2021
Women	12.700	9.500	9.600
Men	22.400	17.400	17.200
Total	35.100	26.900	26.800

Grand total (head count)

Women	1.427.500	1.412.500	1.440.900
Men	1.578.000	1.560.500	1.589.400
Total	3.005.500	2.973.000	3.030.200

CPH share of grand total (pct.)

Women	0,9	0,7	0,7
Men	1,4	1,1	1,1
Total	1,2	0,9	0,9

Employment by education

CPH (head count)	2019	2020	2021
1. Short-cycle higher education	2.000	1.600	1.600
2. Medium-cycle higher education	4.100	3.100	3.200
3. Long-cycle higher education	3.300	2.700	2.800
4. Vocational education	11.600	9.000	8.900
5. No education, etc.	14.100	10.500	10.300
Total	35.100	26.900	26.800
Grand total (head count)			
1. Short-cycle higher education	170.400	167.800	170.400
2. Medium-cycle higher education	571.300	573.500	583.600
3. Long-cycle higher education	402.800	412.400	418.800
4. Vocational education	947.600	922.100	935.200
5. No education, etc.	913.400	897.100	922.100
Total	3.005.500	2.973.000	3.030.200
CPH share of grand total (pct.)			
1. Short-cycle higher education	1,2	1,0	0,9
2. Medium-cycle higher education	0,7	0,5	0,6
3. Long-cycle higher education	0,8	0,6	0,7
4. Vocational education	1,2	1,0	0,9
5. No education, etc.	1,5	1,2	1,1
Total	1,2	0,9	0,9

Litterature

European system of accounts 2010:

<https://ec.europa.eu/eurostat/documents/3859598/5925693/KS-02-13-269-EN.PDF/44cd9d01-bc64-40e5-bd40-d17df0c69334>

Madsen, B., & Jensen-Butler, C. (1999). Make and use approaches to regional and interregional accounts and models. *Economic Systems Research*, 11(3), 277-300.

Madsen, B., & Jensen-Butler, C. (2004). Theoretical and operational issues in sub-regional economic modelling, illustrated through the development and application of the LINE model. *Economic Modelling*, 21(3), 471-508.

Stahmer, C. (2004). *Social accounting matrices and extended input-output tables* (pp. 313-344). Measuring sustainable development: Integrated economic, environmental and social frameworks, Paris.

Appendix

Professional repair and construction companies on the airport's premises are defined as part of Copenhagen Airport's economic activity. But a large part of this activity is carried out by companies, who have not defined a formal workplace at the airport. Therefore, the above standardized method will not catch this activity. Instead, the following method is used for this type of activity:

- ▶ Companies in the airport access card database that relate to the professional repair, building/construction industry and consulting engineering for construction/new buildings are identified each year.
- ▶ An industry distribution based on the official reports to virk.dk is determined based on the largest companies (measured by number of airport cards)
- ▶ Based on the register-based labor force statistics (RAS) from Statistics Denmark, year-specific information on the relationship between primary employment and job in those concerned is applied to the identified industries to convert the number of airport cards into a measure of the number of employment.