

Commercial Properties in Statistics Denmark

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1. Introduction

Statistics Denmark has been producing Commercial Property Price Indices (CPPI) ever since 1992 and for some categories of property even earlier. This hand out describes how the different commercial property categories are defined and what criteria are used to determine what sales to include in the price calculation. Also the calculations and results are described.

Section 2 describes the data source and section 3 describes the online available statistics on commercial properties. In section 4 the SPAR-method is described and finally in section 5 some tables and figures are shown. Annex 1 describes the variables definitions and annex 2 describes how the different commercial properties are defined.

2. Data source

The source of official commercial property price indices in Denmark is information gathered for taxation purposes.

From 1992 – 2011, any purchaser of real property should submit a properly completed sales reporting to the municipality where the property was located. The sales reports were submitted to the municipality along with the deed, which must have an endorsement with the appraisal value before final registration could take place. The municipalities then forwarded the sales reports to the tax authorities, where the data was error checked. Statistics Denmark received, every quarter, data from the tax authorities with information on individual sales.

However on 9th September 2009, an electronic land registration system was introduced. Since 2011 Statistics Denmark has received weekly information from the tax authorities with information from the electronic land registration system. The data quality is generally considered to be high.

3. Commercial Properties

The purpose of the statistics for sales of commercial properties is to analyse the number of sales and the price trends for specified categories of commercial properties.

The commercial properties are divided into four main groups:

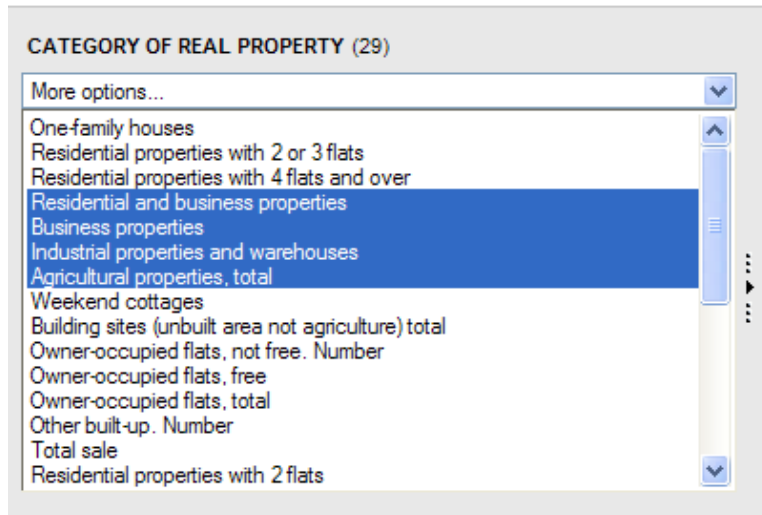
- Residential and business properties (mixed)
- Business properties
- Industrial properties and warehouses
- Agricultural properties

These categories can be found in the StatBank on the website of Statistics Denmark¹.

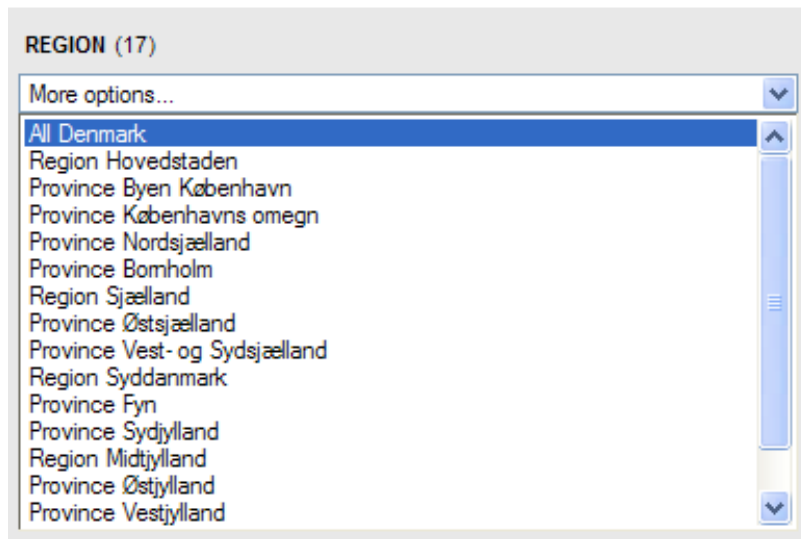
A print screen is shown below²:

¹ www.statistikbanken.dk

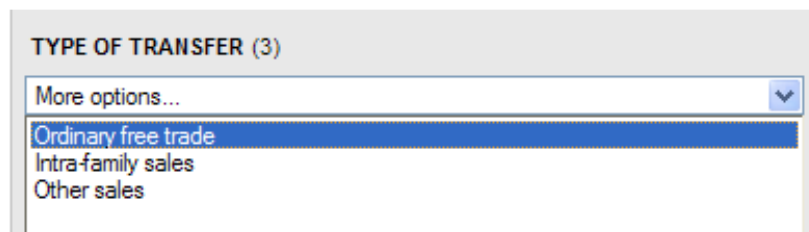
² Matrix EJEN77 on www.statistikbanken.dk



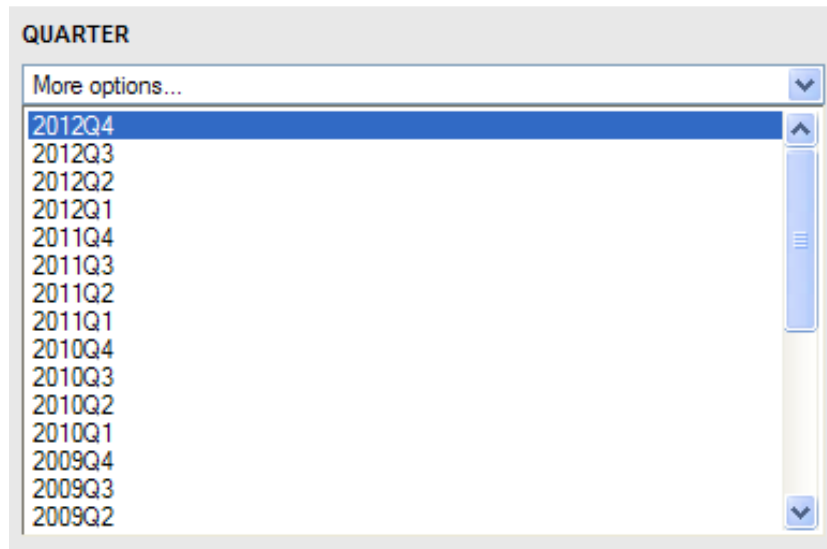
The agricultural properties include both buildings and land. The data is calculated for Denmark as a whole, five regions and 11 provinces. See print screen below¹:



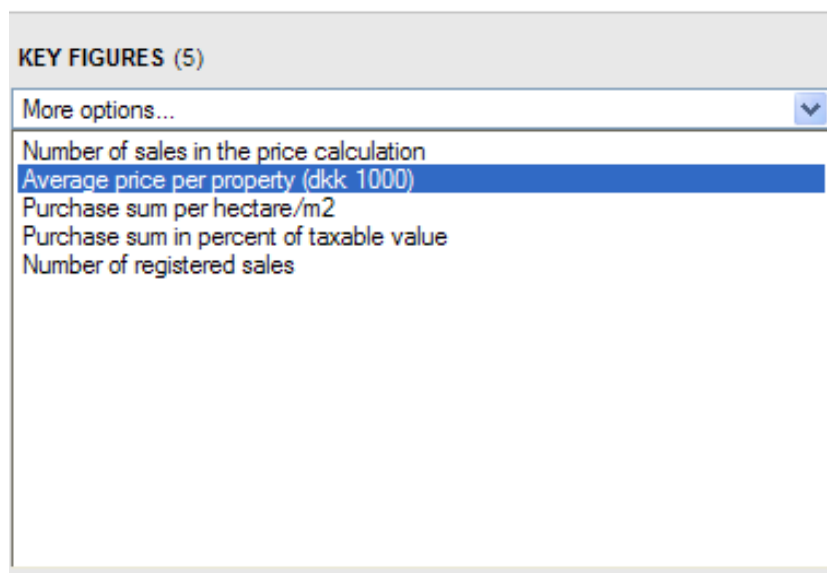
The type of transfer is divided into three types. Compulsory (forced) sales are classified as other sales. See print screen below¹:



Data is calculated on a quarterly basis and is available online from the first quarter of 1992 onwards. See print screen below.¹ The data is also available on a yearly basis.



The calculations consist of five key figures for each category of commercial properties – see print screen below:



The "purchase sum per hectare" is only available for agricultural properties. The "number of sales registered" for the most recent quarters is smaller than the number of sales actually completed during the period since the statistics is compiled before the total number of sales for the period in questions, has been registered. The development in the preliminary number of registered sales does therefore not reflect the changes in the number of completed sales.

The "number of sales in the price calculation" contains all sales, which meets the following conditions:

- No special conditions are occurring, as for instance partial property sold, more than one property sold, seller is a public authority, sales information is missing or the price is exorbitant.
- For residential and business properties, business properties, industrial properties and warehouses, sales where the buyer is private person(s)/partnership, general profit housing, equity/private or another company (not partnership), association/scholarship/ private institution or

private housing society are included. For agricultural properties, only sale where the buyer is a private person is included.

This means that the number of sales in the price calculation is always less than the number of registered sales, which covers all sales.

For more information, see annex:

- Annex 1: Variable definitions
- Annex 2: Definition of commercial properties

Price indices are only calculated for ordinary free trade, in order to exclude non-market prices. Price indices for commercial properties are available online in the matrix EJEN5 at our StatBank.

4. SPAR-method

4.1 In general

Properties that are sold at different periods are different in size, location and standards. In order to calculate the pure price change between different periods, Statistics Denmark is using the SPAR (Sales Price Appraisal Ratio) method to correct for some of these quality differences.

Most countries have tax on real estate property, which is also the case in Denmark. Hence there is an official valuation office (The Tax Authority) that provides periodic appraisals of all taxable real estate properties. The SPAR Method has been used in Statistics Denmark since 1992.

Price term When using the class of SPAR-methods, the price index is calculated by indexing the ratio between the purchase price and the appraisal value, here after referred to as the SPAR-value. The appraisal of a property can be viewed as a "commodity" and the SPAR-value can be viewed as the "price" of this commodity.

The SPAR-value (the price term) can be calculated in several different ways. Statistics Denmark has chosen to calculate the SPAR-value as the arithmetic average purchase price divided by the arithmetic average appraisal value. The formula for calculating the SPAR-value is shown in equation (1) below:

$$(1) \text{ SPAR} = \frac{\frac{\sum \text{price}}{n}}{\frac{\sum \text{appraisal}}{n}} = \frac{\sum \text{price}}{\sum \text{appraisal}} = w_1 \cdot \text{spar}_1 + w_2 \cdot \text{spar}_2 + \dots + w_n \cdot \text{spar}_n$$

where,

$$\text{spar}_i = \frac{\text{price}_i}{\text{appraisal}_i} \text{ (individual spar-value)}$$

$$w_i = \frac{\text{appraisal}_i}{\sum \text{appraisal}} \text{ (the weight)}$$

This means that the appraisal value is used as a current weight. Therefore, the higher the appraisal, the higher is the weight. This class of SPAR method is therefore referred to as the value- weighted SPAR-method.

Price index The price index is calculated by indexing the SPAR-value, as shown in equation (3):

$$(3) I_t = \frac{\text{spar}_t}{\text{spar}_{t-1}} \cdot I_{t-1}$$

where,

I_t :Price Index in period t

Spar_t :Spar value in period t

Growth contribution When using the value-weighted SPAR-method, the growth contribution for each sale can be computed according to equation (4):

$$(4) \text{Growth contribution}_i = w_i \cdot \left(\frac{\text{spar}_i}{\sum \text{SPAR}_{t-1}} - 1 \right)$$

Implementing a new appraisal Every year the Danish Tax Authority is calculating a new appraisal value. However, in even years it is only the commercial properties that are getting new appraisals and in odd years it is only residential properties that are getting new appraisals. Statistics Denmark will receive the 2012-appraisal in October 2013. The basic formula in equation (3) is only valid if the appraisal is based on the same period in both the numerator and denominator. Therefore it is more precise to add the appraisal base period (bp) to equation (3). This is done in equation (5) below:

$$(5) I_t = \frac{\text{spar}_t^{\text{bp}}}{\text{spar}_{t-1}^{\text{bp}}} \cdot I_{t-1}$$

First time a price index is calculated for the latest quarter, there are approximately 90 per cent of all sales included. Each quarter is revised 2 times before all sales are included in the statistic. This means that each quarter is published 3 times before the figures are final.

Example for 2012 Q1:

Category of real property	Preliminary 1	Preliminary 2	Final data
Residential and business properties	91,2	91,1	90,8
Business properties	105,4	105,3	105,6
Industrial properties and warehouses	93,0	91,8	90,6
Agricultural properties	88,7	88,4	88,7

Since preliminary data are published and a new tax-assessment is received before figures are final it has to be decided from which period the new tax-assessment should be implemented. To keep it simple, the new tax-assessment is always implemented for the first quarter of a year, but it still has to be decided for which year it should be done. There are 3 different years to choose:

1. Next year (on quarter 1)
2. Previous year (on quarter 1)
3. Current year (on quarter 1)

For example, the 2012 tax-assessment is received in October 2013 and the preliminary data for Q3 2013 is published shortly after in December 2013.

Case 1:

One extreme is to implement the new tax-assessment on data for the next year (case 1). An advantage of the data in this case is that all of the three versions will always be based on the same tax-assessment and therefore the historical data will not be revised due to implementing of a new tax-assessment. An disadvantage of the final data is the tax-assessment is lagged 2 years in relation to the actual sales period and therefore the tax-assessment is not the most optimal to use.

2011 (2009 tax-assessment)
2012 (2010 tax-assessment)
2013 (2011 tax- assessment)
2014 (2012 tax-assessment)

Case 2:

Another extreme is to implement the new tax-assessment on data for the previous year (case 2). An advantage of the final data in this case is that the tax-assessment is not lagged in relation to the actual sales period and therefore the tax-assesement is the most optimal to use. The disadvantage is that the historical data can be revised significantly when the new tax-assessment is implemented.

2011 (2011 tax-assessment)
2012 (2012 tax-assessment)
2013 (2013 tax- assessment)
2014 (2014 tax-assessment)

Case 3:

Case 1 and case 2 are two extremes. In between them is case 3. The historical data can here be revised slightly when a new tax-assesement is implemented and the tax-assessment is only lagged one year in relation to the actual sales period.

2011 (2010 tax-assessment)
2012 (2011 tax-assessment)
2013 (2012 tax- assessment)
2014 (2013 tax-assessment)

No matter which model you choose, it will be a choice between "the most correct data" vs. "the size of the revisions". Statistics Denmark has chosen case 3.

4.2 Advantages

The main advantages of a SPAR-method that rely on assessment information in the base period and sales information in the current period are:

- The method is easy to understand and implement
- Low/no respondent burden, since the source data on assessment and sales are available from administrative records.
- Information on structure characteristics is not required

This is true for both commercial and residential properties.

4.3 Disadvantages

The main disadvantages of a SPAR-method that rely on assessment information in the base period and sales information in the current period are:

- The method cannot deal with new buildings as they do not have an appraisal value
- If all sales are not available when publishing, you have to choose between "the most correct data" or "the size of the revisions".
- The method cannot adequately deal with depreciation of the real estates
- The method cannot adequately deal with major repairs or renovations of real estates
- The method is entirely dependent on the quality of the base period assessment information.
- There must be no systematic appraisals errors if all data is not available at the first publishing

This is true for both commercial and residential properties.

For more information about the SPAR-method, see the paper "OECD-IMF Workshop on Real Estate Price Indexes, Paris, 6 to 7 November 2007. Conclusions and future directions by Erwin Diewert".

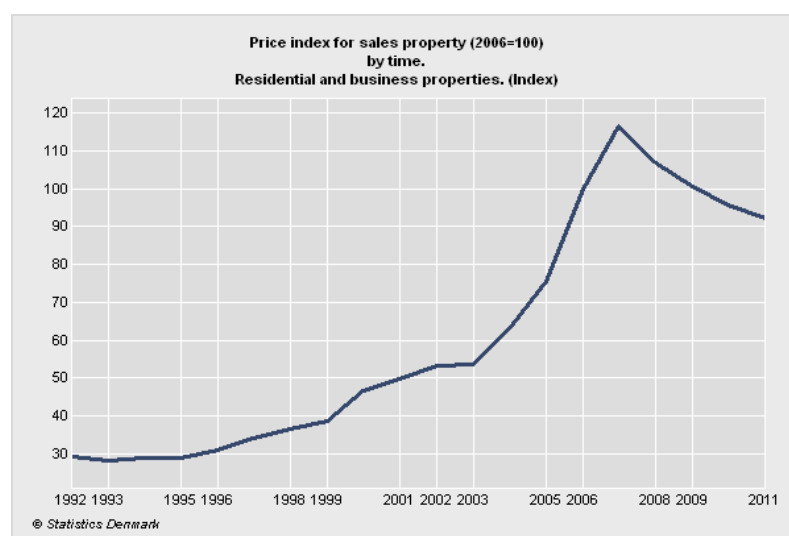
5. Tables and figures

In this section is shown some tables and figures for the four groups of commercial properties.

Residential and business properties

Year	2009	2010	2011
Number of registered sales	1.081	1.331	1.305
Number of sales in the price calculation	819	1.050	1.005
Average price (dkk 1000)	4512	4721	4590
Price index	100,4	95,8	92,2

The price index for residential and business properties has increased from 1992 to 2007 where the prices begin to decline – see figure below:



Business properties

Year	2009	2010	2011
Number of registered sales	794	1.036	968
Number of sales in the price calculation	604	774	715
Average price (dkk 1000)	8.087	10.500	8.055
Price index	101,5	120,5	99,7

The price index for business properties has increased from the beginning of the 90's to 2002, where the prices starts to decline until 2004 where the prices increased until 2009. This prices index varies more than the price index of residential and business properties – see figure below:



Industrial properties and warehouses

Year	2009	2010	2011
Number of registered sales	508	838	686
Number of sales in the price calculation	372	552	513
Average price (dkk 1000)	7.946	6.467	6.499
Price index	102,5	99,5	92,0

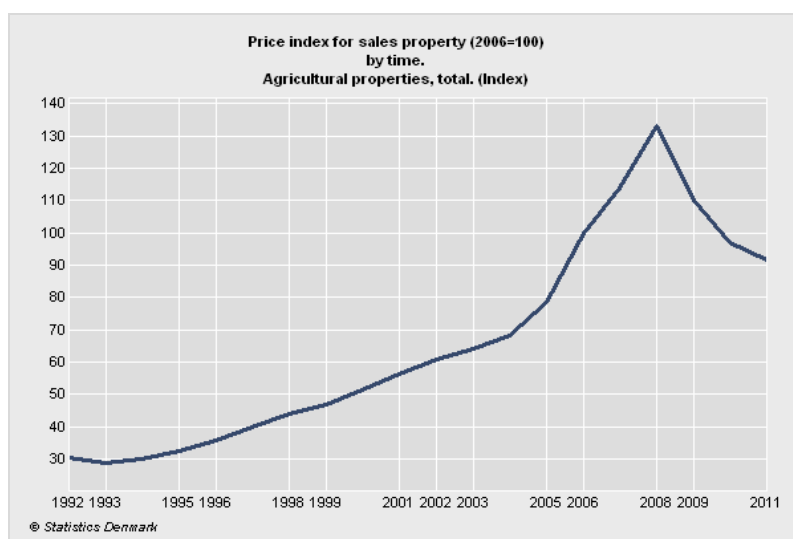
The price index for industrial properties and warehouses are quiet similar to the price index for business properties. However, the prices have declined since 2008 and onwards – see figure below:



Agricultural properties

Year	2009	2010	2011
Number of registered sales	2.574	2.942	2.843
Number of sales in the price calculation	938	1.252	1.376
Average price (dkk 1000)	4.963	4.220	4.225
Price index	110,3	97,1	91,5

The price index for agricultural properties has increased from the beginning of the 90's to 2008, where the prices starts to decline - see figure below:



Annex 1: Variable definitions

Special conditions

There are 6 codes, which may either take the value 0 or 1. If the value is 0, there are no special conditions:

- Special condition 1 = Partial sale
- Special condition 2 = Pile sale (multiple sale)
- Special condition 3 = Services apart from cash purchases price (inheritance, etc.)
- Special condition 4 = Seller is public authority
- Special condition 5 = Insufficient information
- Special condition 6 = Extreme purchase price (SPAR < 0,4 or SPAR > 3)

Ownership after transfer

There are the following options:

- 10 Private person(s)/partnership
- 20 General profit housing
- 30 Equity, private or another company (not partnership)
- 40 Association/scholarship/private institution
- 41 Private housing society
- 50 Location Municipality
- 60 Municipality (no location municipality)
- 70 County
- 80 State

Classification codes

In assessing a real estate the Tax Authority has to classify the type of use for the property. The assignment to a classification code is based on an estimate of where the property can most appropriately be placed. The assignment is made primarily of statistical and management considerations, so that similiar properties can be treated uniformly in the assessment process. An exhaustive list (including residential properties) can be found on the website of the Tax Authority:

http://www.skat.dk/SKAT.aspx?old=165738&vId=206534&search=benyttelseskode*

However, this website is only available in Danish. Below is described some codes for type of use, which are relevant for commercial properties:

Code 2: Residential and business

This code include properties where there in addition to residential premises, are premises used commercially, provided that the business use is at least 25 percent of the property value. What is meant by business is described in code 3.

Code 3: Business

This code includes properties containing only business premises. However, this code shall apply even if the business property includes housing for a caretaker, janitor or the like, where that use is less than 25 per cent of the property value.

The term "business" includes mainly shops and offices of various kinds, but also hotels, restaurants, cinemas, larger guesthouses, banking facilities, also crafts and workshops that are not in the nature of factory activity (see code 4), doctor – or dental consultation, clinics of various kinds, hairdressing salons and the like, as well as auto service stations. The list is not exhaustive.

Code 4: Factory and warehouse

The term "factories" includes not only real industry as dairies, slaughterhouses, sugar factories, brickworks and the like but also larger workshops, if it is not natural to consider them as craft. The code also includes gas, electricity, water and heating that belongs to private or concessionary companies which is operated for sales to a wider group of consumers.

The decision between, on the one hand crafts encoded as residential and business (code 2) or just business (code 3), and on the other hand, companies that is described as factories (code 4) can sometimes be difficult. Indicative will be the nature of the property and size, and whether it is in a business district or an industrial zone.

Code 5: Agriculture

Under this code are included agriculturally used and built properties that have a minimum area of 0,55 hectares. This means that the property includes both land and buildings. What matters is the property use, and it is irrelevant whether the owner has his main occupation on the property or elsewhere. It is also irrelevant whether or not the property is classified as agriculture in the land register. Properties where the agricultural use is purely secondary in relation to the use for residential is assigned to code 1. If the property also run other essential business, it must be estimated whether the property should be coded as agriculture or related to the code for that company (essential business).

Annex 2: Definitions of commercial properties

For each property type there is a broad definition used for number of sales (bold) and a more narrow definition used for calculating the price. The narrow definition is a subset of the general. The records included in the narrow definition are marked with a special code in our dataset.

Residential and business properties

Classification code = 2

Sold land > 0
Number of apartments > 0
Tax assessment, land value and purchase price > 0
Tax assessment > land value
All special conditions must be set to 0
Ownership after transfer in (10, 20, 30, 40, 41)

Business properties

Classification code = 3

Sold land > 0
Number of apartments > 0
Tax assessment, land value and purchase price > 0
Tax assessment > land value
All special conditions must be set to 0
Ownership after transfer in (10, 20, 30, 40, 41)

Industrial properties and warehouses

Classification code = 4

Sold land > 0
Number of apartments > 0
Tax assessment, land value and purchase price > 0
Tax assessment > land value
All special conditions must be set to 0
Ownership after transfer in (10, 20, 30, 40, 41)

Agricultural properties (includes building and land)

Classification code = 5

Sold area > 20.000 square meter (2 hectares)

Tax assessment, land value and purchase price > 0
Tax assessment > land value
All special conditions must be set to 0
Ownership after transfer = 10

The agriculture properties are then divided into different groups according to their size:

10-100 hectares
2-5 hectares
5-10 hectares
10-15 hectares
15-30 hectares
30-60 hectares
Over 60 hectares
60-100 hectares
Over 100 hectares