

**Frequently asked questions about
Commercial Property Price Index by vdpResearch and Deutsche Bundesbank
based on the Real Estate Monitoring Database**

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General information

1) What is the purpose of the Commercial Property Price Index?

The objective of the Commercial Property Price Index (CPPI) is to depict price developments in the German commercial real estate market in a representative and timely manner. In addition to giving an overall analysis, the index breakdown offers differentiated insights into individual sub-segments (e.g. broken down by type of commercial property or by geographical region). This information is generally needed to address a wide range of macroeconomic issues. It is particularly useful for macroprudential analyses and thus for monitoring risks to financial stability. The sub-indices of the CPPI also aid regional economic studies.

2) For which user groups is the price index intended?

The index is aimed primarily at institutions and agents involved in matters of financial stability and macroprudential analysis, including central banks, supervisory authorities, banks and other financial market participants. Government agencies, economic research institutes, real estate analysts and academia also stand to benefit from a representative and timely presentation of price developments in the commercial real estate market.

3) What types of real estate does the index cover and how are they defined?

Office properties, retail properties and multi-family houses are covered. These are defined in line with the definitions of commercial real estate proposed by the European Systemic Risk Board (ESRB). Multi-family houses are considered, provided that they are owned by enterprises; multi-family houses owned by households, meanwhile, meet the ESRB definition of residential real estate (“buy-to-let”).

4) What time period does the index cover?

The observation period of the CPPI begins with the first quarter of 2013.

5) How frequently is the index published?

The CPPI is published on a quarterly basis.

6) When is the index published?

Publication generally takes place on the tenth day of the second month following the end of the reporting quarter, or on the first working day after that.

7) What is the geographical coverage of the index?

The overall index covers Germany as a whole. Additional indices provide a regional breakdown.

8) What regional sub-aggregates are shown?

In addition to the index for Germany as a whole, various geographical categories are provided on the basis of the RegioStaR Gem5 typology.¹ This typology classifies all cities and municipalities in Germany into five categories, ranging from cities with supra-regional significance to village areas.² Sub-indices are available for all types of real estate by RegioStaR Gem5 category. For multi-family houses, an aggregate of the seven largest cities is also shown.

9) How does the new CPPI differ from previous indices?

The new index is broken down by quarter and region. CPPIs for Germany to date have typically been available either at quarterly frequency or been broken down by region.

Furthermore, the new CPPI is based on actual purchase prices. Previously available price indices for Germany are mostly based on capital values. Capital value indices derive the price indirectly from rental costs and capitalisation rates, often including estimates.

10) Where can interested parties find further methodological documentation, data downloads and contact persons for queries?

The time series can be found on the websites of the Bundesbank and vdpResearch. Contact details to request further information are also provided there.

¹ The RegioStaR classification is a system for typing municipalities in Germany according to their structural characteristics and their function in the geographical area. It was developed by the Federal Ministry of Transport for mobility and transport research. We use the Regional Statistical Spatial Typology for Mobility and Transport Research (RegioStaR Gem5), which comprises the following categories: cities of supra-regional importance, cities of regional importance, cities of local importance, urban areas, and village areas. See <https://www.bmv.de/SharedDocs/DE/Artikel/G/regionalstatistische-raumtypologie.html>

² Metropolises: metropolitan centres of supra-regional importance and high population density; regiopolises/large cities: major regional cities and regiopolises with important urban functions; central cities/medium-sized cities: cities of medium size that have central importance for their surrounding areas; urban areas: densely built-up areas with an urban character and good infrastructure; small-town/village areas: small towns and rural municipalities with low population density.

11) What roles do the Bundesbank and vdpResearch play in preparing the index?

vdpResearch updates the database with information on real estate sales from banks' financing business. It also quality-assures the microdata and gets them ready for calculating the raw indices. The Bundesbank cannot access the microdata. The raw indices are calculated using a methodology agreed upon by the Bundesbank and vdpResearch. The index series are derived after applying a smoothing method, the parameterisation of which is also coordinated between the two institutions. The Bundesbank is responsible for the calculation and final quality assurance of the published indices.

Transaction data

12) What is the source of the data used to calculate the indices?

The price data are taken from vdpResearch's Real Estate Monitoring Database (*Marktschwankungsdatenbank*, (MSKDB)). The MSKDB is made up of two comprehensive sub-databases: vdpResearch's transaction database (*Transaktionsdatenbank*, TADB) and S-Management Services's central real estate market database (*Zentrale Immobilienmarkt-Datenbank*, ZIMDB). It captures data on financed purchases of commercial real estate provided by Pfandbrief banks, cooperative banks, savings banks and some private banks. It documents more than 300,000 transactions for the period from 2003 to 2025. Multi-family houses account for the bulk of these (around 93% of recorded transactions), followed by office properties (5%) and retail properties (2%). Individual properties involved in portfolio sales or share deals are also fed into the database if they are financed by a regular loan.

13) What is the source of the data?

The data are derived directly from the credit financing operations of banks. In other words, banks that finance a property feed information on the purchase price and property characteristics, such as the floor space, into vdpResearch's Real Estate Monitoring Database.

14) What type of data are entered?

The data include the purchase price of the property, net of taxes and ancillary costs, and relevant real estate characteristics (e.g. location, year of construction, condition, usable space, etc.). This

supplementary information makes it possible to carry out a quality adjustment as part of the index calculation procedure.

15) How are the data cleansed (plausibility checks, treatment of outliers)?

The data are subjected to a multi-stage procedure to check their plausibility and consistency. This entails, amongst other things, identifying and treating extreme observations, checking for temporal and factual consistency between variables (e.g. year of construction and transaction date), and other rule-based and statistical validation steps. Observations that point to potential input errors or price formation outside the ordinary course of business are classified as outliers in these procedures, excluded from the main dataset and analysed separately.

Index calculation

16) What does the index measure?

The index measures the pure change in price of the stock of real estate (i.e. buildings and land) between the reporting period and the base year. The stock of real estate is representative for the base year and is kept constant over the entire period under review. It is therefore a Laspeyres price index.

17) How is the index calculated?

The index is calculated using a four-step procedure. First, the traded properties are classified by real estate type and regional type (stratification). Second, the individual price data for each stratum are adjusted for the price-determining influences of different property quality and aggregated into raw indices. Third, the raw indices are smoothed using the Kalman filter, and the resulting current rates of change are chained to the existing index. Fourth, the data are aggregated across real estate type and region type.

18) What does stratification mean and what is its purpose?

Stratification means assigning microdata to precisely one combination of real estate category (i.e. office, retail, multi-family houses) and region type (using RegioStaR Gem5 categories for office and retail property and RegioStaR17 categories for multi-family houses). This reduces the heterogeneity

of observations within the groups. This makes it easier to specify and estimate hedonic models for quality adjustment purposes.

19) What does hedonic quality adjustment of price data mean?

The hedonic estimation model is based on the assumption that the price of a property is equal to the total value of the property's price-determining characteristics plus a statistical error term. The contribution of price-determining characteristics is derived from the parameters estimated in the hedonic regression (shadow prices).

Specifically, the hedonic price function assumes that a property's log price per square metre can be explained by its age, the log usable or living space, and indicator variables for the property's condition and amenities. Fixed effects at the local government level control for the macrolocation. In addition, an indicator variable takes into account the relative location quality within a particular district (microlocation).

20) How are the raw indices calculated?

Raw indices for each and every stratum are compiled using the approach of Silver (2018); in particular, Equation 26.³ The observed average price change between the observation period and the estimation period of the hedonic price function is corrected for differences in property quality. The correction is based on the differences in quality of the observed properties during both periods of time, evaluated using the hedonic price function.

To allow for changes in the unobservable prices of characteristics in the hedonic price function, the latter is estimated for each calendar year. The price index is computed by linking the indices of different price functions.

21) Why are smoothing procedures used?

The commercial real estate market is characterised by a high degree of heterogeneity in terms of properties and a low number of transactions. The raw index calculation is subject to statistical uncertainties (e.g. model uncertainty, parameter uncertainty, sample variability). This results in erratic fluctuations that overshadow the market-driven index path. Smoothing is a model-based procedure that greatly reduces erratic fluctuations.

22) What smoothing procedure is used?

The price index is smoothed using the Kalman filter. To this end, a state-space model is specified. The raw index comprises market-driven index movement and a purely random disturbance variable

³ See Silver, M. S. (2018), How to measure hedonic property price indexes better, Eurostat Review on National Accounts and Macroeconomic Indicators (EURONA) 1/2018, pp. 35-66.

that reflects the measurement inaccuracies. The market-driven index movement is assumed to follow a local linear trend model (LLTM). This is used to map basic time series characteristics of the raw index trajectories.

23) What weighting scheme is used for aggregation?

A Laspeyres approach is used to aggregate the sub-indices. The weighting is based on the stock value per stratum. That stock value is derived from the floor space and the average price per square metre.

24) What is the source of the data on square metre prices?

The average square metre price per stratum is the average square metre price in the base year taken from vdpResearch's Real Estate Monitoring Database.

25) What is the source of the data on floor space?

For multi-family houses, a distinction must be made between properties owned by enterprises and properties owned by households. Only multi-family houses owned by enterprises are classified as commercial real estate. These data are taken from the census.

Due to a lack of census data for office and retail properties, the weights for such properties are calculated on the basis of vdpResearch's floor space estimates.

26) What is the base year of the index?

The base year for the price index is 2022.

27) Why is 2022 chosen as the base year?

2022 was the year of the last census. It represents the latest official floor space data for multi-family houses.

Index revisions

28) Is the index subject to revisions?

Yes. Revisions are justified in the statistical methodology and reduce the risk of the index drifting artificially due to smoothing and chain-linking. If data for a new reporting period are added, adjustments are made to the smoothed raw index series, particularly at the current end, when the Kalman filter is applied. Revisions in the chained indices reflect these adjustments. However, revisions are not made on the basis of lagged data input. The granular database is fully available at the time the index is compiled for the current reporting period.

29) How substantial are the revisions?

According to an analysis performed under quasi-real conditions, the average absolute revision of the year-on-year rate was 11% of the standard deviation of the year-on-year rate. For the real estate types, it was between 10% (multi-family houses) and 13% (offices, retail properties).

30) How many periods are revised when a quarter is published?

The three preceding quarters are usually updated again. Periods further back in time than that are not subject to regular revisions.