Session 4: CPPI Compilation
"Country Practices and Challenges"

Quarterly CPPIs for Germany using transaction data from the financing business of banks

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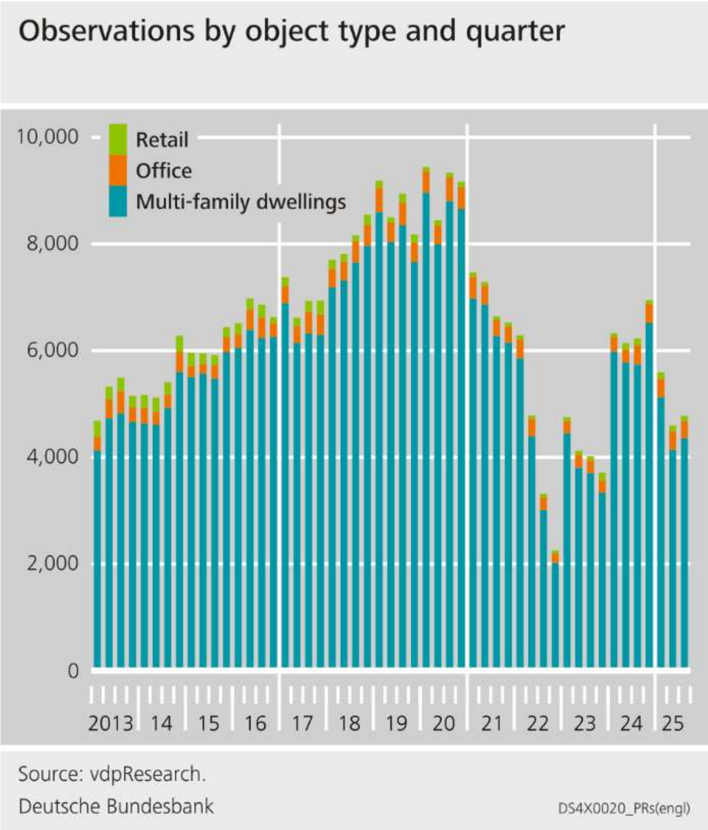
Motivation

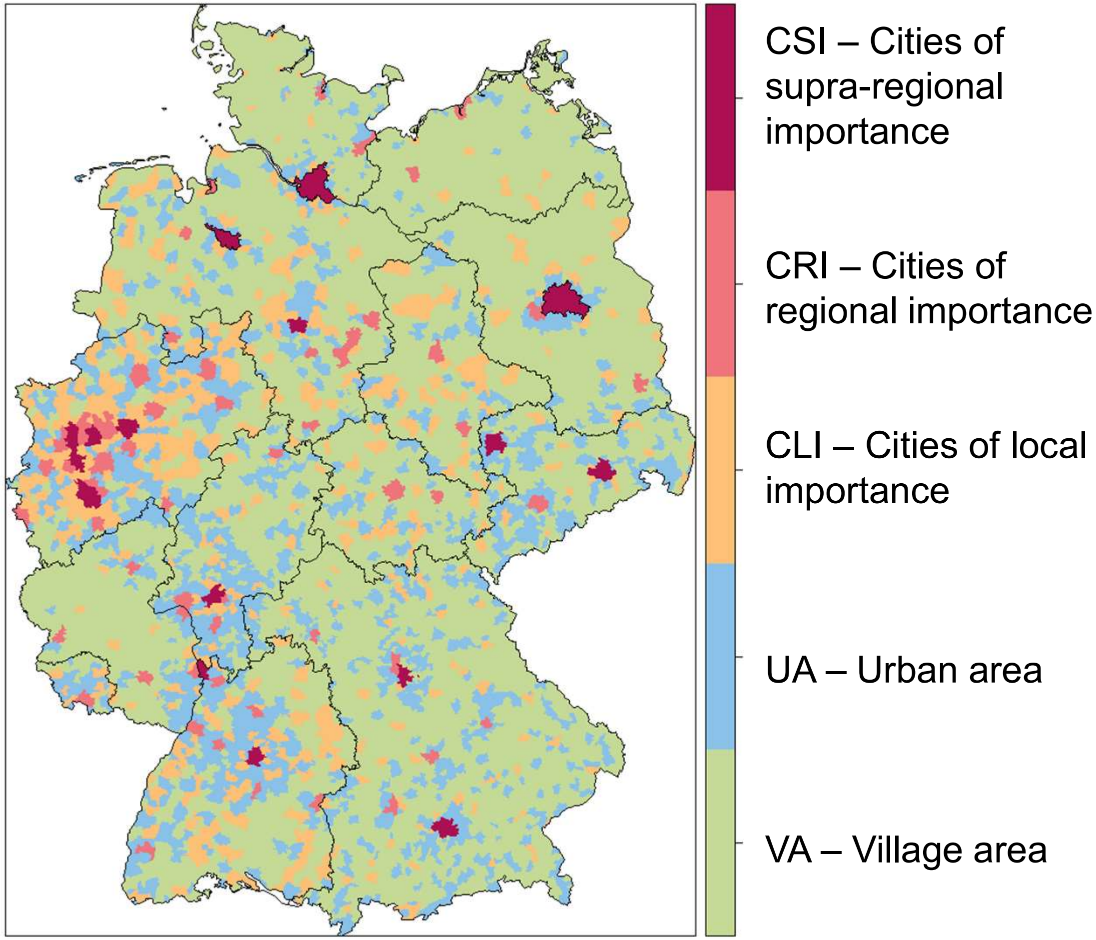
- **Urgent user need for commercial real estate (CRE) market indicators (e.g. macroprudential analysis) but significant gaps in official statistics**
  - Recommendations on closing real estate data gaps by European Systemic Risk Board (ESRB)
- **Statistical community has intensified efforts to further develop data sources, statistical methodology and compilation procedures (European Commission 2023)**
  - European Statistical System has proposed legislation for establishing a framework for the development, production and dissemination of indicators
- **Research project by Bundesbank and vdpResearch** (Association of German Pfandbrief Banks) aims at developing a consistent set of quarterly core indicators (prices, rents, rental yields) for German CRE markets using the vdp transaction database
  - Compilation of price indices most advanced ➔ Focus of this presentation

Transaction data by vdpResearch



- Information from **financing business of banks** by vdpResearch
- About **327.000 observations** between 2003 and 2025Q3
- Multi-family dwellings account for about **93 %** of observations, office buildings for **5 %** and retail space for **2 %**
- **Stratification by object types** (multi-family dwelling, office, retail)

Regional Stratification

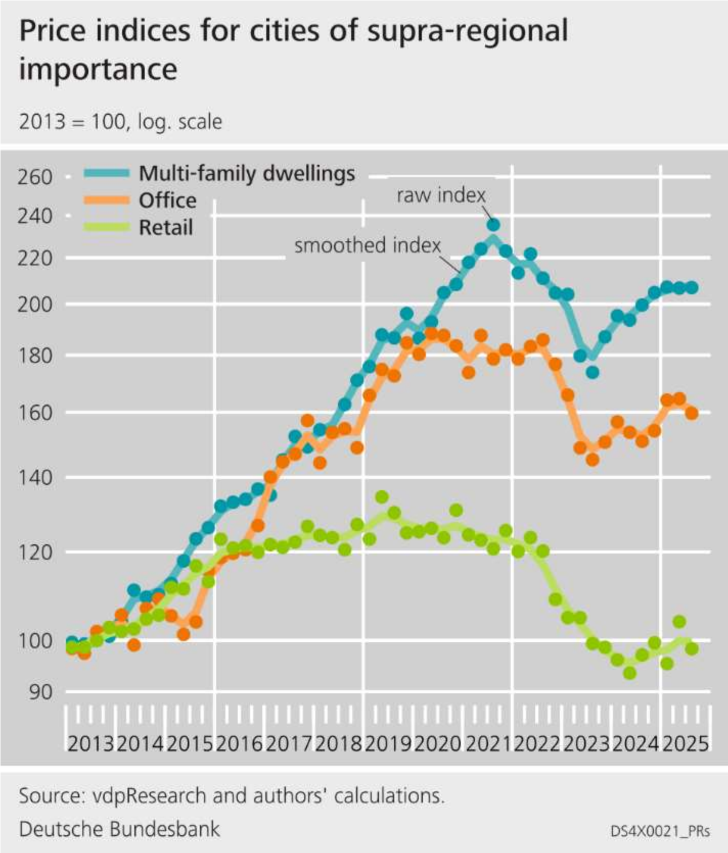


- **Regional stratification based on spatial typology** developed by the German authority for transportation and mobility research
- Common basis für all object types: **RegioStaR Gem5**
- **For multi-family dwellings, finer stratification is feasible** due to large number of observations: RegioStaR17 plus 7 largest cities separately

Raw index compilation for each type-region combination

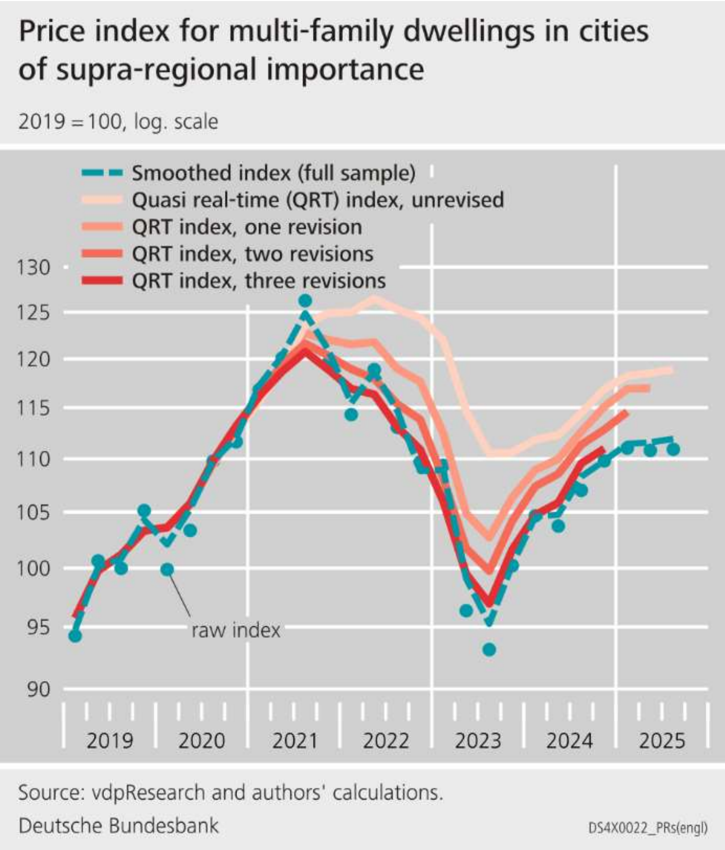
- **Data processing**: Dataset trimmed, omitting transactions with extremely high square meter prices
- **Quality adjustment**: Log-linear hedonic regression
- **price determining variables**: age, age squared, floor space, level of amenities, status of maintenance, macro and micro location
- **estimation period**: last calendar year
- **Index construction**: Silver's (2018) workaround for double imputation

Filtering



- **Raw index series** characterized by strong volatility
- Separating market volatility from sampling variability and other statistical factors by **Kalman filter** approach:
  - Specify structural time series model (Local Linear Trend Model)
  - Use smoothed time series of Kalman filter technique

Chaining and revisions



− Smoothed time series suffers from **endpoint problem**, posing a challenge for chaining

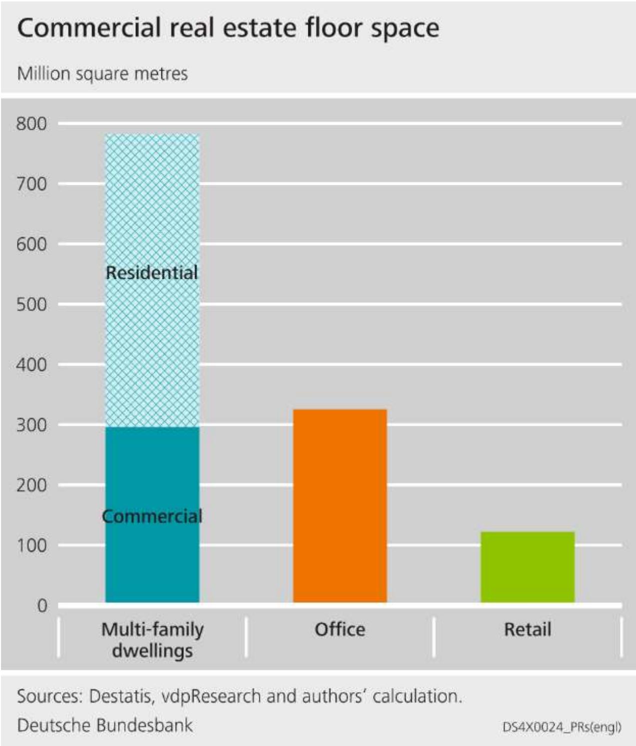
− Quasi real-time (QRT) exercise:

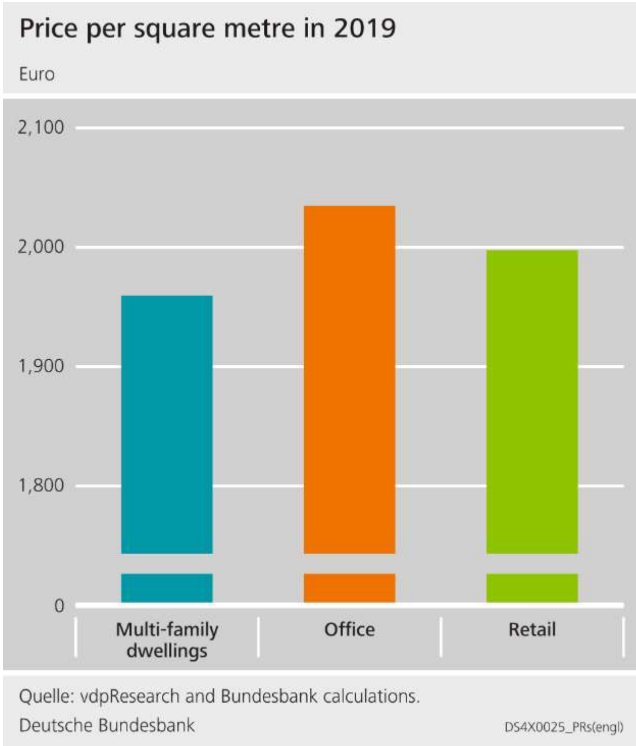
- After three revisions, the smoothed index is only subject to marginal future change

⇒ **Chained index** is compiled by

- using datapoint of smoothed raw index for new reporting period
- allowing the three last reporting periods to be revised

Weighting

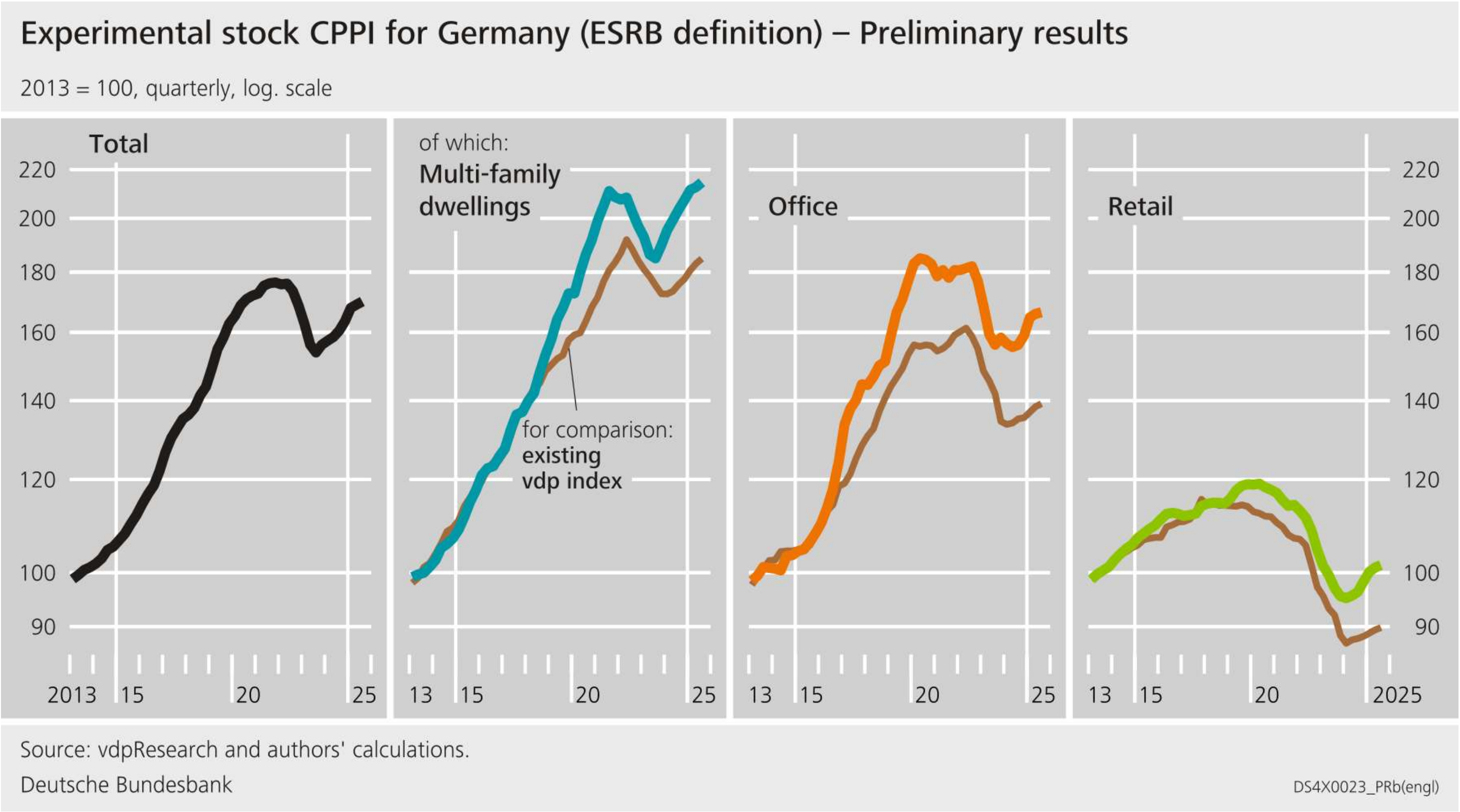




Breakdown		Weight (stock CPPI, capital value)
by type	Multi-family dwellings	39%
	Office	44%
	Retail	16%
by region	CSI	50%
	CRI	18%
	CLI	17%
	UA	11%
	VA	5%

- Index covers the key object types of the ESRB recommendations following analysts' primary interest (Knetsch, 2021)

Experimental CPPI for Germany - Preliminary results



Conclusions

- Bundesbank and vdpResearch have been collaborating in the compilation of an **experimental quarterly CPPI for Germany**, which
  - is based on the **largest transaction dataset** currently available (~26,000 observations per year)
  - suits the needs for **macroprudential analysis**, as it fulfils main requirements of the **ESRB recommendations** in terms of scope and breakdowns (type and region)
- Experimental CPPIs are to be complemented by experimental macro-consistent **rent and rental yield indices** (e.g. Knetsch et al., 2025)
- **Official CRE market indicators** are eventually needed nonetheless

References

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