

Commercial property prices: price indices vs. performance indicators

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Questions raised in this presentation

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“Real estate prices (residential and commercial)” (Recommendation 19 of the G20 Data Gaps Initiative)

1. Comparing apples with apples

- Despite the quest for swiftly disseminated indicators, it is of **utmost importance to set up a valid and reliable methodological framework** first. The **various data users make substantially different demands** on the index concepts. These, in turn, **need to be tailored for the distinctive purposes**.
- The observation of **values and prices generally yields different results**. The change in market values between two consecutive periods does not necessarily reflect the **pure, i.e. quality-adjusted, change in prices**. It is rather a *mixtum compositum* of **quality changes** due to depreciation and renovation as well as the **quality-adjusted change in prices**; if quantities remain the same.
- Let, for example, the **population be equal in the two periods** under consideration. **Due to depreciation the quality of all buildings will be lower on average**. *Ceteris paribus*, it follows that in such a situation **values decrease although quality-adjusted prices have remained constant**.

2. Different approaches to measurement

– The **market value provides a nominal measure** for commercial property. If quantities (floor space or lot size in square metres, say) are available, dividing the value in euro by that quantity yields a so-called **unit value in euro per square metre**. Thus, the value can be split up as follows:

$$(1) \quad \text{Value} = \text{Unit Value} \times \text{Quantity.}$$

– However, the unit value in Equation (1) **depends on the quality of the building and not just on floor space, or the location of the lot and not only its size.**

2. Different approaches to measurement

– Since price indices aim for a quality-adjusted indicator **prices here denote a constant quality *numéraire*.**

– With a hedonic quality adjustment, say, it is possible to decompose the value into a **constant-quality price** and a volume measure that inherits quality changes:

$$(2) \quad \text{Value} = \text{Price} \times \text{Volume}.$$

– Therefore, an index for property prices in its pure form will reflect **movements in prices that are stripped of quality changes.** The latter are included in the volume as shown in Equation (2).

2. Different approaches to measurement

- Eventually, the ultimate statistical goal is splitting up the value into a **quality-adjusted price**, the quality component itself and a quantity measure independent of quality:

$$(3) \quad \text{Value} = \text{Price} \times \underbrace{\text{Quality} \times \text{Quantity}}_{\text{Volume}}$$
$$\underbrace{\text{Price} \times \text{Quality}}_{\text{Unit Value}} \times \text{Quantity}$$

- Following Equation (3), the value is obtained via **multiplying the constant-quality price of a unit by a dimensionless mark-up (or mark-down) for the desired level of quality and the nominal quantity** of the structure or the land. This **mark-up can reflect characteristics such as the age of the building or its year of construction.**

3. Prices vs. performance indicators

- **Investment performance indicators** serve the specific purpose to provide a benchmark for investors and fund managers for commercial property investment portfolios. This is a **very different purpose than measuring the price changes** of commercial property.
- In order to clarify terminology and concepts we now turn to a definition of the key figures at hand. Departing from a real estate portfolio the **capital growth (CG)** between two periods is defined as:

$$(4) \quad CG^t = \frac{V^t - V^{t-1} + \text{Receipts}^t - \text{Expenditure}^t}{V^{t-1} + \text{Expenditure}^t},$$

- where V^t represents the portfolio value at time t . It is therefore the **change in values** plus the sum of capital receipts from sales minus capital expenditures (e.g. for new objects) divided by the capital employed (calculated as the value of the portfolio in period $t-1$ and capital expenditure in period t).

3. Prices vs. performance indicators

– The **income return** at a given period in time equals the net income, I^t , divided by the portfolio value at time $t-1$ (again corrected for capital expenditure in period t):

$$(5) \quad IR^t = \frac{I^t}{V^{t-1} + \text{Expenditure}^t}.$$

– The **total return** (TR) is the sum of the two components:

$$(6) \quad TR^t = CG^t + IR^t.$$

3. Prices vs. performance indicators

- The on-going discussion on commercial property price indicators has brought to light that **different actors in the market have preferences regarding the measurement aim that pole apart.**
- While a **substantial share of faction is in line with the well-reasoned tradition of official statistics to measure pure price changes, another part of the interest group has suggested performance indicators being most suitable** for tracking the phenomenon at hand. However, **it appears that the pros and cons are not fully understood yet.**
- Strictly speaking the two “worlds” of **price and performance figures are mutually exclusive.** There is no such thing as performance in the realm of prices; *vice versa*, prices only very indirectly or only partly influence measures such as total return.

4. A stylised framework

- Next we provide a simplified model which formally treats **prices and performance indicators in a single, unified framework**. This will allow a **better understanding of the links between the two indicators** and, most particularly, the **limitations of performance measurement**.
- Assume, for the sake of exposition, that no change occurs in the “quantity” component of commercial property. This means that the same objects can be observed over time. This implies that neither new buildings are constructed nor that old objects are demolished.
- It should be noted that this by no means rules out the cases of **depreciation due to ageing or appreciation in the form of investments in the stock**. This setup establishes the basis for what follows.

4. A stylised framework

– Let P^t be the **price** of a given building at time t – **stripped of any quality change** – and let prices evolve at the time-varying asset inflation rate π^t :

$$(7) \quad P^t = P^{t-1} \times (1 + \pi^t).$$

– On the other hand, **capital values are influenced by quality change in addition to pure price change**. Hence, define the growth of the capital value V^t at time t as the difference between price change and net depreciation. The rate d^t mirrors **depreciation net of appreciation** and, thus, its sign is not necessarily determined *a priori*:

$$(8) \quad V^t = V^{t-1} \times (1 + \pi^t) \times (1 - d^t).$$

4. A stylised framework

– In the long run, the **capital consumption should be amortised**. Accordingly, the cash flow I^t at time t of an object is linked to its value at time $t-1$ via the income return r^t :

$$(9) \quad I^t = V^{t-1} \times r^t.$$

– It immediately follows that:

$$(10) \quad r^t = I^t / V^{t-1} = IR^t.$$

4. A stylised framework

– While it is obvious that the price index captures π^t , **what information can be revealed from performance measures?**

– An index based on the growth of **capital values** (CG) gauges

$$(11) \quad CG^t = V^t / V^{t-1} - 1 = (1 + \pi^t) \times (1 - d^t) - 1 \approx \pi^t - d^t.$$

– Using capital values, therefore, introduces **quality aspects that, in turn, may lead to a biased measure of pure price change.**

4. A stylised framework

- The **total return** (TR) is frequently used to assess the performance of an investment. Since it assumes the **cash flows being reinvested**, the total return is sum of the capital growth (capital gains/losses corrected for expenditures and capital receipts) and the income return:

$$(12) \quad TR^t = CG^t + IR^t = (1 + \pi^t) \times (1 - d^t) - 1 + r^t \approx \pi^t - d^t + r^t.$$

- Depending on the prevailing circumstances, the **total return can overshoot or undershoot the true price development**. What makes it even worse is its architecture being a **mixture of three independent measures**. This will render it very hard for economic analysts – who are used to price indices – to understand. The picture drawn from **prices and performance indicators can be fundamentally different**. Eventually, this will lead to the **wrong conclusions being drawn for policy making**. Given the importance of the real estate sector for the economy and financial stability, the **stakes at risk are potentially high for experiments**.

5. A case study on Germany

Measurement aim	Aggregate type	Use for the concept
Value	Transaction-based	Nominal wealth traded on the market
	Stock-based	Nominal wealth in the whole economy
Price	Transaction-based	Pure price movements
		Deflation
	Stock-based	Pure price movements
		Deflation
Volume	Transaction-based	Real wealth traded on the market
	Stock-based	Real wealth in the whole economy
Quantity	Transaction-based	Number of transactions
	Stock-based	Physical stock of the economy
Performance	Total Return	Benchmarking of return on investments
	Cash Flow Return	Benchmarking of return on investments

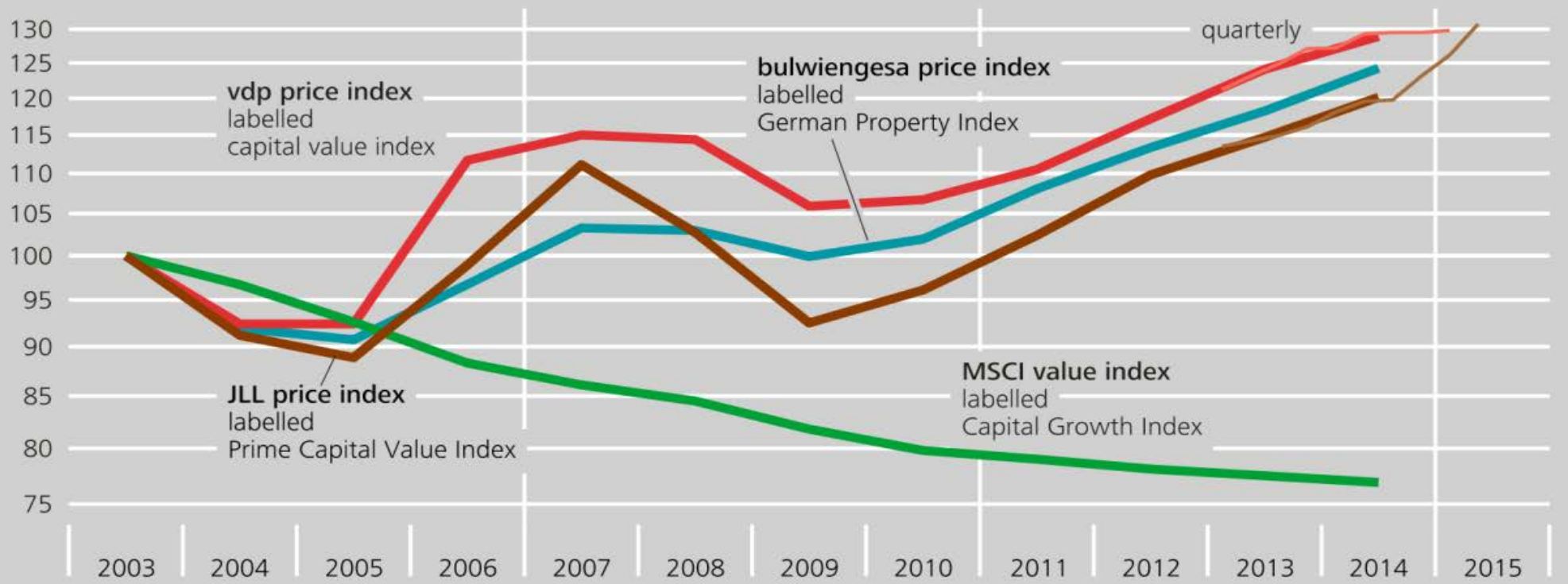
5. A case study on Germany

	bulwiengesa AG	vdpResearch	Jones Lang LaSalle (JLL)	MSCI (IPD)
Provider's label	German Property Index	Capital value index	Prime Capital Value Index	Capital Growth Index
Coverage	127 cities	Germany, roughly 40% of market value	6 major cities, prime segment	Germany, roughly 19% of market value
Quality adjustment	Stratification	Hedonic	Stratification	None
Property types	Office, residential, industry, retail	Office, residential, retail	Office, residential, retail	Office, residential, industry, retail
Aggregation	Weighted average over regions	Not applicable	Weighted average over cities	Unweighted average of sample
Frequency	Annual	Annual/quarterly	Quarterly	Annual (quarterly)
Time series start	1995 (1990)	2003/2008	1981	1996
Timeliness	t+180 days	t+40 days	t+15 days	t+90 days
Transparency	Limited	Higher	Limited	Lower
Origin of data	Various sources	Transactions	Various sources	Valuations
Classification	Constant-quality price index type	Constant-quality price index type	Constant-quality price index type	Chained nominal value index type

5. A case study on Germany

Price and value indices for office property in Germany

2003 = 100, annual data, log scale



Sources: bulwiengesa AG, MSCI, JLL and vdp.

Deutsche Bundesbank

S3IN0241B.Chart

5. A case study on Germany

- Evidently, the **capital growth does not reflect pure price movements**, since quality changes (such as depreciation) are not excluded. As a consequence, the same holds for the total return.
- In order to **grasp the empirical magnitude of conceptual differences** it is possible to solve Equation (11) or (12) for the net depreciation rate d^t – provided a measure for the price movement is available. This yields:

$$(13) \quad d^t = \frac{\pi^t - CG^t}{1 + \pi^t} = \frac{\pi^t - (TR^t - r^t)}{1 + \pi^t}.$$

- The bulwiengesa AG price index offers a measure for π^t . From this calculation we infer that, on average, **office buildings (including land) are depreciated at a net rate of 2.2 per cent a year**; it should be noted that the calculation averages the **net depreciation of the land (being in most cases 0% per definition)** and the net depreciation of the imposed structure.

6. Lessons learned

- The **coverage (regional, type of property and use) varies substantially** for the different indices.
- **A clear terminology according to statistical concepts**, i.e. a taxonomy of price, unit value, value and volume, **has to be adopted** in order to inform users.
- **Metadata and index concepts should be disclosed properly** in order to describe available indicators and compare existing sources internationally.
- The **conceptual approach to CPPIs must not be founded on portfolios** and try excluding capital expenditure as well as capital receipts; it should rather have the **quality-adjusted price as starting point**.
- We are submitting **data from bulwiengesa AG for office and retail properties** to the ECB for usage in the “*Experimental* Indicators of Commercial Property Prices” on a best effort basis.

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