Conceptual Issues in the Construction of CPPIs

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Abstract

In this presentation I review two approaches to the construction of CPPIs:

- Transactions based, or data driven.
- Target driven, in which various targets can be defined and there appear to be several estimation methods.

Next, by way of example I present some results of a recent study on commercial office space in the downtown area of a large US city. In a cross-sectional hedonic regression rent per square meter was related to a number of physical and locational characteristics, among which sustainability and walkability. In addition to a low R squared the estimated regression equation exhibited a number of counterintuitive coefficients.

Transactions based approach (1)

- Collect (all) prices (per square meter) of transactions during certain period (not too long) in certain region.
- Execute some data cleaning and calculate mean price.
- Construct simple index numbers.
- Decisions are necessary on
  - type of mean,
  - trimming or not.

Transactions based approach (2)

- Serious problem of mean-price-based index is that the mix of properties changes through time.
- Simplest cure is standardization, but
  - with respect to base period mix,
  - comparison period mix,
  - or some other mix?
- Any standardized index is a transactions-value weighted mean of mean-price-based cell indexes. Thus problem of mix-change is only pushed down a level of aggregation.
- The more cells are distinguished, the more empty cells will be found.

Measurement targets (1)

Suppose that in any period all the commercial properties can be listed, and suppose that any property comes with a price (= value of actual or potential transaction on the market).

The commercial property stock value is equal to the simple sum of those prices.

Primary target for CPPI: Measuring value change of (all) commercial property stock.

Measurement targets (2)

Composition of the stock changes continuously. Between two periods there are

- continuing properties,
- discarded properties, and
- new properties.

Secondary target for CPPI: Measuring the value change of the continuing commercial property stock.

Measurement targets (3)

But even continuing properties change through time: depreciation and renovation.

Tertiary target for CPPI: Measuring the constant-quality value change of the continuing commercial property stock (that is, the price component).

This can be done in several ways: Laspeyres, Paasche, etcetera.

Measurement targets (4)

Modified primary target for CPPI: Measuring the value change of (all) the commercial property stock, whereby the value change of the continuing elements is adjusted for depreciation and renovation effects.

In practice the *secondary target* appears to be chosen.

Problems (1)

Prices

- are observed only for properties transacted,
- are registered by various institutions,
- can be related to different dates (because a transaction of a property usually takes much time),
- do not necessarily reflect the market values of the properties.

Problems (2)

Valuations

- are obtained by vastly different methods;
- by various agencies;
- for various purposes.

Main estimation methods

- Comparing (stratified) means of transaction prices (but now stock-value weighted).
- Comparing prices of properties which are more than once transacted.
- Comparing transaction prices to assessment (appraisal) prices (SPAR method).
- Hedonic regression method where price is related to characteristics.

Ideally each method should be able to

- account for depreciation and renovation,
- make the land-structure split.

Prices and rents

- In the foregoing we were concerned with prices = market values of properties.
- After replacing some words the foregoing theory can be applied to rents = market values of *use* of properties for a certain period (usually a year).

An example from a recent Master Thesis defended at RSM 2011

- Commercial office space
- Downtown area of a large US city
- Rent per square meter was, in a hedonic regression, related to a number of characteristics.

Building characteristics (1)

- Age
- Average floor size
- Number of floors
- Sustainability (energy label)
- Quality of construction
- Amenities (AC, ICT, security, etcetera)
- Car parking

Building characteristics (2)

- Distance from center of CBD
- Walkability (= “the degree to which an area within walking distance of a property encourages walking for recreational or functional purposes.” Pivo and Fisher, *Real Estate Economics* 2011)

Results

- Number of cases 672
- 2011 asking rent per square meter
- Semi-logarithmic function incl. dummy variables
- R squared = 0.287
- Most parameters as expected but also some counterintuitive (average floor size, sustainability)

The message

Fairly detailed data from a reliable source plus a straightforward hedonic regression do not guarantee sensible results.