Fees with multiple price-dependent rates

UNECE Meeting of the Group of Experts on Consumer Price Indices

30 May – 1 June 2012

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Introduction

- STATEC is currently developing an owner-occupied housing price index system.

- In this framework, a quality-adjusted House Price Index (HPI) is already compiled.

    - measures the changes in the transaction prices of dwellings purchased by households
    - quarterly frequency
    - data goes back to the 1st quarter 2007

- The HPI can be reused to measure changes in transaction costs associated with the acquisition of a dwelling.

Introduction

European OOH classification

O.1. Owner-occupiers housing expenditures
    O.1.1. Acquisitions of dwellings
        O.1.1.1. New dwellings
            O.1.1.1.1. Purchases of new dwellings
            O.1.1.1.2. Self-build dwellings and major renovations
        O.1.1.2. Existing dwellings new to households
        O.1.1.3. Other services related to the acquisitions of dwellings
            - Registration fees
            - Notary fees

            - …
    O.1.2. Ownership of dwellings
        O.1.2.1. Major repairs and maintenance
        O.1.2.2. Insurance connected with the dwelling
        O.1.2.3. Other services related to ownership of dwellings

Introduction

- The price for such services can be defined in several ways:
  - Fixed amount per transaction *(Ex.: 500 EUR per transaction)*
  - A percentage applied to the transaction price *(Ex.: 3% of the price of the transaction)*
  - A combination of a fixed fee and a percentage

- These fixed fees and percentages are sometimes dependent on the level of the transaction price.

  Examples:

  - progressive fee schemes: the higher the price, the higher the percentage applied

  - regressive fee schemes: the higher the price, the lower the percentage applied

- Similar types of fee structures encountered in other fields: financial services, social protection (see European regulations N° 1920/2001, N° 2166/1999).

Introduction

Rate = 1%	Rate = 4 %

350 000 €   Price
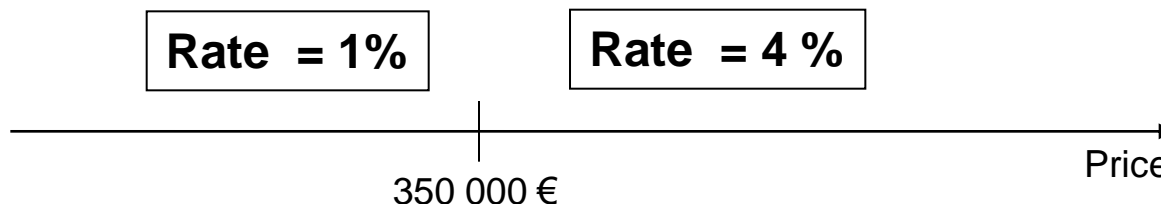
Example 1

	House price	Rate applied	Fee
Base period	300 000 EUR	1%	3 000 EUR
Current period	310 000 EUR	1%	3 100 EUR
	3.3%		3.3%

Example 2

	House price	Rate applied	Fee
Base period	345 000 EUR	1%	3 450 EUR
Current period	356 500 EUR	4%	14 260 EUR
	3.3%		313.3%

Concepts

We would like to measure changes both in the fee structure **and** in house prices:

$$I_t = \frac{\text{Fees}_t(\text{Prices}_t(\text{Dwellings}))}{\text{Fees}_0(\text{Prices}_0(\text{Dwellings}))}$$

- This index compares the total fee collected in the current period to the total fee collected in the base period for a set of representative dwellings.

- The dwellings are priced at the current period and at the base period.

Compilation of a price index

Fee = rate * transaction price, whatever the transaction price

This price index can be compiled by comparing the rates over time, multiplied by an appropriate house price index:

$$I_t = \frac{rate_t}{rate_0} \cdot HPI_t$$

- $rate_o, rate_t$: rates applied in the two comparison periods
- HPI_t : quality adjusted house price index

Compilation of a price index

Fee = rate$_s$ * transaction price, if transaction price lies within the price class s

This price index can be disaggregated into the contribution of each price class:

$$I_t = \sum_s w^s \cdot \frac{rate_t^s}{rate_0^s} \cdot HPI_t^s$$

- w^s : expenditure weight in the base period related to price class *s*.
- $rate_o^s$, $rate_t^s$: rates applied in the comparison periods in price class *s*.
- HPI_t^s : class specific house price index, in general different from the overall house price change ($HPI_t \neq HPI_t^s$).

This price index depends on **the distribution of the underlying house prices**.

# Compilation of a price index

- A reasonable assumption is that house prices are log-normally distributed (i.e. the logarithm of the price is distributed normally).

- In the current period, house prices have been adapted by a factor given by the overall house price index : $price_t = price_0 * HPI_t$.

Distribution in t   Distribution in t+1
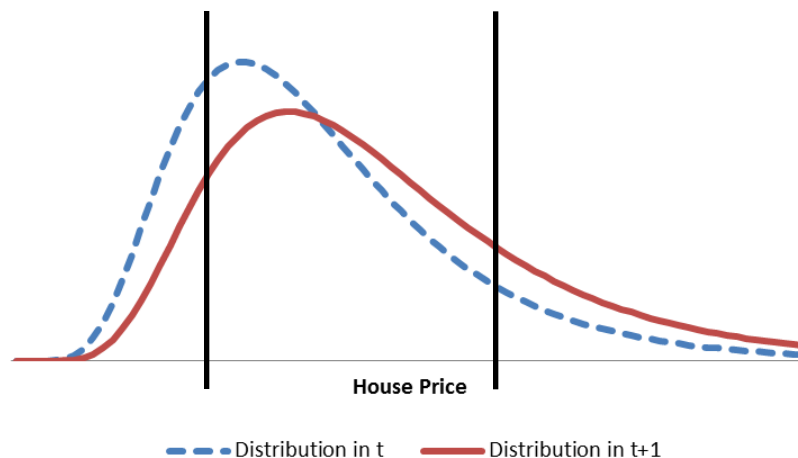
We are comparing the amount of fee collected in the two comparison periods on average under these assumptions.

House prices in Luxembourg
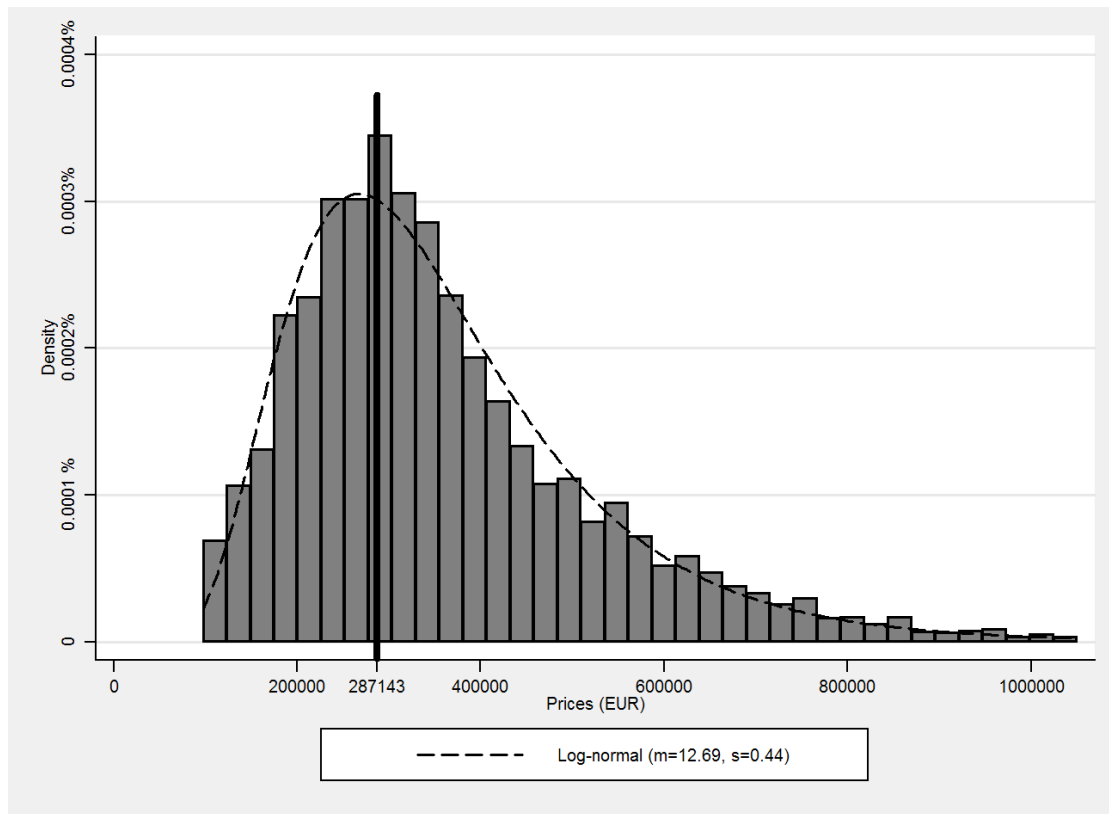
Transaction data (single-family houses, apartments) from 2007

Log-normal distribution with parameters

m = 12.69
s = 0.44

Registration fees

Fee defined with two price classes:

|		
[0 EUR; 287 143 EUR]	100 EUR	(constant fee)
[287 143 EUR;]	7% * price – 20 000 EUR	(percentage with a tax allowance of 20 000 EUR)

Registration fees

- Fee scheme is kept constant: index for the registration fee is only driven by the house price index.
- Quarterly rate of the price index for the fee is on average 2.7 times the quarterly rate of the HPI.

Registration fees

Results remain quite robust if the parameters of the log-normal distribution are changed a bit (increase or decrease of 10% of the average price in the base period).
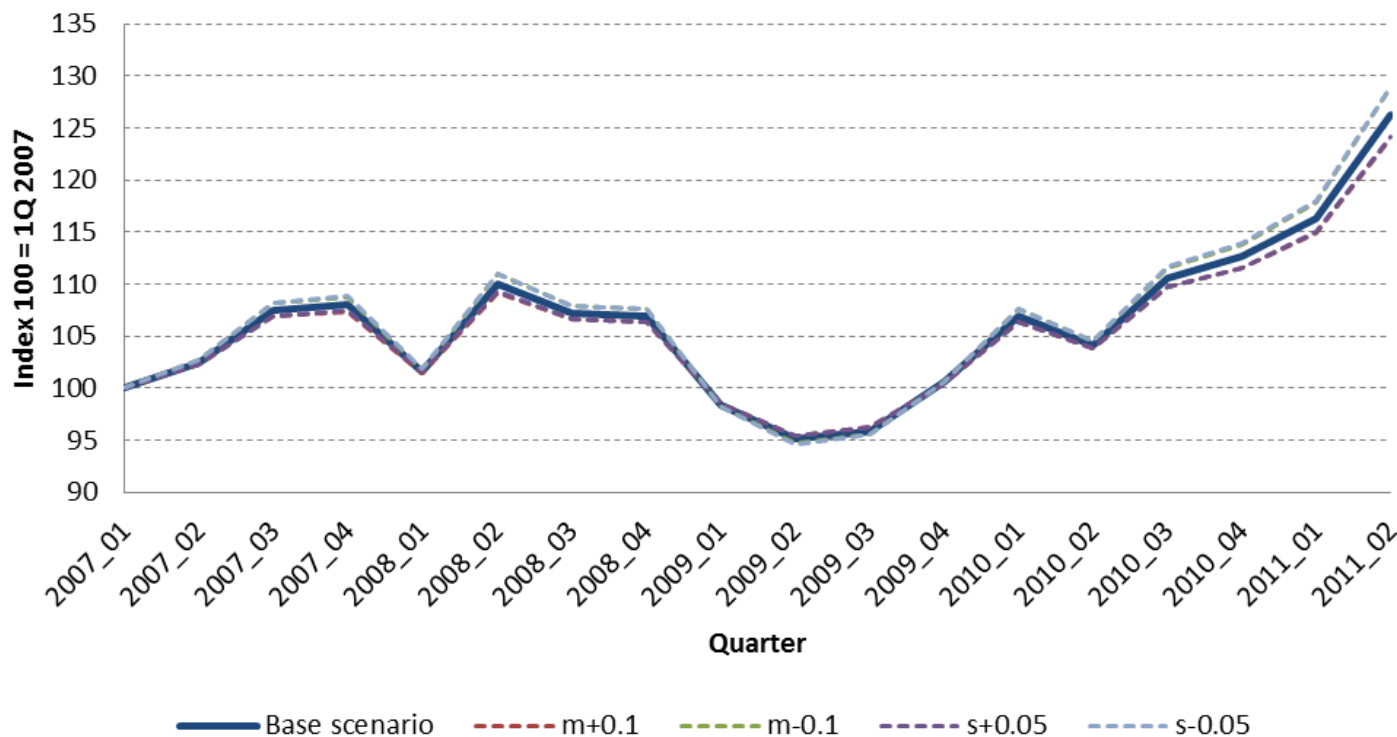
Notary fees

Fee defined with 9 price classes:

[0EUR ; 3 718 EUR]	4%
[3 718 EUR; 7 437 EUR]	2% + 74 EUR
[7 437 EUR; 17 353 EUR]	1,5% + 112 EUR
[17 353 EUR; 24 789 EUR]	0,8% + 233 EUR
[24 789 EUR; 74 368 EUR]	0,6% + 283 EUR
[74 368 EUR; 148 736 EUR]	0,5% + 357 EUR
[148 736 EUR; 247 894 EUR]	0,3% + 654 EUR
[247 894 EUR; 1 239 468 EUR]	0,1% + 1 150 EUR
[1 239 468 EUR; 2 478 935 EUR]	0,05% + 1 770 EUR

Notary fees

- Fee scheme is kept constant: index for the notary fee is only driven by the house price index.
- Quarterly rate of the price index for the notary fee is on average 1/3 of the quarterly rate of the HPI.

Conclusions

- Price index for a fee that is proportional to a transaction price can be extended to treat multiple price-dependent rates.

- Index formulas for such fees have been developed that assume a log-normal distribution on house prices.

- Price index takes into account the accelerating (decelerating) effect of progressive (regressive) fee schemes under increasing house prices.

- These indices can be the building blocks of more complex fee schemes.

- The distribution of the underlying house prices plays a major role.