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Research Report

European Real Estate Index (EREI) 2026. A near-real-time European Real Estate Index EREI: Monthly listing prices and rents for residential real estate

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A Near-real-time European Real Estate Index EREI: Monthly Listing Prices and Rents for Residential Real Estate

European Real Estate Index (EREI) 2026

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European Real Estate Index (EREI) 2026: A Near-real-time European Real Estate Index EREI: Monthly Listing Prices and Rents for Residential Real Estate

Abstract

Real estate is a capstone connection between various economic agents and markets. It is the main store of household wealth, serves as collateral for mortgage loans in the banking system, aids the transmission of monetary policy, and can propagate financial crises when overvalued. Yet comparable house-price data across the European Union (EU) and the euro area is unavailable, which hinders the design and evaluation of common monetary and economic policy that operates across heterogeneous housing markets. We derive monthly subnational European Real Estate Indicators (EREI) from online residential property advertisements in 16 European countries. The release covers April 2024 to June 2026 and contains 48,168 region-month-segment observations for 1,154 NUTS 3 regions, aggregating more than 43 million listing observations across the monthly sale and rental cross-sections. Each region-month segment reports the number of advertisements and summary statistics for asking prices per square meter and listing durations. The release also includes sale-segment indices for Europe, the euro area, and individual countries. Thirteen covered countries are EU members, which represented 85% of EU-27 gross domestic product in 2024. EREI data support research on a wide range of socio-economic phenomena associated with real estate dynamics, such as the evaluation of monetary policy or macroprudential policy effects on financial stability.

Keywords: European Real Estate Index, EREI, house prices

1 Background & Summary

Real estate links the balance sheets of households, banks, and firms. Housing accounts for about 50–72% of net household wealth, depending on the wealth group [1]. Bank exposures to property markets are correspondingly large. In 2022, residential mortgages accounted for almost 30% of euro area banks' total loans and advances, while an additional 10% of loans were exposed to commercial real estate [2]. EU/EEA banks reporting to the EBA held EUR 4.6 trillion in mortgage loans in June 2025 [3]. Changes in collateral values and borrower creditworthiness transmit property-market downturns to credit supply and the broader economy [4].

These exposures differ markedly across European countries and regions. The European Central Bank sets one monetary policy stance for the euro area, but the prevalence of mortgage debt, interest rate fixation periods, housing tenure, and the speed of loan repricing vary across member states and household groups [5]. A common interest rate change, for instance, can therefore pass through to housing demand, household consumption, collateral values, and bank risk at different speeds. Measuring these differences requires observations that are both geographically detailed and more frequent than the national quarterly series commonly used for international comparisons. Regional coverage is important because national averages can conceal substantial local differences in housing-market conditions and responses to common policy changes, particularly in rural areas.

Eurostat's harmonised House Price Index measures transaction-price changes for residential property at quarterly frequency [6]; the European Central Bank also disseminates national residential property price series compiled from national sources [7]. Online advertisements provide a complementary view of market supply, asking prices, and marketing duration. Their timeliness and spatial detail are useful, but duplicate advertisements, changing portal coverage, and the difference between asking and transaction prices require explicit treatment [8]. A recent Eurostat project has likewise demonstrated the potential of portal data for monthly real estate indicators using data from 13 EU countries[1] [9].

We propose a European Real Estate Index (EREI) that features monthly frequency, subnational geography, and sale and rental segments in a single harmonized table. Across the monthly sale and rental cross-sections, the regional aggregates summarize more than 43 million listing observations. The dataset covers Austria, Belgium, Croatia, Cyprus, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. The 13 EU members in this group accounted for 85.3% of EU-27 gross domestic product in 2024 [10]. Coverage varies across countries, regions, months, and market segments. Frequency and publication timing both affect the information available to users. At the EREI v1.0 cutoff on 30 June 2026, EREI includes observations up until that month. Importantly, EREI data are updated monthly and therefore allow an assessment of real estate markets almost in real-time. Comparable indices, e.g., by the European Central Bank [7] lag up to 6 months behind and are only available on a quarterly basis.

[1]The Eurostat sample comprises Austria, Belgium, Cyprus, Czechia, Denmark, Finland, Hungary, Lithuania, Luxembourg, Malta, Romania, Slovakia, and Spain, jointly accounting for roughly 26% of EU-27 GDP in 2024. In comparison, the EU states covered by the European Real Estate Index (EREI) account for over 85% [10].

The EREI project builds on automated collection of online residential property advertisements conducted since 2018 [11]. Earlier publications document prior research uses and earlier stages of this evolving data collection, including an analysis of European housing markets during the COVID-19 pandemic [12], but do not describe the fixed dataset deposited with this article. EREI v1.0 consolidates this work in a fixed, versioned release covering April 2024 through June 2026, for which the acquisition, harmonization, quality control, and validation procedures are documented below.

2 Methods

2.1 Release scope and unit of observation

EREI v1.0 covers advertisements collected from April 2024 through June 2026. Each row represents one observed combination of country, subnational region, calendar month, market, and listing segment. The present release contains the `residential` market and distinguishes properties advertised for sale (`buy`) and rent (`rent`). The composite `nuts3`–`date`–`market`–`listing_type` key is unique.

EREI v1.0 contains two data records: the regional aggregate table and the sale-segment EREI price index table derived from it. Figure 1 summarises the monthly acquisition, quality control, reporting, and release workflow.

2.2 Input sources and acquisition

EREI is assembled from country-specific online real estate portals (Table 1). Separate source adapters retrieve the configured searches for residential properties offered for sale and, wherever available, for rent, and map the results to a common raw schema. Searches are divided by geography where needed and, where a portal limits the number of returned results, by price or floor area. Adapters use structured site responses when available and otherwise parse search and listing pages. The common schema contains source and listing identifiers, source URL, collection and listing dates, location fields, selected property attributes, price and currency, and a field for source-specific information. All advertisements returned by the configured searches enter processing.

Automated acquisition begins near the start of each month. An extract is rejected if it is empty, if prices or listing identifiers are present in fewer than 65% of records, if none of postcode, NUTS-3 identifier, or city reaches 65% completeness, or if its volume is below 75% of the mean of the three most recent runs. Rejected or anomalous collections are reviewed and collected again where possible. If a valid replacement cannot be obtained, the affected portal-segment-month is omitted rather than carried forward or interpolated. Accepted extracts proceed to the common processing described below.

Only monthly statistics aggregated by NUTS-3 region, market, and listing type are released.

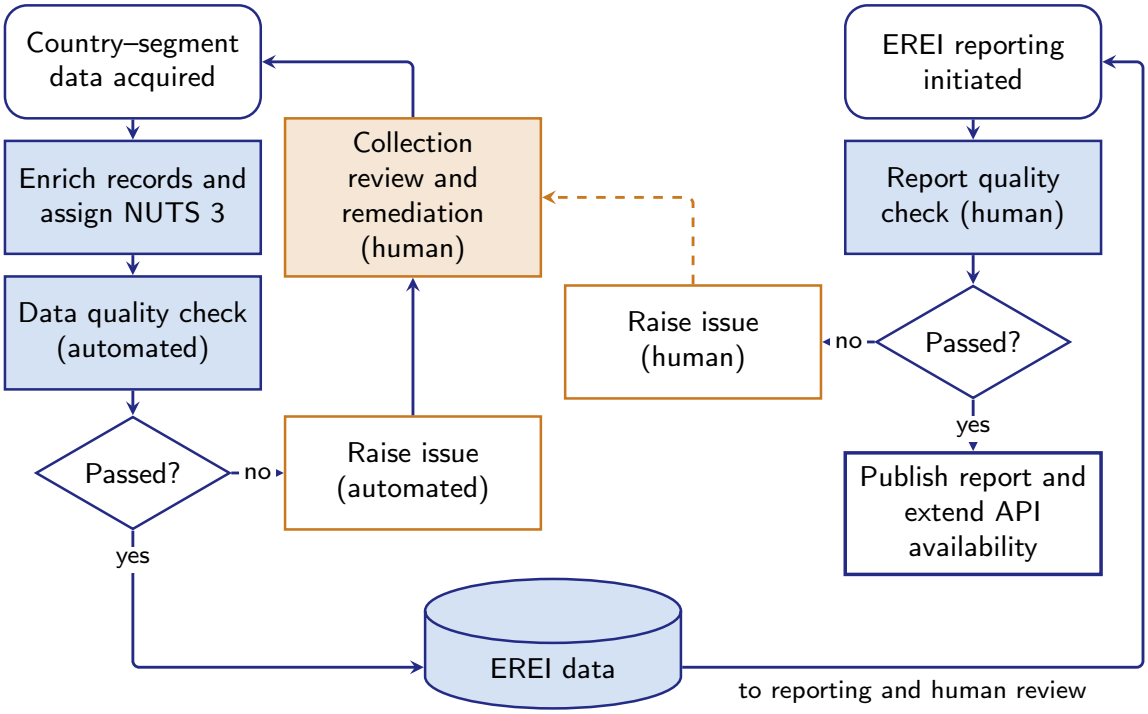

Figure 1: **Monthly EREI acquisition, validation, and publication workflow.** Country–segment extracts are enriched with NUTS-3 identifiers before automated checks. Extracts that fail a check are reviewed, and acquisition is repeated where possible. Extracts that pass the automated checks enter the reporting workflow, which includes a second human review. Only data that pass both stages are published through the report and API and included in the EREI v1.0 archive.

Table 1: Online property portals represented in EREI v1.0.

ISO3	Country	Portal used by the acquisition workflow
AUT	Austria	Wohnnet (`https://www.wohnnet.at/`)
BEL	Belgium	Immoweb (`https://www.immoweb.be/`)
CHE	Switzerland	ImmoScout24 (`https://www.immoscout24.ch/`)
CYP	Cyprus	Bazaraki (`https://www.bazaraki.com/`)
DEU	Germany	Immowelt (`https://www.immowelt.de/`)
ESP	Spain	Fotocasa (`https://www.fotocasa.es/`)
FIN	Finland	Etuovi, sale segment (`https://www.etuovi.com/`); Vuokraovi, rental segment (`https://www.vuokraovi.com/`)
FRA	France	Immobilier Le Figaro (`https://immobilier.lefigaro.fr/`)
GBR	United Kingdom	Rightmove (`https://www.rightmove.co.uk/`)
HRV	Croatia	Indomio (`https://www.indomio.hr/`)
ITA	Italy	Immobiliare.it (`https://www.immobiliare.it/`)
NLD	Netherlands	Funda (`https://www.funda.nl/`)
NOR	Norway	FINN (`https://www.finn.no/`)
POL	Poland	Domy.pl (`https://domy.pl/`)
PRT	Portugal	Imovirtual (`https://www.imovirtual.com/`)
SWE	Sweden	Hemnet, sale segment (`https://www.hemnet.se/`)

Individual advertisements, listing identifiers and URLs, addresses, advertiser information, free text, images, and source HTML are not redistributed.

2.3 Common harmonisation, eligibility, and cleaning

All advertisements returned by each configured residential sale or rental search enter processing. No country-specific sample is drawn after retrieval. Records enter the regional aggregates if they meet the validity, minimum data, and geographic assignment requirements described below. Source-specific procedures address source anomalies and do not alter these requirements.

Source labels for sale and rent are normalised to the two release segments, selected numeric fields are parsed to numeric types, and postcodes are standardised before geographic assignment. Dates are converted to calendar month ends. The date identifies the month in which the advertisements were collected. A record dated 31 January 2026 contains data collected during January 2026. The date does not imply collection specifically on 31 January and does not represent a transaction date. After automated and human quality control, approved aggregates are published within the subsequent month.

The regional output contains summary fields on the original and logarithmic scales for asking price per square metre and listing duration. These measures are calculated from advertisements rather than transaction deeds. For sale advertisements, asking price per square metre is the asking price divided by floor area. For rental advertisements, it is the monthly asking rent divided by floor area. These definitions apply across all countries and segments. Prices for the United Kingdom, Poland, Norway, Switzerland, and Sweden are converted to euros. For these markets, local currency prices are multiplied by the value for the last day of the collection month from a monthly European Central Bank reference table expressed as euros per unit of local currency [13].

Within each accepted portal extract, repeated listing identifiers are reduced to one record by retaining the last occurrence. Listing identity is based solely on the identifier supplied by the portal. No probabilistic property matching is used. Only one portal contributes to each country and listing segment, so records from different portals are not pooled within a segment. A continuing advertisement contributes once to each monthly cross-section in which its identifier is observed, using the attributes observed in that collection. It does not contribute after withdrawal. A relisting with a new identifier, or a second advertisement for the same dwelling under another identifier, is treated as a distinct advertisement.

Within accepted extracts, observations lacking the information required for the released measures are excluded. Missing information is not generally imputed. Confirmed exceptions are described below. To enter aggregation, an advertisement must have a floor area of at least $10\,\mathrm{m}^2$ and a positive asking price per square metre below 10^9 euros per square metre. Listing duration values below 0.001 months or above 600 months do not enter the duration summaries. For a variable with at least 30 valid observations in a country, collection month, and listing segment, the current pipeline winsorises that variable at the 2nd and 98th percentiles. At the aggregate ingestion stage, region and segment identifiers must be non-empty, listing count values must be

numeric and positive, and the four price metric fields must be numeric. Duration fields may be missing when no duration can be calculated. Duplicate aggregate keys are rejected.

2.4 Geographic enrichment

The Nomenclature of Territorial Units for Statistics (NUTS) is Eurostat's hierarchical classification for collecting, harmonising, and analysing European regional statistics. NUTS 3 identifies the smallest of its three regional levels [14]. Depending on the source, an advertisement carries a NUTS 3 regional identifier, a postcode, or geographic coordinates. Source-provided regional identifiers are standardised directly. Under the NUTS 2021 postcode route, postcodes are normalised and matched by country using the European Commission's correspondence table between postal codes 2020 and NUTS 2021 (version 4.0) [15]. An exact postcode match is used directly. A partial postcode is accepted only when all corresponding entries identify the same NUTS 3 region. Ambiguous or unmatched locations do not enter the regional aggregates.

The released `nuts3` field can be used to join EREI to regional datasets published by Eurostat and other providers at the same classification level and vintage. Data published at a coarser NUTS level can be linked after EREI is aggregated to the corresponding level. Classification vintages must be aligned because regional identifiers and boundaries can change over time.

Coordinates are assigned by a point-in-polygon match to the Eurostat GISCO NUTS 2021 level-3 shapefile `NUTS_RG_01M_2021_4326.shp`, supplied at a 1:1-million map scale in WGS 84 coordinates (EPSG:4326). Figure 2 uses the corresponding Eurostat GISCO NUTS 2021 level-3 GeoJSON `NUTS_RG_20M_2021_4326_LEVL_3.geojson`, generalised for a 1:20-million map scale and supplied in WGS 84 coordinates (EPSG:4326) [14, 16]. These third-party geometry files are not included in the EREI archive. They are available from the official GISCO NUTS 2021 distribution. For countries outside the EU, the corresponding Eurostat level-3 statistical regions are used.

2.5 Source-specific corrections and model-based inference

In the spirit of the collection process shown in Figure 1, selected issues can emerge at later stages when processing and using the data for analyses. Such idiosyncratic data collection issues also trigger human correction interventions that we describe here. Each procedure below applies only to eligible records from the stated country, listing segment, and period. Figure 3 marks the country–segment–month windows in which each procedure was active for eligible records. Common harmonisation and geographic enrichment are not marked.

Regression-based floor-area recovery in Germany. From September 2024 through August 2025, the German acquisition parser did not retain floor areas recorded as non-integer values. Direct extraction resumed in September 2025. For eligible German sale and rental records in the

affected period, floor area was estimated separately for apartments and houses using

$$\log(A_i) = \alpha_{r(i)} + \beta \log(P_i) + \varepsilon_i,$$

where A_i is floor area, P_i is asking price, and $\alpha_{r(i)}$ is a NUTS-3 intercept. The models were fitted to listings collected from September 2025 onward with directly observed non-integer floor area. Regions with fewer than 50 such observations used the object-type-specific national intercept. Retransformation used a region-by-object-type Duan smearing factor $S = n^{-1} \sum_i \exp(-\hat{\varepsilon}_i)$ to correct retransformation bias in price per square metre [17]. In the coverage-failure window (September 2024–August 2025), 23.7% of rent and 16.9% of buy index listings carry an imputed floor area (monthly range 13–28% rent, 9–20% buy). Listing-months without an area observation in any month (27,179 buy, 1,170 rent) are excluded rather than imputed.

Probability weighting for furnished rentals in Germany. German rental observations from April 2024 through September 2025 were adjusted for furnished and short-term advertisements, which were not identified by a direct source field in the earlier data. A logistic model trained on the September 2025 cross-section estimates the furnished probability q_i from log price, log floor area, price per square metre, price per square metre relative to the local median, a size- and location-adjusted price premium, the local price level, a small-unit indicator, and property type. The probabilities are recalibrated to each month's prevalence using expectation maximisation to correct for prior shift [18]. Observations enter the monthly statistics with weight $w_i = 1 - q_i$. The procedure removes only the estimated furnished share above the 4–5% prevalence observed after the source fix.[2] Observations from October 2025 onward are used without this model-based weighting. The released German rental summary statistics for April 2024 through September 2025 incorporate the furnished probability weights. For winsorisation of these observations, the 2nd and 98th percentile bounds are the points at which 2% and 98% of the total furnished-decontaminated weight accumulate, rather than the corresponding shares of the listing headcount. Over April 2024–September 2025 the furnished adjustment removes 18% of listing mass ($\frac{1}{n}\sum_i(1 - w_i)$, equivalent to dropping 18% of listings); 15% of listings have $w_i < 0.5$.

Identification and exclusion of prefabricated houses in Germany. Catalogue advertisements for prefabricated houses were excluded from the German sale series throughout the release period. They were identified sequentially using provider names, listing identifiers observed during the provider-labelled period, and exact signatures defined by postcode, object type, asking price, and floor area. Signature matching was restricted to records with directly observed floor area so that imputed values could not create false matches. The cross-month identifier backfill and exact-signature links are used only to classify these anomalous records. They are not used to merge or deduplicate ordinary advertisements. Based on this identification, we eliminate 12% of otherwise admissible listings from the German buy market between September 2024 and July

[2] with $\hat{\pi}_t$ the month's EM-estimated prevalence and $\pi^{\text{base}} = 4.6\%$ the post-fix mean, q_i is first rescaled by $\lambda_t = \max(0, \hat{\pi}_t - \pi^{\text{base}})/\hat{\pi}_t$ before forming $w_i = 1 - q_i$, so that $\frac{1}{n}\sum_i(1 - w_i) = \max(0, \hat{\pi}_t - \pi^{\text{base}})$ and a furnished share of π^{base} is retained ($w_i = 1$ from October 2025).

2026. Most of the drops occur in the most recent periods, when the share of prefabricated listings exceeds 30% in June 2026. One year prior, the detected rate is only 10%.

Square meter imputation United Kingdom. As of this release, we do not impute square-meter values in the United Kingdom, where coverage is relatively low: floor area is available for only 35% of observed listings. In the future, we may impute missing floor area using the number of rooms and location information and incorporate these estimates into the index. For now, the index represents only the subset of listings for which square-meter values are observed.

Prior to April 2026, the data available for France represented an inconsistent subsample of the market, so we exclude this period from the index. We are investigating whether earlier months can be incorporated using composition-weighted indices that reweight the observed subsample to match the expected market composition inferred from more recent observations.

Square meter for housing units in Austria. A significant share of housing listings in Austria report plot size, rather than living area, as the headline size. For affected listings, this results in substantially understated prices per square meter relative to the true, previously unobserved values.

Following a scraper adjustment implemented in July 2026, we now observe all available size categories reported in each listing. Based on the data collected since this adjustment, we estimate that the issue affects approximately 18% of listings per month, compared with around 1% of rental listings. This introduces a downward level bias of approximately -5% in the Austrian index, while the corresponding bias in the rental index is below -1%. Initial results suggest, however, that month-over-month changes in aggregate prices are only minimally affected. Using the additional information now being collected, we may be able to retrospectively impute missing living-area values for affected listings and thereby improve the historical coverage and accuracy of the index.

2.6 Regional aggregation

The regional records preserve variation across regions and between sale and rental advertisements. The sale-price indices summarise monthly changes for individual countries, the euro area, and Europe. Figure 4 compares the Europe and euro area EREI indices with the ECB's transaction-based House Price Index.

After cleaning and geographic assignment, advertisements are grouped by country, region, collection month, market, and listing segment. The regional table reports a listing count and summary fields on the original and logarithmic scales for asking price per square metre and listing duration.

A listing spell measures the number of months in which a listing is observed. It starts at one in the first observed month and increases by one for each additional month of observation. The `listings` field counts advertisements whose currency can be converted where necessary, whose floor area is at least $10\,\mathrm{m}^2$, and whose valid price per square metre contributes to the corresponding moments.

For an available listing-level value x_i, after validity gates and any winsorisation, the released mean and variance are

$$\bar{x} = \frac{\sum_i w_i x_i}{\sum_i w_i}, \qquad v_x = \frac{\sum_i w_i (x_i - \bar{x})^2}{\sum_i w_i}.$$

The variance is therefore a population variance. Unweighted observations, including sale listings, use $w_i = 1$. The log-scale fields apply the same formulas after taking the natural logarithm of each value. If no listing spell can be calculated for a regional cell, `None` is emitted for each of its four duration summary fields.

2.7 Index construction

EREI v1.0 also includes the sale-segment EREI price index derived from the regional records. It is distributed as a wide monthly table containing a date, Europe and euro area series, and one series for each of the 16 countries. The index values are derived rather than observed directly.

Only records with `market=residential` and `listing_type=buy` enter the v1.0 index. Let p_{rct} denote the released `priceqm_avg` value and n_{rct} the released `listings` value for region r, country c, and month t. The country-month price is

$$P_{ct} = \frac{\sum_{r \in \mathcal{R}_{ct}} n_{rct} p_{rct}}{\sum_{r \in \mathcal{R}_{ct}} n_{rct}},$$

using the regions observed in that country and month. A country return is formed only from consecutive months,

$$R_{ct} = \frac{P_{ct}}{P_{c,t-1}} - 1.$$

For geographic group G, let $\mathcal{C}_{Gt}$ contain the member countries with a valid consecutive-month return. The group return is

$$R_{Gt} = \frac{\sum_{c \in \mathcal{C}_{Gt}} N_{c,t-1} R_{ct}}{\sum_{c \in \mathcal{C}_{Gt}} N_{c,t-1}}, \qquad N_{ct} = \sum_{r \in \mathcal{R}_{ct}} n_{rct},$$

and the index is chain-linked as $I_{Gt} = I_{G,t-1}(1 + R_{Gt})$, beginning at 100 on the first available date. Country series use the same construction with a single country. Europe contains all 16 release countries. The euro area series contains Austria, Belgium, Croatia, Cyprus, Finland, France, Germany, Italy, the Netherlands, Portugal, and Spain.

No balanced regional panel is imposed, so changes in the set of observed regions can affect P_{ct}. A return is not calculated across a gap and no missing value is interpolated. When consecutive observations resume, chaining continues from the last computed index level.

3 Data Records

The first data record is a long table with one row per observed region-month-market-segment combination. Its 14 fields are described in Table 2.

Table 2: Fields in the regional EREI table.

No.	Field	Description
1	`iso3`	Three-letter country identifier.
2	`nuts3`	NUTS 3 or corresponding subnational region identifier.
3	`date`	Calendar month-end label for the collection month.
4	`market`	Real estate market; `residential` in EREI v1.0.
5	`listing_type`	Advertisement segment, `buy` or `rent`.
6	`listings`	Count of listings contributing to the moments of asking price per square metre; weighted German rental cells report the rounded sum of furnished weights.
7	`priceqm_avg`	Mean asking price per square metre.
8	`priceqm_var`	Population variance of asking price per square metre.
9	`priceqm_log_avg`	Mean after the natural log transformation of asking price per square metre.
10	`priceqm_log_var`	Population variance after the natural log transformation of asking price per square metre.
11	`spellm_avg`	Mean listing duration in months; `NA` when no duration can be calculated.
12	`spellm_var`	Population variance of listing duration in months; `NA` when no duration can be calculated.
13	`spellm_log_avg`	Mean after the natural log transformation of listing duration; `NA` when no duration can be calculated.
14	`spellm_log_var`	Population variance after the natural log transformation of listing duration; `NA` when no duration can be calculated.

The second data record is the wide sale-segment index table. Through June 2026 it contains 27 monthly rows and 19 fields: `date`, `Europe`, `Eurozone`, and the 16 country codes listed in Table 1.

The logarithmic price fields provide information beyond the NUTS 3 mean. Two regions can have the same average asking price but very different price distributions. The fields can be used to estimate price quantiles and the share of listings above or below a chosen price. This allows users to compare price dispersion across regions and over time. It also shows whether price changes occur throughout the distribution or are concentrated at its lower or upper end.

Let $\mathcal{C}$ be a set of regional cells for one month and listing segment. For each cell c, let n_c be `listings`, μ_c be `priceqm_log_avg`, and v_c be `priceqm_log_var`. The pooled log-price mean and population variance are

$$N = \sum_{c \in \mathcal{C}} n_c, \qquad \mu = \frac{\sum_{c \in \mathcal{C}} n_c \mu_c}{N}, \qquad v = \frac{\sum_{c \in \mathcal{C}} n_c \left[v_c + (\mu_c - \mu)^2 \right]}{N}.$$

Assume that log asking prices follow a normal distribution with mean μ and variance v. The resulting lognormal approximation is

$$\widehat{F}_X(x) = \Phi\left(\frac{\ln x - \mu}{\sqrt{v}} \right), \qquad \widehat{Q}_X(p) = \exp\left[\mu + \sqrt{v}\, \Phi^{-1}(p) \right], \qquad 0 < p < 1,$$

where Φ is the standard normal cumulative distribution function. The value $\widehat{F}_X(x)$ estimates the share of contributing listings with an asking price per square metre no greater than x. Multiplying this share by N gives the estimated number of such listings. The value $\widehat{Q}_X(p)$

estimates the corresponding price quantile. These quantities can be calculated from the regional table without access to the underlying advertisement records.

4 Data Overview

EREI v1.0 contains 48,168 region-month-segment observations from April 2024 through June 2026. Across these records, the released `listings` field sums to 43,084,189 monthly listing observations in the sale and rental segments. In June 2026, sale data cover 1,140 regions in all 16 countries and rental data cover 1,077 regions in 14 countries, yielding 2,217 observed regional cells. In that month, Cyprus and Sweden do not have rental records. The second record contains 27 monthly observations of 18 index series. Figures 2 and 3 summarise spatial and temporal coverage across the released countries and market segments.

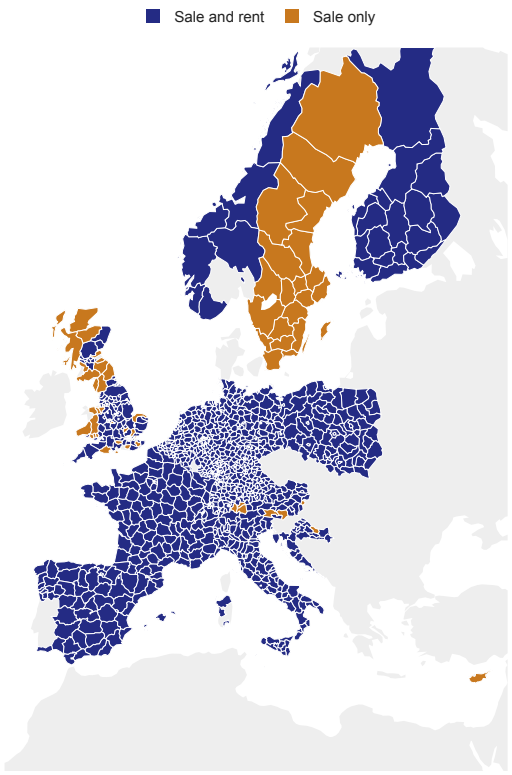

Figure 2: **Spatial coverage in June 2026.** Dark blue regions contain both sale and rental observations (1,077), while orange regions contain sale observations only (63); no region is observed for rent only. Grey land has no observation in EREI v1.0 for that month. Of the 1,140 observed regional codes, 1,118 match the NUTS 2021 geometry shown here. Twenty-two Norwegian and Portuguese codes from the 2024 NUTS or statistical region classifications are not displayed because they are absent from that geometry. Administrative boundaries: © EuroGeographics.

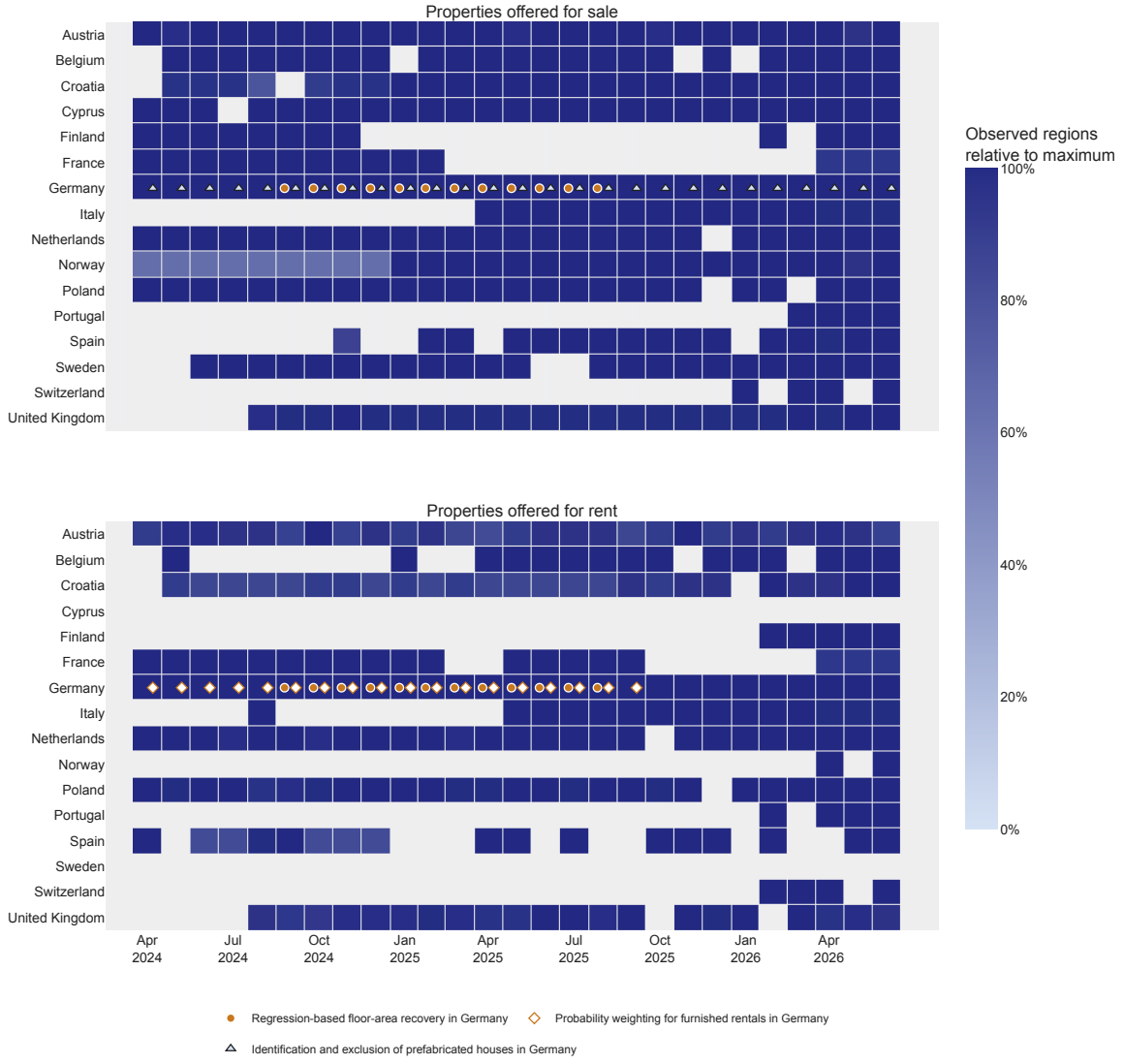

Figure 3: **Temporal coverage and scope of source-specific treatments.** Each cell shows the number of regional identifiers observed in a month relative to the largest monthly number observed for the same country and segment between April 2024 and June 2026. Darker blue denotes coverage closer to that country-segment maximum; grey denotes no record. Markers identify months in which a confirmed procedure was active for eligible records: orange circles denote regression-based floor-area recovery in Germany for sale and rental records from September 2024 through August 2025; diamonds denote probability weighting for furnished rentals in Germany from April 2024 through September 2025; and triangles denote identification and exclusion of prefabricated houses in Germany for sale records throughout the release.

5 Technical Validation

5.1 Dataset-wide processing and structural validation

Acquisition and common processing. The validation covers the path from raw advertisements through accepted, eligible, geographically assigned, and aggregated records.

Structural integrity and index reconstruction. We applied deterministic checks to the EREI v1.0 regional table. The composite key is unique for all 48,168 rows. Required identifier, count, and price fields contain no null values, non-missing numeric values are finite, and every date is a calendar month end. Listing counts and average asking prices per square metre are positive in every observed cell. Table 3 records the checks applied to the distributed records. The index table has 27 unique month-end rows and 19 fields. Its Europe and euro area series are complete through June 2026; the country series contain between 2 and 27 non-missing monthly values.

Table 3: Deterministic checks applied to EREI v1.0 through June 2026.

Check	Result	Interpretation
Composite-key uniqueness	48,168 unique keys in 48,168 rows	No duplicate region-month-market-segment rows.
Required-field serialisation	Core identifier, count, and price fields are complete	Duration fields may be `NA` when no duration can be calculated.
Numeric finiteness	No non-finite non-missing values	All non-missing distributed numeric cells can be parsed.
Calendar alignment	All 27 dates are month ends	Date labels follow the published monthly convention.
Positive count and mean price	All observed cells pass	All released counts and mean prices satisfy the positivity check.
Index table structure	27 unique dates and 18 index series	Europe and euro area series are complete; country-series gaps are retained as missing.
Index recomputation	354 non-missing values reproduced; maximum absolute difference 2.84×10^{-14}	The regional table and distributed index agree with the stated construction, including the missing-value pattern.
Geometry-vintage match	1,132 of 1,154 release codes match	Twenty-two Norwegian and Portuguese 2024 identifiers are absent from the 2021 geometry.

5.2 Validation against external data

Aggregate index comparison. Figure 4 compares the EREI aggregates with the ECB benchmark and also shows their publication timing. The EREI index closely resembles the transaction-based price index of the ECB. The ECB benchmark, however, aggregates transaction prices at the national level only. In [19], we therefore validate EREI at the NUTS-3 level directly, comparing listing-price levels with transaction-based benchmarks in the nine countries where such regional data exist. Across 465 matched regional units, correlations reach 0.94 to 0.97 in the five most populous markets, and where benchmark and index measure the same object, listing

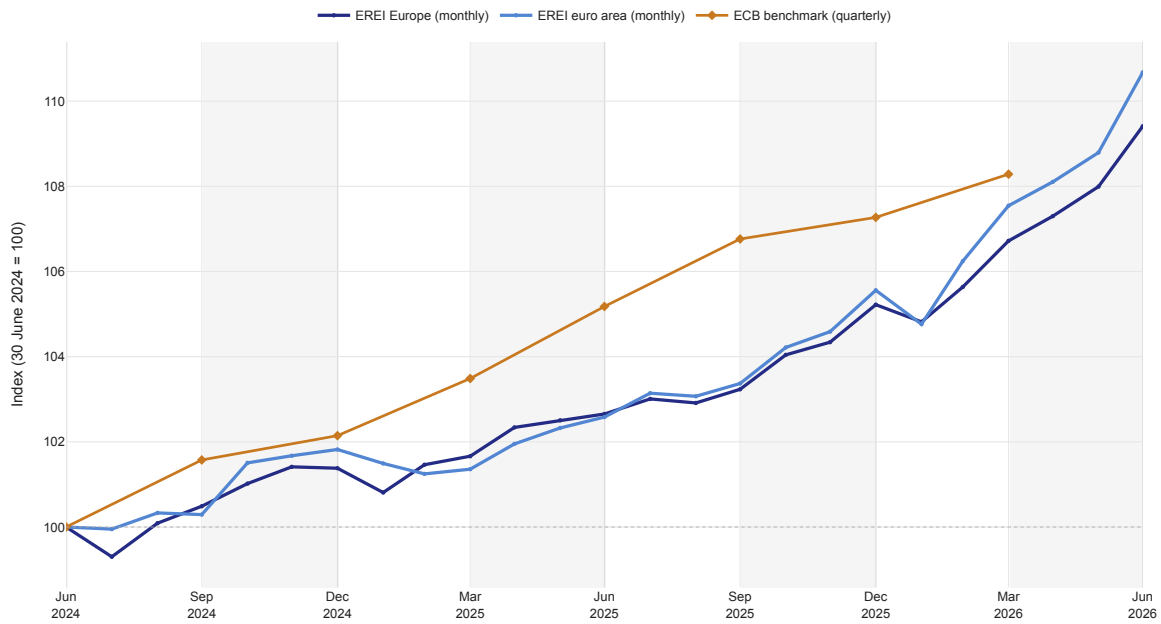

Figure 4: **Monthly aggregate EREI price indices and the quarterly official benchmark.** The Europe and euro area EREI sale-segment indices are observed monthly. The ECB Data Portal's quarterly euro area House Price Index is transaction-based and covers the official changing-composition euro area, whereas the EREI euro area aggregate covers the 11 euro area countries represented in EREI [7]. The displayed window begins at the earliest common quarter end, 30 June 2024, and all three series are rebased to 100 on that date. No monthly benchmark value is imputed. Alternating grey bands identify calendar quarters and vertical guides mark quarter ends. For the timeliness comparison, the benchmark line is truncated at the EREI data cutoff and includes the latest observation available when the values were retrieved on 28 July 2026, 2026 Q1. EREI therefore extends three months beyond that benchmark observation. The 2026 Q1 benchmark was released on 2 July 2026 [22]; immediately before that release, the latest benchmark was 2025 Q4 and EREI's reference-period endpoint was six months more recent. The dotted horizontal line marks an index value of 100.

prices move essentially one-for-one with transaction prices. The agreement visible in Figure 4 thus extends to the regional level at which EREI operates.

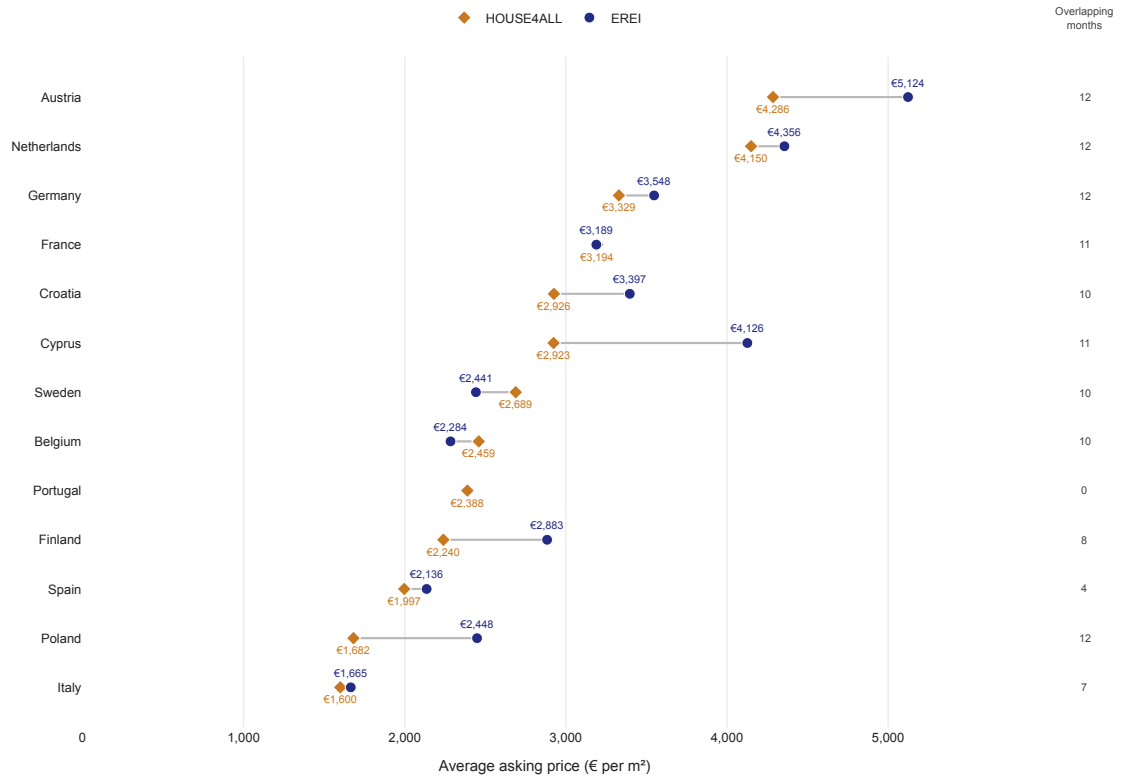

Figure 5: **Country-level asking price comparison with ESPON HOUSE4ALL.** For each country, the EREI monthly residential sale level is the listing-weighted mean of regional asking prices per square metre. The plotted EREI value is the equal-weighted mean of the available monthly country levels that overlap the HOUSE4ALL collection window from March 2024 through March 2025; the right-hand column reports the number of overlapping months. The benchmark values are the uncorrected national sales asking prices in euros per square metre reported in Table 5 of the ESPON HOUSE4ALL methodological report [20]. Portugal has zero overlapping EREI months and is shown with its benchmark value only. Across the 12 paired countries, the Spearman rank correlation is 0.87, and the median absolute percentage difference relative to HOUSE4ALL is 8.2%.

Country-level comparison with HOUSE4ALL. Figure 5 compares EREI country levels with a separately produced external source based on online real estate advertisements. HOUSE4ALL collected housing offers from March 2024 to March 2025 and developed harmonised indicators from web-scraped advertisements across Europe [20]. An overlapping month is an EREI country observation that falls within the HOUSE4ALL collection window from March 2024 through March 2025. The available overlapping months are averaged without imputing missing months. Across the 12 countries with at least one overlapping observation, the Spearman rank correlation is 0.87, and the median absolute percentage difference is 8.2%. Thus, EREI preserves the cross-country price ordering found in HOUSE4ALL.

6 Usage Notes

EREI describes online property advertisements and the market conditions they reflect. It should not be interpreted as a register of completed transactions, realised sale prices, appraised values, or the full property stock.

Missing region-month cells are not zeros. Users should preserve the sale and rental distinction, inspect country-level coverage before constructing a balanced panel, and read a month-end label as the collection month rather than a transaction date or exact collection day. Cross-country comparisons should follow the currency, rent, floor area, aggregation, and listing identity definitions in the Methods.

The index is derived from the sale segment and inherits the source, geographic, and temporal coverage of the regional records used to construct it. Changing regional composition can affect country-month prices. Country-series gaps should remain missing and must not be bridged by interpolation.

Spatial analyses should use the released regional identifiers with official GISCO geometry for the matching NUTS vintage. The same identifiers facilitate joins to Eurostat and other European regional statistics reported at NUTS 3; statistics reported at NUTS 1 or NUTS 2 can be linked after aggregation to the corresponding level. Researchers combining EREI with population, income, credit, or policy data should align geographic vintages explicitly. The generalised 1:20-million geometry used in Fig. 2 is intended for cartographic display, not precise boundary or area measurement.

EREI v1.0 is the fixed version of record described and reviewed with this article. The EREI API is maintained separately and may subsequently contain newer observations or additional market segments.

7 Data Availability

The public dashboard at `https://erei.iwh-halle.de/dashboard/` and API at `https://erei.iwh-halle.de/api/v1` provide the evolving EREI coverage as well as up-to-date observations. EREI-authored records are available under CC BY 4.0. The compatible and official GISCO NUTS-3 geometry can be retrieved from `https://gisco-services.ec.europa.eu/distribution/v2/nuts/` and joined using the released `nuts3` identifiers [16].

References

[1] Blatnik, N., Bobasu, A., Krustev, G. & Tujula, M. Introducing the Distributional Wealth Accounts for euro area households. *ECB Economic Bulletin* 5/2024 (2024). `https://www.ecb.europa.eu/press/economic-bulletin/articles/2024/html/ecb.ebart202405_02~50a620f16b.en.html`

[2] Ryan, E., Jarmulska, B., De Nora, G., Fontana, A., Horan, A., Lang, J. H., Lo Duca, M., Moldovan, C. & Rusnák, M. Real estate markets in an environment of high financing costs. *ECB Financial Stability Review*, November 2023 (2023). https://www.ecb.europa.eu/press/financial-stability-publications/fsr/special/html/ecb.fsrart202311_02~75cf0710b9.en.html

[3] European Banking Authority. *EBA response to the targeted consultation on the competitiveness of the EU banking sector*. 17 April 2026. https://www.eba.europa.eu/sites/default/files/2026-04/fb640125-d90d-4085-8708-97b9929f7213/EBA%20response%20to%20EC%20consultation%20banking%20competitiveness.pdf

[4] Peltonen, T. Residential real estate sector vulnerabilities. Speech at the public hearing of the European Parliament HOUS Committee, European Systemic Risk Board (2025). https://www.esrb.europa.eu/news/speeches/date/2025/html/esrb.sp250707~7ff7d3f004.en.html

[5] Baptista, P., Dossche, M., Hannon, A., Henricot, D., Kouvavas, O., Malacrino, D. & Zimmermann, L. The transmission of monetary policy: from mortgage rates to consumption. *ECB Economic Bulletin* 4/2025 (2025). https://www.ecb.europa.eu/press/economic-bulletin/articles/2025/html/ecb.ebart202504_01~b621c01098.en.html

[6] Eurostat. House price and sales index (prc_hpi_inx): reference metadata. European Commission (2025). https://ec.europa.eu/eurostat/cache/metadata/en/prc_hpi_inx_esms.htm

[7] European Central Bank. House price index, total, whole territory, euro area, quarterly (RESR.Q.U2._T.N._TR.TVAL.4D0.TB.N.IX). ECB Data Portal (2026). https://data.ecb.europa.eu/data/datasets/RESR/RESR.Q.U2._T.N._TR.TVAL.4D0.TB.N.IX

[8] Loberto, M., Luciani, A. & Pangallo, M. What do online listings tell us about the housing market? *International Journal of Central Banking* **18**, 325–377 (2022). https://www.ijcb.org/journal/v18n4/what-do-online-listings-tell-us-about-housing-market

[9] Eurostat. Residential real estate indices based on web data. European Commission (2026). https://cros.ec.europa.eu/book-page/residential-real-estate-indices-based-web-data

[10] Eurostat. Gross domestic product and main components (nama_10_gdp), current prices, 2024. European Commission, accessed 27 July 2026. https://ec.europa.eu/eurostat/databrowser/view/nama_10_gdp/default/table?lang=en

[11] Koetter, M., Noth, F. & Woebbeking, F. European Real Estate Index (EREI) 2025. *IWH Technical Reports* No. 1/2025, Halle Institute for Economic Research (2025). https://doi.org/10.18717/tr84tr-wh89

[12] Koetter, M. & Noth, F. European Real Estate Markets During the Pandemic: Is COVID-19 also a Case for House Price Concerns? *IWH Policy Notes* No. 3/2022, Halle Insti-

tute for Economic Research (2022). https://www.iwh-halle.de/fileadmin/user_upload/publications/iwh_policy_notes/iwh-pn_2022-03_en_Immobilienpreise.pdf

[13] European Central Bank. Euro foreign exchange reference rates. https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/index.en.html

[14] Eurostat. *Statistical regions in the European Union and partner countries: NUTS and statistical regions 2021, 2022 edition*. Publications Office of the European Union (2022). https://doi.org/10.2785/321792

[15] European Commission, Eurostat. Postcodes and NUTS correspondence tables: postal codes 2020 to NUTS 2021, version 4.0. TERCET (2021), accessed 27 July 2026. https://gisco-services.ec.europa.eu/tercet/flat-files

[16] European Commission, Eurostat. GISCO NUTS 2021 regions, level 3, EPSG:4326 (1:1-million shapefile and 1:20-million GeoJSON). GISCO Data Distribution API (2021), accessed 27 July 2026. https://gisco-services.ec.europa.eu/distribution/v2/nuts/nuts-2021-files.html

[17] Duan, N. Smearing estimate: a nonparametric retransformation method. *Journal of the American Statistical Association* **78**, 605–610 (1983). https://doi.org/10.1080/01621459.1983.10478017

[18] Saerens, M., Latinne, P. & Decaestecker, C. Adjusting the outputs of a classifier to new a priori probabilities: a simple procedure. *Neural Computation* **14**, 21–41 (2002). https://doi.org/10.1162/089976602753284446

[19] Koetter, M., Noth, F. & Woebbeking, F. Do online real estate listing prices gauge transaction prices (well)? Evidence from novel near-real-time data. *IWH Discussion Papers* No. 13/2026, Halle Institute for Economic Research (2026). https://doi.org/10.18717/dp09-fw05

[20] Sielker, F., Banabak, S., Sutterlütti, D., Larrea, E., Serra, M., Palma, E. & Falcón, L. *Access to Affordable and Quality Housing for All People: Methodological report*. ESPON EGTC (October 2025). ISBN 978-2-919839-28-5. https://www.espon.eu/sites/default/files/publications/files/2026-02/espon-h4al-methodological-report.pdf

[21] Koetter, M., Noth, F. & Woebbeking, F. European Real Estate Index, version 1.0. Zenodo https://doi.org/10.5281/zenodo.21631665 (2026).

[22] Eurostat. House prices up by 4.7% in the euro area. *Euro indicators*, 2 July 2026 (2026). https://ec.europa.eu/eurostat/web/products-euro-indicators/w/2-02072026-bp

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