

## The Data: Coverage, Periodicity, and Timeliness

### Coverage characteristics

**Purpose of the study:** The Residential Property Price Index which covers the whole country is constructed for the purpose of monitoring price movements in the Turkish housing market.

**Data description:** Price indices are those constructed to monitor price movements in the Turkish housing market. Price data related to all dwellings subject to sale are used to develop the residential property price indices. Dwelling prices indicated in valuation reports prepared at the time of approval of individual housing loans are used as a proxy for price. Valuation reports which form a basis for housing loans are prepared by real estate appraisal companies. The actual sale of the property and utilization of the loan is not required and all dwellings appraised are included in the scope.

#### Statistical concepts and definitions:

**Residential Property Price Index (RPPI):** Residential property price index constructed using hedonic regression method in which prices are adjusted for quality changes related to observed housing characteristics.<sup>1 2</sup>

**Residential Property Price Index for New Dwellings (NRPPI):** Price index constructed using hedonic regression method for dwellings built in the current and the previous years covering the whole country.

**Residential Property Price Index for Existing Dwellings (ERPPI):** Price index constructed using hedonic regression method for the dwellings built before the current and the previous years covering the whole country.

**Nomenclature of Territorial Units for Statistics (NUTS):** Regional unit classification designed for the whole country in compliance with the European Union Regional Statistics System to develop a comparable statistical database.

**Level:** Regional units formed according to NUTS.

- **NUTS Level 3:** 81 regional levels corresponding to cities.
- **NUTS-Level 2:** 26 regional levels formed by combining NUTS-Level 3 units (Annex 1).

**Unit Price:** Price calculated by dividing the value of a property by its gross area of use.

**Median Unit Price:** Median price calculated from the dataset comprising the m2 unit values in valuation reports related to both the reference month and to preceding and succeeding months, by excluding the extreme values in each stratum.

**Stratum:** The smallest unit in which dwellings with similar characteristics are grouped together geographically and which provides a sufficient number of observations to calculate a reliable median unit price.

**Classification system:** Nomenclature of Territorial Units for Statistics (NUTS) is used for aggregating the data. The data are aggregated at the 3<sup>rd</sup> and 2<sup>nd</sup> levels of NUTS respectively for RPPI and ERPPI and the overall indices for Turkey are constructed using the data aggregated at the 2<sup>nd</sup> level. NRPPPI is constructed using the data aggregated at the 3<sup>rd</sup> level and the index for Turkey is constructed using the data aggregated at the 3<sup>rd</sup> level.

**Statistical population:** Dwellings in Turkey.

**Reference area:** The RPPI and ERPPI which are constructed to represent the whole country, cover appraised dwellings in 75 cities. Cities of Bayburt, Bingöl, Gümüşhane, Kilis, Şırnak and Tunceli are excluded from the scope due to insufficient number of observations. While constructing the NRPPPI, which also represents the whole country, data pertaining to the valuations of new dwellings in 56 cities where there are sufficient number of observations are used (Annex 2).

<sup>1</sup> For detailed information, see [Hülagü T., Kızılkaya E., Özbekler A.G., ve Tunar P. \(2016\). A Hedonic House Price Index for Turkey. Working Paper No. 16/03.](#)

<sup>2</sup> Eurostat (2011), Handbook on Residential Property Prices Indices. <http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA-12-022>

	<b>Geographical level:</b> RPPI is computed for the whole country and on the basis of NUTS Level, whereas NRPPi and ERPPi are published for the whole country and for the three major cities.										
	<b>Sector coverage:</b> None.										
	<b>Time coverage:</b> RPPI statistics are available starting from 2010.										
	<b>Coverage, n.e.s.:</b> None.										
	<b>Exceptional circumstances on coverage:</b> The strata which have insufficient number of observations are excluded from the scope.										
	<b>Statistical unit:</b> Dwellings in Turkey.										
	<b>Base period:</b> 2017										
	<b>Reference period:</b> Previous two months.										
	<b>Unit of measure:</b>										
	<table border="1"> <thead> <tr> <th><b>Variable/Indicator</b></th> <th><b>Unit of measure</b></th> </tr> </thead> <tbody> <tr> <td>RPPI</td> <td>Index</td> </tr> <tr> <td>NRPPi</td> <td>Index</td> </tr> <tr> <td>ERPPi</td> <td>Index</td> </tr> <tr> <td>Unit Price</td> <td>TL/m<sup>2</sup></td> </tr> </tbody> </table>	<b>Variable/Indicator</b>	<b>Unit of measure</b>	RPPI	Index	NRPPi	Index	ERPPi	Index	Unit Price	TL/m <sup>2</sup>
<b>Variable/Indicator</b>	<b>Unit of measure</b>										
RPPI	Index										
NRPPi	Index										
ERPPi	Index										
Unit Price	TL/m <sup>2</sup>										

<b>Periodicity</b>	<b>Frequency of data collection:</b> Monthly.
	<b>Frequency of dissemination:</b> Monthly.
<b>Timeliness</b>	<b>Average production time for each release of data:</b> Approximately 45 days
	<b>Time lag - first results (days):</b> Approximately 45 days.
	<b>Time lag - final results (days):</b> Approximately 75 days.

## Access by the Public

<b>Advance dissemination of release calendar</b>	The release calendar is announced to the public in advance and published on the first business day of each year on the website of the CBRT.
	<b>Link to advance release calendar:</b> <a href="#">Data Release Calendar</a>
	<b>Data release policy:</b> The institutions and organizations which are the subscribers of the data delivery system are informed about the publication of the results just after they are made available on the website of the CBRT.
<b>Simultaneous release to all interested parties</b>	<b>Simultaneous release:</b> Residential Property Price Index statistics are released simultaneously.
	<b>Pre-release data share with press or other specific users under special agreements:</b> Not shared.

# Integrity

**Dissemination of terms and conditions under which official statistics are produced, including those relating to the confidentiality of individually identifiable information**

**Responsibility for collecting, processing, and disseminating statistics:** The Surveys and Indices Division of the Data Governance and Statistics Department of the CBRT is responsible for collecting, processing and disseminating the statistics.

**Data sharing and coordination among data producing agencies:** None.

**Confidentiality of individual reporters' data:** In accordance with Article 43, Paragraph 5 of CBRT Law No. 1211, as amended on April 25, 2001 by the Law No. 4651, which states that "...the Bank may not publish or disclose the statistical information having a private and personal nature nor may it submit these to any official authority or private body other than the Banking Regulation and Supervision Agency. This information shall not be used for purposes other than those of statistical nature nor as means of evidence.", the data shall be deemed as confidential and will not be exposed to third parties.

**Staff, facilities, computing resources, and financing:** A total of 4 people of whom 2 graduated in statistics work in the process of collecting, processing, controlling, analyzing and publishing the statistics. When any technical problem is encountered during the preparation of the statistical data, IT Department supports immediately to solve the flaws.

**Monitoring user requirements:** The "Statistics Users Survey" is conducted via the website of the CBRT once in a year.

**Quality policy:** Publishing up-to-date, reliable, timely, and transparent statistics in compliance with international standards.

**Quality monitoring:** There are various micro and macro level controls in order to ensure quality standards.

**Impartiality of statistics:** Necessary measures to produce unbiased statistics are taken.

**Data sources:** The data source is valuation reports prepared at the stage of approval of individual housing loans extended by banks. Valuation reports which form a basis for housing loans are prepared by real estate appraisal companies. To construct the RPPI representing the whole country, all valuation reports are used, to construct the NRPPi valuation reports for the dwellings built in the current and previous years are used and to construct the ERPPi valuation reports for the dwellings built before the current and the previous years are used.

**Methodology:** RPPI which measures quality adjusted price changes related to the observed housing characteristics is constructed by using "characteristic-prices-based" hedonic regression method and log-linear regression model. The log-linear regression model is applied for each stratum and for each period which enables observing the price effects of quality component changes by stratum and in time.

In the scope of the current RPPI implementation, in which the geographical stratification approach is applied, dwellings with similar characteristics are grouped together to form homogenous strata and the indices for each stratum of RPPI and ERPPi are weighted by the average value and the number of dwellings sold to reach the overall price index. In calculating the NRPPi, the indices for each stratum are weighted by building permit statistics issued by the Turkish Statistical Institute (TURKSTAT) and average value of dwellings.

Sub-cities, which have sufficient number of observations, are determined as strata. In the case of insufficient number of observations for sub-cities, cities (NUTS-Level 3) and in the case of insufficient number of observations for cities, NUTS-Level 2 regions constitute strata. The strata are reviewed each year considering the number of observations. The strata in which the number of observations is insufficient are excluded and the strata which have satisfactory number of observations are included in calculation of the index.

The dataset used for calculating the index is composed by using a quarterly dataset including both the reference month and the preceding and succeeding months by excluding the extreme values in each

stratum. However, data for only two months, January 2010 and February 2010 are used to calculate the index for January 2010, which is the first month of the series.

**Calculation of Extreme Values:** The Tukey's Hinges method has been implemented in the analysis of extreme values in order to construct the indices. Unit prices that qualify the following equation:

$$\mathbf{m2\ unit\ price} < \mathbf{Q1-3*(Q3-Q1)} \text{ or } \mathbf{m2\ unit\ price} > \mathbf{Q3+3*(Q3-Q1)}$$

where:

**Q1:** Lower Quartile and **Q3:** Upper Quartile

are accepted as extreme values and excluded from the analysis.

**Weighting:** Data on house sales registered by the General Directorate of Land Registry and Cadastre (LRC) and average value of dwellings which are included in the CBRT dataset are used as weights for aggregating the strata in constructing the RPPI and ERPPI whereas building occupancy permit statistics issued by TURKSTAT and average value of dwellings are used for weighting in computing the NRPPI.

Weights used to produce the RPPI and ERPPI are updated each year with the weights calculated using the average value and number of dwellings sold in the related stratum in the previous year. In calculating the indices for the very first years of the series, 2010 and 2011, data on average value of dwellings for 2010 and dwelling sales data for 2011 are used as an exception.

Building occupancy permits issued in the two consecutive years preceding the reference year and previous year's average value are used to calculate the weights for constructing the NRPPI. In calculating the weights for 2010, data on average value of dwellings for 2010 are used as an exception.

**Calculating the Indices:** RPPI, ERPPI and NRPPI, which measure quality adjusted price changes are computed by using the following regression model, by estimating the regression coefficients for each period and each stratum. Indices are computed with the base year 2012 in the pre-2017 period and 2017 starting from 2017. The whole series are computed with the base year 2017.

$$\ln p_n^t = \beta_0^t + \sum_k \beta_k^t z_{nk}^t + \varepsilon_n^t \quad \forall n, t$$

$p_n^t$  : value of property n in month t

$z_{nk}^t$  : characteristic k of property n in month t

$\beta_k^t$  : shadow price of the features of dwellings n in month t

$\varepsilon_n^t$  : error term

Laspeyres index is calculated for each stratum for computing price changes by keeping housing characteristics constant in time.

$$P_i^t = \frac{\exp(\widehat{\beta}_0^t) \exp\left[\sum_k \widehat{\beta}_k^t \overline{z_{nk}^0}\right]}{\exp(\widehat{\beta}_0^0) \exp\left[\sum_k \widehat{\beta}_k^0 \overline{z_{nk}^0}\right]}$$

$P_i^t$ : price index for stratum i in period t

$\widehat{\beta}_k^0$  : estimated shadow price of the features in the base period

$\widehat{\beta}_k^t$  : estimated shadow price of the features in period t

$\overline{z_{nk}^0}$  : average housing characteristics in the base period

**Modes of dissemination:** Residential Property Price Index results are published on the website of the CBRT under the menu "Statistics/Real Sector Statistics" along with a report summarizing the monthly developments. The data are also available as a time series under the menu "Statistics/Electronic Data Delivery System (EDDS)".

	<p><b>Commenting on erroneous interpretation and misuse of statistics:</b> After the data is published, media is tracked regularly in order to prevent misuse of data.</p> <p><b>Disclosure of terms and conditions for statistical collection, processing, and dissemination:</b> Data are submitted by the banks within the first 5 business days of each month via the Electronic Data Transfer System (EDTS) of the CBRT.</p> <p><b>Seasonal adjustment:</b> Seasonal adjustment is not applied.</p> <p><b>Legal acts and other agreements on collection, processing, and dissemination of statistics:</b></p> <ul style="list-style-type: none"> <li>• Article 43, CBRT Law No. 1211, as amended on April 25, 2001 by the Law No. 4651</li> <li>• Turkish Statistics Law No. 5429 - Official Statistics Program</li> </ul>
<b>Identification of internal government access to data before release</b>	None.
<b>Identification of ministerial commentary on the occasion of statistical releases</b>	Statistics are published along with a report without any interpretation.
<b>Provision of information about revision and advance notice of major changes in methodology</b>	<p><b>Revision schedule:</b> Indices may be subject to revision up to one year.</p> <p><b>Identification of preliminary and/or revised data:</b> While disseminating the current month's indices, indices may be subject to revision up to one year due to revisions in the calculations or late and revised submissions of valuation reports by the banks.</p> <p><b>Advance notice of major changes in methodology, source data, and statistical techniques:</b> Major changes in methodology and statistical techniques are announced on the website of the CBRT in advance.</p>

## Quality

<b>Dissemination of documentation on methodology and sources used in preparing statistics</b>	The documentation on methodology used in preparing the statistics is available under the related heading on the website of the CBRT.
<b>Dissemination of component detail, reconciliations with related data, and statistical frameworks that support statistical cross-checks and provide assurance of reasonableness</b>	<p><b>Internal consistency:</b> Consistency checks are made systematically. Statistics in the same data set are internally consistent with each other.</p> <p><b>Temporal consistency:</b> Comparable time series start from 2010. There is no break in the time series data with respect to methodological changes.</p> <p><b>Intersectoral and cross-domain consistency:</b> Residential Property Price Index statistics are consistent with other data sources or statistics.</p>

## Notes

<b>Last posted</b>	
<b>Last certified</b>	
<b>Last updated</b>	16/03/2021

## Annex 1: Nomenclature of Territorial Units for Statistics

Level 1	Level 2	Cities
TR 1 - İstanbul	TR 10	İstanbul
TR 2 - Western Marmara	TR 21	Edirne, Kırklareli, Tekirdağ
	TR 22	Balıkesir, Çanakkale
TR 3 - Aegean	TR 31	İzmir
	TR 32	Aydın, Denizli, Muğla
	TR 33	Afyonkarahisar, Kütahya, Manisa, Uşak
TR 4 - Eastern Marmara	TR 41	Bursa, Eskişehir, Bilecik
	TR 42	Bolu, Kocaeli, Sakarya, Yalova, Düzce
TR 5 - West Anatolia	TR 51	Ankara
	TR 52	Konya, Karaman
TR 6 - The Mediterranean	TR 61	Antalya, Burdur, Isparta
	TR 62	Adana, Mersin
	TR 63	Hatay, Kahramanmaraş, Osmaniye
TR 7 - Middle Anatolia	TR 71	Nevşehir, Niğde, Aksaray, Kırıkkale, Kırşehir
	TR 72	Kayseri, Sivas, Yozgat
TR 8 - Western Black Sea	TR 81	Zonguldak, Bartın, Karabük
	TR 82	Çankırı, Kastamonu, Sinop
	TR 83	Samsun, Çorum, Amasya, Tokat
TR 9 - East Black Sea	TR 90	Artvin, Giresun, Gümüşhane, Ordu, Rize, Trabzon
TR A - North East Anatolia	TR A1	Erzurum, Erzincan, Bayburt
	TR A2	Ağrı, Ardahan, Kars, Iğdır
TR B - Middle East Anatolia	TR B1	Bingöl, Elazığ, Malatya, Tunceli
	TR B2	Van, Bitlis, Hakkâri, Muş
TR C - South East Anatolia	TR C1	Kilis, Adıyaman, Gaziantep
	TR C2	Diyarbakır, Şanlıurfa
	TR C3	Batman, Mardin, Siirt, Şırnak

**Annex 2: Cities Included in Calculation of Residential Property Price Index for New Dwellings (NRPPI)****Cities**

<b>Adana</b>	<b>Ordu<sup>(1)</sup></b>	<b>Mardin<sup>(6)</sup></b>
<b>Ankara</b>	<b>Osmaniye<sup>(1)</sup></b>	<b>Niğde<sup>(6)</sup></b>
<b>Antalya</b>	<b>Yalova<sup>(1)</sup></b>	<b>Sinop<sup>(6)</sup></b>
<b>Aydın</b>	<b>Bolu<sup>(2)</sup></b>	<b>Giresun<sup>(7)</sup></b>
<b>Balıkesir</b>	<b>Edirne<sup>(2)</sup></b>	<b>Van<sup>(7)</sup></b>
<b>Bursa</b>	<b>Elazığ<sup>(2)</sup></b>	
<b>Çanakkale</b>	<b>Erzurum<sup>(2)</sup></b>	
<b>Çorum</b>	<b>Kırklareli<sup>(2)</sup></b>	
<b>Denizli</b>	<b>Kütahya<sup>(2)</sup></b>	
<b>Diyarbakır</b>	<b>Şanlıurfa<sup>(2)</sup></b>	
<b>Eskişehir</b>	<b>Trabzon<sup>(2)</sup></b>	
<b>Gaziantep</b>	<b>Afyonkarahisar<sup>(3)</sup></b>	
<b>Hatay</b>	<b>Amasya<sup>(3)</sup></b>	
<b>İstanbul</b>	<b>Bilecik<sup>(3)</sup></b>	
<b>İzmir</b>	<b>Düzce<sup>(3)</sup></b>	
<b>Kahramanmaraş</b>	<b>Karabük<sup>(3)</sup></b>	
<b>Kayseri</b>	<b>Kırıkkale<sup>(3)</sup></b>	
<b>Kocaeli</b>	<b>Sivas<sup>(3)</sup></b>	
<b>Konya</b>	<b>Tokat<sup>(3)</sup></b>	
<b>Malatya</b>	<b>Adıyaman<sup>(4)</sup></b>	
<b>Manisa</b>	<b>Kastamonu<sup>(4)</sup></b>	
<b>Mersin</b>	<b>Zonguldak<sup>(4)</sup></b>	
<b>Muğla</b>	<b>Aksaray<sup>(5)</sup></b>	
<b>Sakarya</b>	<b>Uşak<sup>(5)</sup></b>	
<b>Samsun</b>	<b>Burdur<sup>(6)</sup></b>	
<b>Tekirdağ</b>	<b>Isparta<sup>(6)</sup></b>	

(1) Included in calculation of NRPPPI starting from 2013.

(2) Included in calculation of NRPPPI starting from 2014.

(3) Included in calculation of NRPPPI starting from 2015.

(4) Included in calculation of NRPPPI starting from 2016.

(5) Included in calculation of NRPPPI starting from 2017.

(6) Included in calculation of NRPPPI starting from 2018.

(7) Included in calculation of NRPPPI starting from 2019.