राष्ट्रीय आवास बैंक
NATIONAL HOUSING BANK

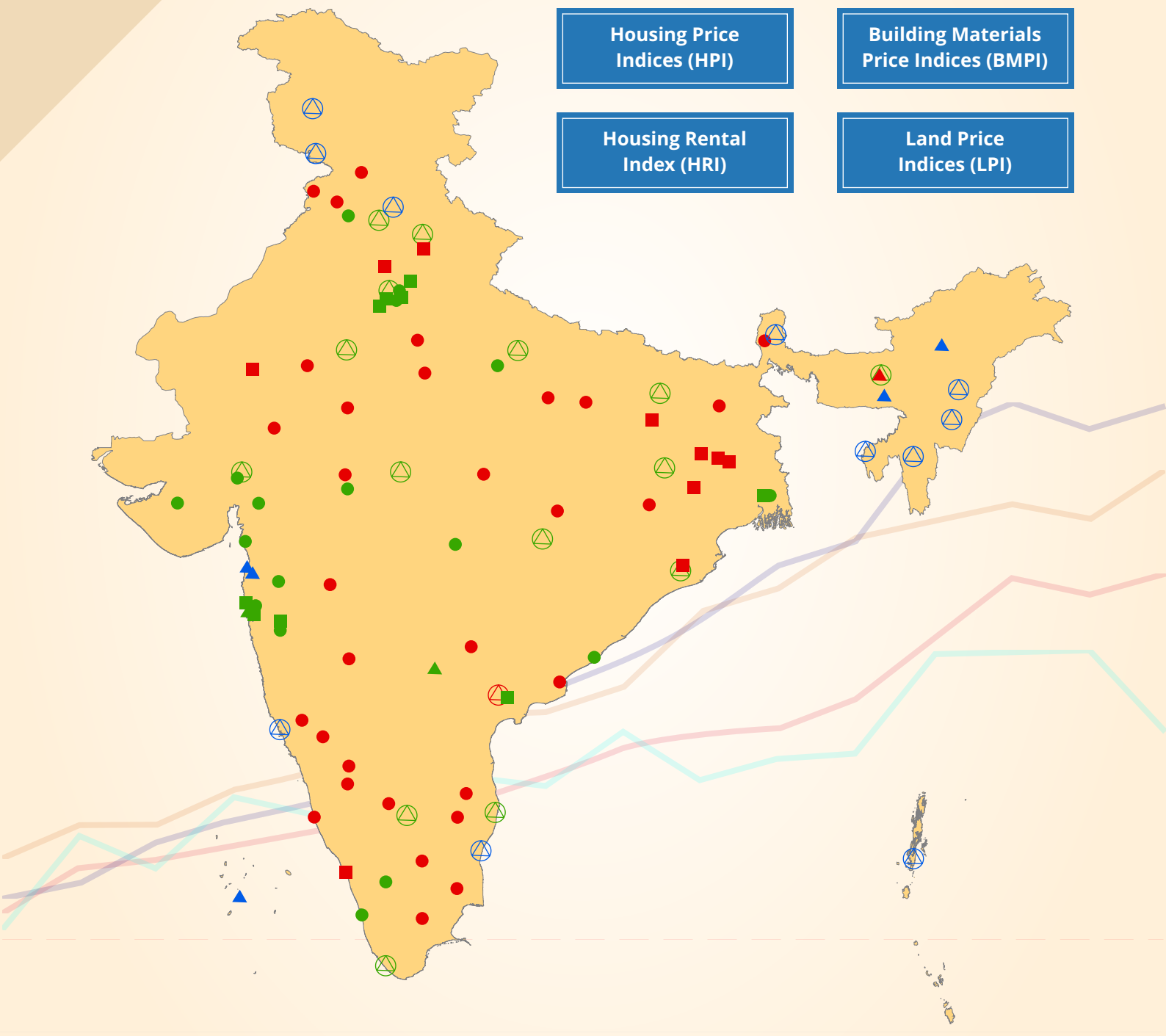
NHB RESIDEX

Housing Price Indices (HPI)

Building Materials Price Indices (BMPI)

Housing Rental Index (HRI)

Land Price Indices (LPI)



2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017







NHB RESIDEX

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DISCLAIMER

FOREWORD

Housing is a basic need for all human beings across all income spectrums. At an individual level, it is crucial for improving one's quality of life and at macro level for capital formation by boosting household savings. Home ownership has emerged as an individual and social goal in India. As the apex financial institution for housing, National Housing Bank is committed to promote research and development in housing and habitat related areas. NHB has now revamped its RESIDEX aimed at bringing more transparency into India's housing market and ensuring ease and clarity in stakeholders' decision-making process on housing

The latest version of NHB RESIDEX is not only wider in its geographic coverage, but also uses analytics in the calculation of the indices. NHB RESIDEX has proposed to enlarge its coverage and capture the housing price data from over 100 cities across the country, including State/UT capitals and Smart Cities. NHB RESIDEX's update involved streamlining the entire process of data collation, data sorting, and formulation of indices etc. under new digital framework. Here we would like to thank CERSAI, our data provider during the earlier versions of NHB RESIDEX and the Banks and HFCs for sharing data in the revamp process. In this endeavor NHB has engaged Liases Foras Real-Estate Rating and Research Pvt. Ltd. which has automated the processes and provided data analytics support to NHB.

NHB RESIDEX is not just an index. It is a brand, providing a cluster of housing related indices for the benefit of the various stakeholders including the Banks, other financial institutions, users etc. Going forward, NHB RESIDEX will also offer Housing Rental Index, Land Price Indices, and Building Materials Price Indices. We therefore envision NHB RESIDEX to be of great use to diverse stakeholders in the housing industry.

With housing in India being a major focus area, the need for transparent reference index is more important than ever. In recent years, the Government of India has initiated a series of positive steps in order to bring about more transparency and balanced growth of the sector. Under the Housing for All by 2022 Mission of GoI, the introduction of PMAY, providing infrastructure status to affordable housing, enactment of Real Estate Regulation & Development Act and amendment of the Benami Property Act are directly aimed at rationalizing the housing market in India and facilitating the efforts for providing affordable housing in the country. Various schemes are being announced to promote the economic activities of households, which will translate into greater end-user participation in the housing markets. In line with these developments, NHB RESIDEX will establish higher efficiency and confidence in the housing market and enable the governments to achieve their housing goals successfully.

We would like to thank the GoI and the RBI for their constant support and encouragement in this endeavor.

We extend our thanks to the TAC members for their valuable inputs and guidance. We also thank the Liases Foras Real Estate Rating & Research Pvt Ltd for providing support in the process revamping the NHB RESIDEX. We hope to receive valuable feedback from the stakeholders for improving the NHB RESIDEX in the times to come.

Sriram Kalyanaraman
Managing Director & Chief Executive Officer
NATIONAL HOUSING BANK

LIST OF ABBREVIATIONS

BMPI	-	Building Materials Price Indices
CERSAI	-	Central Registry of Securitisation, Asset Reconstruction and Security Interest of India
CLSS	-	Credit Linked Subsidy Scheme
CPI	-	Consumer Price Index
CSO	-	Central Statistics Office
GDP	-	Gross Domestic Product
GoI	-	Government of India
HFC	-	Housing Finance Companies
HPI	-	Housing Price Index
HR	-	Hedonic Regression
HRI	-	Housing Rental Index
LPI	-	Land Price Indices
MCD	-	Municipal Corporation of Delhi
NCR	-	National Capital Region
NCT	-	National Capital Territory
NDMC	-	New Delhi Municipal Council
NHB	-	National Housing Bank
NSSO	-	National Sample Survey Office
PLC	-	Preferred Location Charge
PMAY	-	Pradhan Mantri Awas Yojna
RBI	-	Reserve Bank of India
RSR	-	Repeat Sales Regression
SMA	-	Simple Moving Average
TAC	-	Technical Advisory Committee
TAG	-	Technical Advisory Group
UK	-	United Kingdom
UPRN	-	Unique Property Reference Number
US	-	United States of America
UT	-	Union Territories
WPI	-	Wholesale Price Index

CONTENTS

CHAPTER 1 INTRODUCTION

1.1 Housing Price Indices

The Housing Price Indices (HPIs) are a broad measure of movement of residential property prices observed within a geographic boundary. Housing price indices capture changes in the value of residential properties. Apart from serving as an indicator for housing price trends, the HPI provides an analytical tool for estimating changes in the rates of mortgage and measure housing affordability.

Residential property price is an important indicator of a nation's socio-economic performance. The wealth of many households is held in the form of housing, and therefore the price movement of housing bears a significant impact on national consumption and investment patterns. In other words, housing is a major contributor of physical and financial assets, and its price behaviour is a reflection of overall national economic performance. Movement in prices of real estate-particularly residential housing, is of vital importance to the study of economies and urban growth. It is therefore critical to closely monitor housing price movements on a regular basis.

Establishing a reliable housing price index is important for both, academic research and practical applications. Statistics on housing prices is of key importance and has many uses. Users of HPI range from private individuals looking to purchase or sell a house, to surveyors valuing a property for a mortgage company, analysts interested in the broader economic patterns and government policy makers assessing the success of housing policies. Furthermore, different users have different needs; whilst an economist may be more interested in the national picture, a private individual may be more interested in housing prices in their local area.

So far, there have been various concepts of housing price indices, and many sources and ways for compiling price data, both private and public. The methodology for construction of indices differs from country to country depending on the use and purpose of indices and availability of data. Some of the commonly used methods to calculate HPI include but are not limited to the hedonic regression (HR), simple moving average (SMA) and repeat-sales regression (RSR). For e.g. United States (US) publishes a quarterly measure of the movement of 'single-family' housing prices. Here the HPI is a weighted, repeat-sales index, meaning that it measures average price changes in repeat sales or refinancing on the same properties in 363 metropolises. The United Kingdom (UK) on the other hand has been publishing HPI since 1973. The indices were initially published by housing finance providers, and more recently are being brought out by government bodies. Currently the UK publishes a monthly HPI using Laspeyres-type Annual Chain Index allowing weights to be changes each year. The index is calculated using mortgage financed transactions that are collected by conducting a mortgage survey. It also includes analysis by region, type of buyer and type of dwelling. In Japan the indices are calculated using Hedonic or Quality adjusted Regression & Fisher Index. Here in order to compare the value of transaction prices at different points in time for HPI, fluctuations in housing prices are broken down into fluctuations due to changes in attributes and prices.

Housing prices in a city fluctuate across neighbourhoods and locations which may result in distortions in the analysis, if the data is processed inappropriately. Besides, for a housing price index to be of real use, data must be collected and updated every quarter. Accurate and timely collection of housing price data therefore requires use of advanced statistical tools and precocious technical skills. Nevertheless, the aim is never to construct a 'perfect' housing index but to construct an approximation to the theoretically ideal index that meet user need as best as it can, and that relevant information is available for users to make informed decisions.

1.2 Need for Housing Price Indices in the Indian Context

In India, housing is the fourth largest employment-generating sector contributing to about 6.86% of the employment and accounting for 1.24% of the total output of the economy and 1% of GDP. It is thus, an important subject for the Indian economy and various measures have been taken for its overall development. From the point of view of the housing finance sector, there are risk exposures for both, lenders and borrowers. Bank as well as corporates with a large exposure to real estate/housing may get affected by volatility in housing prices. Further, housing price is an important consideration for policy makers in framing monetary and fiscal policy measures. The housing price indices, which provide granular information on movement of prices of residential properties at locality/zone/city level can be relevant indicator for the local authorities in formulating their property tax policies. Regular monitoring of housing prices can be useful inputs for different interest groups like Banks, HFCs, Developers, and home-buyers. Consumers, i.e. home-buyers, will be able to check and compare prices before entering into a property transaction. It will provide developers a standardized tool to gauge housing demand within cities and across the country.

One of the major considerations in housing finance is also valuation of property being financed. Banks and Housing Finance Companies (HFCs) can use the index to make informed decisions and avoid default risk. At the macro level, the HPI could be a useful tool in compilation of various economic indicators of growth, output, inflation, financial health etc. which serve as further inputs to policy making.

Building a reliable database on housing and related factors at a national level is therefore important for streamlining the housing related sectors, for bringing about greater transparency to India's real estate markets and to establish greater trust among stakeholders and encourage wider and more competitive participation in the housing market.

1.3 The Genesis of NHB RESIDEX – India's first Housing Price Index

Apart from the uses discussed above rapid urbanization and high economic growth experienced by the Indian cities in the past few years has resulted in tremendous real-estate activity, especially in the housing sector. The importance of facilitating supply of affordable housing to the masses and the necessity of designing a right mix of policy initiatives to encourage broad based home ownership underline the relevance of tracking the movement in the prices of housing. Development of a credible database on actual price trends therefore needs no further emphasis and has rightly emerged as a crucial element of market development and for enhancing the efficiency of market processes.

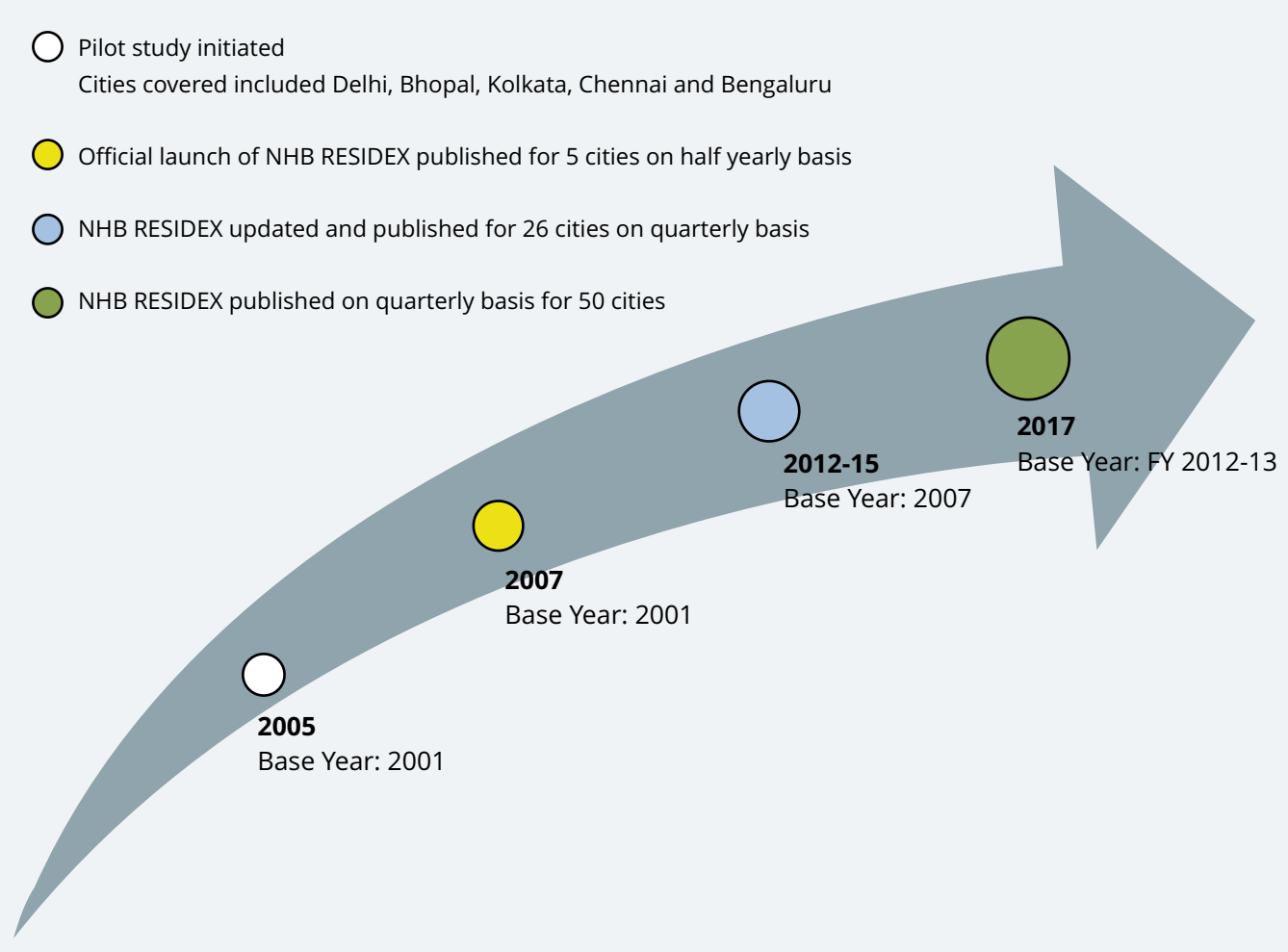
National Housing Bank (NHB), based on its mandate to undertake research and surveys on housing and related activities, as the per the provisions of the NHB Act, 1987, recognised the need of the hour, and at the behest of the Government of India, Ministry of Finance, undertook a pilot study covering 5 cities to examine the feasibility of preparing an index at the national level. In order to facilitate the study, a Technical Advisory group (TAG) comprising of experts from Government of India, Ministry of Finance, Reserve Bank of India, National Sample Survey Office (NSSO), Central Statistics Organisation (CSO), Labour Bureau, NHB and other market players, was constituted to deal with all issues relating to methodology, collection of data and also to guide the process of construction of an appropriate index.

Based on the result of the study and recommendations of the TAG, the first official housing price index for the country named 'NHB RESIDEX' was launched in July, 2007.

CHAPTER 2 NHB RESIDEX, ITS JOURNEY

2.1 Evolution of NHB RESIDEX

Figure : Map of Indices under NHB RESIDEX brand



2005 - Pilot stage (base year 2001): The pilot study, initiated in 2005 covered 5 cities viz. Bengaluru, Bhopal, Delhi, Kolkata and Mumbai representing the various regions of the country. 2001 was taken as the base year in order to make it comparable with WPI and CPI. Year-to-year price movement during the period 2001-2005 was captured in the study, and subsequently updated for two more years i.e. up to 2007. The official launch of NHB RESIDEX was made in July 2007. This index was constructed on a half yearly basis and only residential houses in urban areas with basis amenities were considered.

For the purpose of this study the primary data on housing prices was collected from Cooperative Housing Federations and Societies, Real Estate Agents and Resident Welfare associations. TAG had designed a specific questionnaire for the purpose keeping into consideration the difficulties one may encounter in collection of data from the above sources.

2012 onwards - Expansion stage (base year 2007): In the following year, from Jan-June 2008 period, NHB RESIDEX was expanded to cover 15 cities taking 2007 as the base year. Initiating Jan-Mar 2012, it expanded further to cover 20 cities (base year 2007). Later, starting Jan-Mar 2013, NHB RESIDEX in its final edition was covering 26 cities viz., Ahmedabad, Bengaluru, Bhopal, Bhubaneswar, Chandigarh, Chennai, Coimbatore, Dehradun, Delhi-NCR, Faridabad, Guwahati, Hyderabad, Indore, Jaipur, Kochi, Kolkata, Lucknow, Ludhiana, Meerut, Mumbai, Nagpur, Patna, Pune, Raipur, Surat and Vijayawada. The index, initially published on half yearly basis, was from 2010 brought out every quarter.

NHB RESIDEX was updated up to March, 2015 (Quarter Jan-Mar). It tracked the movement in prices of residential properties over a period of time by size and location of dwelling units (location, zone and city) which are relevant indicators for policy formulations at the Local, State and National level.

2.2 Past Methodology & Data sources for NHB RESIDEX computation

The process of arriving at City-wise Housing Price Index desired a detailed inference about the geography of all the cities so that price fluctuations across different locations within a city, due to locality-specific factors, could be known. Accordingly, based on that detailed study of Housing Prices in such locations within a city, a Residential/Market Segmentation was designed for all the cities. The selected city level market was first segmented on the basis of the municipal administrative zones or property tax zones. Thereafter, selection of locations was done on the basis of their spatial distribution across the city. The NHB RESIDEX thus, took into account the price trends for residential properties in different locations and zones in each city. In the construction of NHB RESIDEX, modified Laspeyres method was used with transactional weights assigned to the three built-up area categories viz., <500 sq. ft., 500 – 1,000 sq. ft. and >1,000 sq. ft. The housing/ population stock data was taken into consideration for arriving at the average housing prices in each of the zones in a city. City and Zonal indices were calculated by taking the prices relatives of the current year and base year.

Some assumptions underlying the construction of NHB RESIDEX included (i) composition of stock of properties remains constant over a certain period of time; (ii)unit prices of properties are representative of the respective unique set; (iii) record of stock of houses recorded with CERSAI are adequate for construction of the index.

NHB RESIDEX was initially computed using market data. From the quarter January – March 2010, data was collected from Banks and Housing Finance Companies. From the quarter October - December 2013, the data from Central Registry of Securitisation Asset Reconstruction and Security Interest of India (CERSAI) was being used. NHB RESIDEX for 26 cities was constructed quarterly taking into account the price trends for residential properties in different locations and zones in each city and was based upon the transaction data received from CERSAI.

2.3 2017 - Revamping of NHB RESIDEX as a Brand (base year FY 2012-13)

Given the importance of the growing housing and housing finance markets in the Indian economy, NHB RESIDEX is expected to bring greater uniformity and standardization as well as greater transparency in the valuation of properties across the country. Accordingly, a review of the NHB RESIDEX was undertaken recently, to discuss the relevance of past data sources, base year and methodology to produce high quality statistics, coverage expansion, improved presentation, periodical and timely publication and to make indices more relevant and aligned with the macroeconomic scenario.

The changes required based on the outcomes of the review exercise included (i) shifting the base year to an approximate nearest year (ii) revising the residential segmentation for all the cities (iii) expanding reach to all State Capitals and Smart Cities (iv) harmonizing and correlating the index with HPI of the RBI and (v) introducing automation in the process of computation of the indices using advanced software to reduce processing time, improve accuracy and eliminate manual intervention, to the extent possible. The NHB, thus, undertook the task of transforming the index for the upcoming quarters with an aim to link it with related indices for a more accurate measure of the contemporary rate of change in the housing prices.

The scope of the NHB RESIDEX brand has been widened to include housing rental index (HRI), land price indices (LPIs) and building materials price indices (BMPIs), besides housing price indices (HPIs). The geographical coverage will progressively be expanded to over 100 cities including all State/UT Capitals and smart cities.

CHAPTER 3 BRAND NHB RESIDEX

NHB RESIDEX has now emerged as a brand encompassing housing, land and building materials price indices. It aims to provide an inter-linkage of housing price with other related verticals prices and reveal the extent of interdependence between them. Further, within each of the vertical, there are a set of indices which track the prices at different stages of the entity in consideration based on the different data sources available. The base year, computational methodology, data sources, city coverage etc., for computation of indices have undergone change after the revamp of NHB RESIDEX. The entire processes for data collation, data sorting and formulation of indices have been streamlined and automated to minimize manual intervention and possibility of error.

3.1 Features of the updated NHB RESIDEX

3.1.1 Shift in Base Year from 2007 to FY 2012-13

Base year revision exercises are undertaken as per the internationally accepted practices to capture the changing structure of the economy. This ensures capturing the latest information and accurately reflects the current economic situation in the country. The process for selection of new base year for NHB RESIDEX also involved analyzing its appropriateness and relevance in the current market scenario. There will be automatic shifting of the base year after every five years.

3.1.2 Increased Geographical Coverage

NHB RESIDEX has been published for 50 cities with FY 2012-13 as base year as opposed to 26 cities being covered earlier with 2007 as base year. Generally, State/UT capitals have high level real estate activity and are representative of the State and hence, inclusion of State/UT capitals is a major consideration for selection of new cities. A few States/UTs missed out in the current phase due to non-availability of data are proposed to be included in the upcoming phases. Also, in order to transform/evolve based on government policy objectives and initiatives, the current phase of NHB RESIDEX has also included Smart Cities undergoing high real estate activity among the 50 cities. The updated phase of NHB RESIDEX includes 18 State/UT capitals and 37 Smart cities which will progressively be expanded to more cities to include all State/UT capitals and smart cities.

Table : Classification of cities in the current Phase

Classification	North Zone	Central & East Zone	West Zone	South Zone
State Capitals and Smart Cities	Delhi Chandigarh Dehradun Lucknow	Bhubaneshwar Guwahati Patna Ranchi Bhopal Raipur	Gandhinagar Jaipur	Bengaluru Chennai Thiruvananthapuram
State Capitals		Kolkata	Mumbai	Hyderabad
Smart Cities	Ludhiana Faridabad Kanpur Ghaziabad Meerut	Bidhan Nagar New Town Kolkata Indore	Pune Surat Ahmedabad Nagpur Thane Nashik Vadodara Rajkot Pimpri Chinchwad Kalyan Dombivli Navi Mumbai	Kochi Vishakhapatnam Coimbatore
Additional Cities	Gurugram Greater Noida Noida Bhiwadi	Howrah	Chakan Mira Bhayander Panvel Vasai Virar	Vijayawada

3.1.3 Approach for defining cities

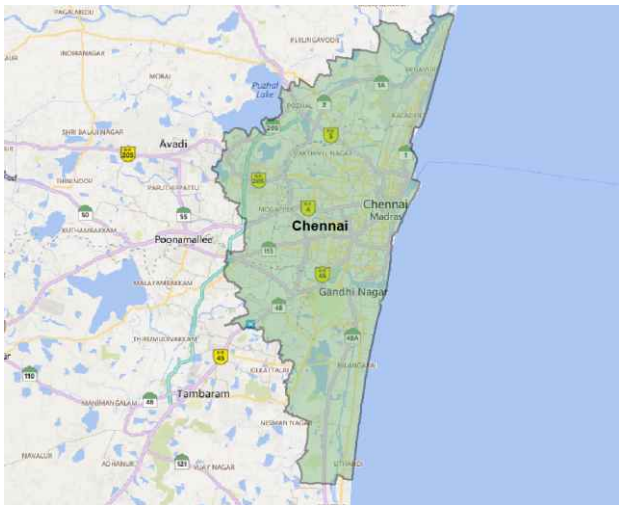
Cities for the calculation of HPI have been defined as per Census of India, 2011. Census has considered the municipal corporations, municipal councils, municipalities and nagar panchayats as separate cities/ statutory towns. City boundaries have been limited to boundaries defined by municipal corporations/ councils/ municipalities. Outgrown regions as defined in Census have not been considered as part of city.

The maps of a few cities are shown below:

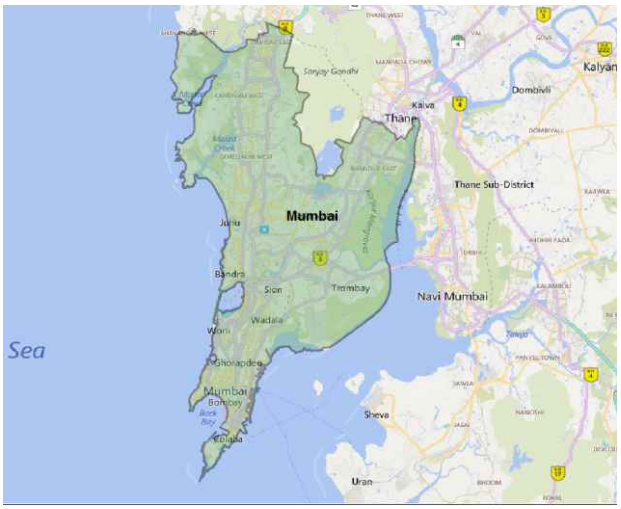
Kolkata

Delhi[1]

Chennai



Mumbai

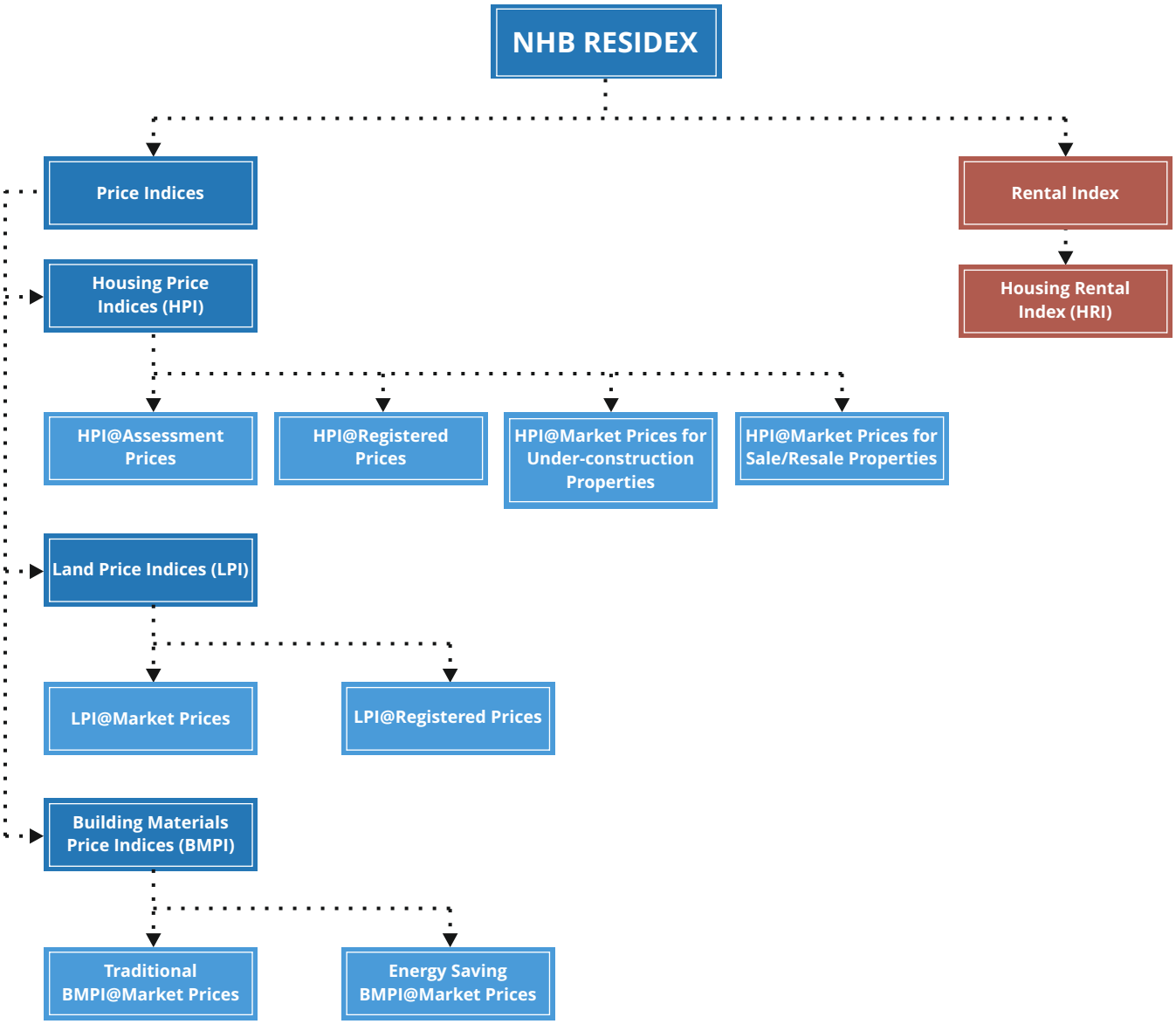


3.1.4 Comprehensive Indices

The current phase publishes HPIs for both sold and under-construction properties. The sold properties correspond to both primary and secondary market transaction and their indices are based on three different set of prices i.e., assessed price, registered price and market price. In order to bring the entire spectrum of housing and related activities under the purview of the NHB RESIDEX, in the upcoming phases it is planned to bring out Housing Rental Index (HRIs), Land Price Indices (LPIs) and Building Materials Price Indices (BMPIs), besides HPIs.

[1]Delhi has been considered as one city since out of the four municipal bodies, three were formed in 2012 by trifurcation of MCD (Municipal Corporation of Delhi). The trifurcation was done for better administration of civic body. All three corporations are part of one city viz is Delhi. Fourth Municipal corporation in Delhi is NDMC (New Delhi Municipal Council) comprises of the territory that has been described as Lutyen's Delhi and consist of only 3% of land area of NCT of Delhi.

Figure: Map of Indices under NHB RESIDEX brand

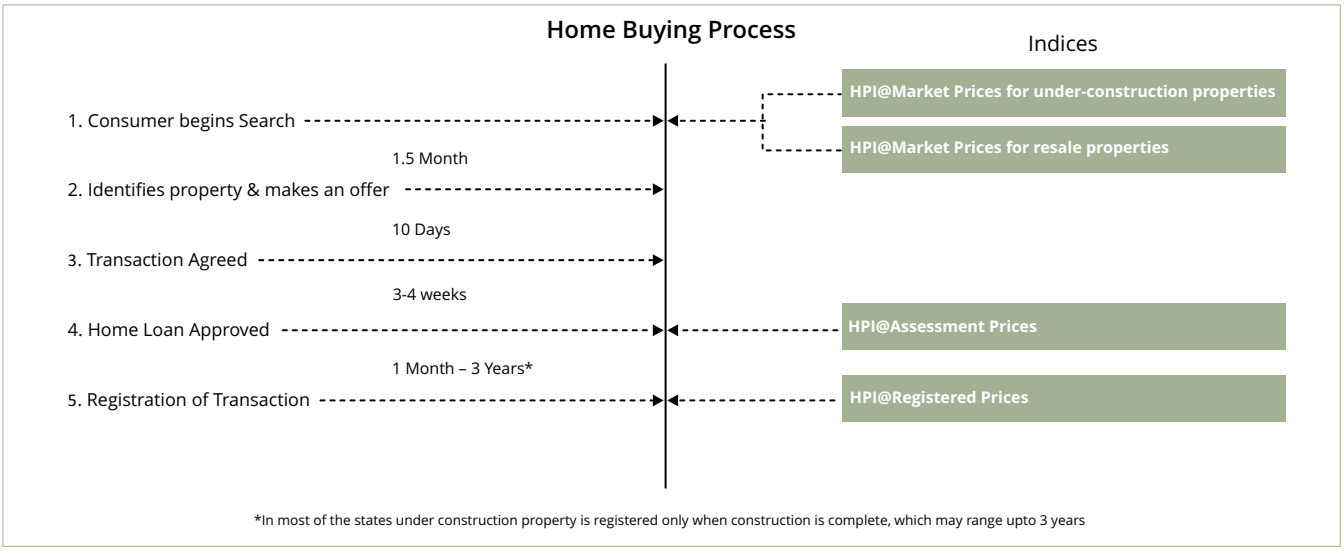


Housing Price Index (HPI)

HPI represents the change in prices of residential housing properties.

Under HPI, the four indices viz., HPI@Assessment Prices, HPI@Registered Prices and HPI@Market Prices for under-construction properties, and HPI@Market Prices for resale properties use different sources to provide the entire spectrum of prevailing prices at the city and neighbourhood level. These data sources are valuation data of Banks/HFCs for HPI@Assessment Prices, registration data of States/UTs for HPI@Registered Prices and primary and secondary market data for HPI@Market Prices for under-construction properties and HPI@Market Prices for resale properties. Thus, HPIs under NHB RESIDEX aim to capture various stages of the home buying process in the country.

Figure: Home Buying process & NHB RESIDEX HPI; as per survey



Land Price Index (LPI)

Land Price Indices indicate changes in land prices across cities in the country. As land is a raw material for housing and industrial development, it is important to track its prices for maintaining economic efficiencies.

LPI comprises of two indices viz. LPI@Market Prices and LPI@Registered Prices, using different sources of data. LPI@Registered Prices would track the land prices of a city based on the registration of transaction during a particular period. LPI@Market Prices would be developed using the market price of land in various parts of a city.

Building Materials Price Indices (BMPI)

Building Materials Price Indices indicate the changes in the building material prices. As building material is a significant part of real estate property prices, the changes in their prices may be linked with housing prices to ascertain the correlation between HPI and BMPI.

Building Materials Price Indices consists of two indices viz., Traditional BMPI@Market Prices and Energy Saving BMPI@Market Prices. Traditional BMPI@Market Prices track the price movement of traditional building material such as cement, steel, sand, brick, tiles etc. The indices will be developed at city level as well as national level. Energy Saving BMPI@Market Prices track changes in prices of energy saving building material like glass, fiber etc. The building material for this index is ascertained based on green building norms.

Housing Rental Index (HRI)

Housing Rental Index provides quarterly analysis of rental property prices in the market. It tracks changes in rental prices thereby, allowing comparison of the prices that tenants are charged in different periods.

3.1.5 More detailed to capture location level indices

As compared to the earlier phases wherein indices were available for various zones in a city, NHB RESIDEX in the current phase envisages to providing housing price trends for micro locations, ward boundaries as well as pin codes in a city.

3.1.6 Change in Data Sources

The data sources for NHB RESIDEX have been selected based on the ease of availability of data required for periodic update of the indices. The current phase uses assessment data sourced from Banks/HFCs for HPI@Assessment Prices, registration price data sourced from Sub-Registrar Offices (SRO) for HPI@Registered Prices and primary and secondary market data from builders/developers for HPI@Market Prices for under construction properties and HPI@Market Prices for sale/resale properties.

3.1.7 Change in methodology for Index computation

Indices in the current phase are being computed using the weighted average price method i.e., Laspeyres method which is slightly distinct from the Modified Laspeyres method being used earlier. The weightages are now based on the number of transactions in the base year at different product category level. Previously, in addition to transactional weightages, factors using housing/population stock weights were applied at zonal and product levels.

3.1.8 Product Category Classification

Presently, the product classification based on carpet area size per square meter has been defined in line with Credit Linked Subsidy Scheme (CLSS) guidelines. The three categories are (a) <= 60 sq. m. (b) >60 sq. m. and <=110 sq. m. (c) >110 sq. m. The main reason behind keeping this categorization is to enable mapping the impact of Pradhan Mantri Awas Yojana (PMAY) and other affordable housing schemes of the Government of India.

3.1.9 Publication of Median Housing Prices

Median prices at product category level are being published along with the indices on a quarterly basis.

3.1.10 Automation of Processes

The automation of several processes using advanced software have led to improvement in accuracy and computation speed. The processes that have been automated include cleaning of raw data, computation of indices and conduct of in-depth analysis.

3.1.11 User-friendly website

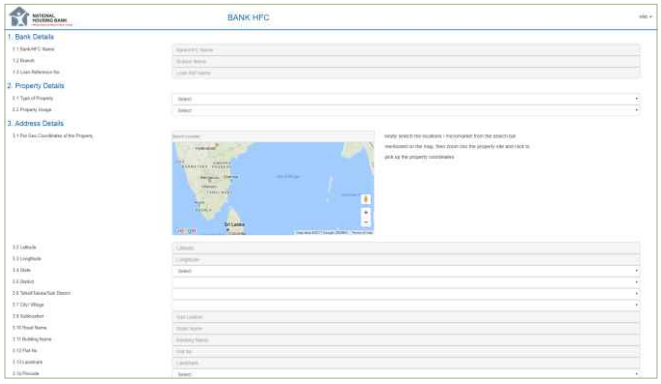
A user-friendly website has been designed to make the indices available to the general audience.

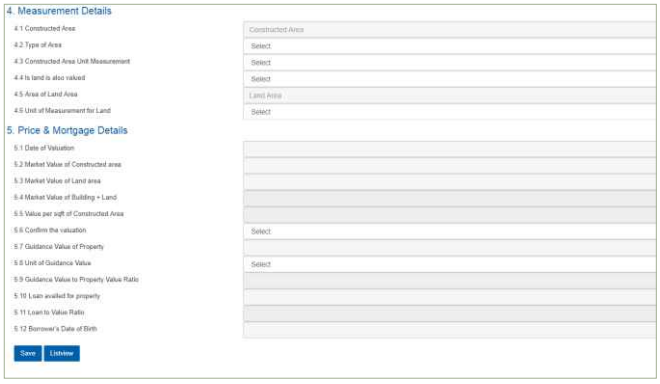
3.1.12 Automation for the purpose of data collection

Data collection from Lenders (valuation data) and Sub Registrar Offices (registration data) will be carried out via web portal. Authorized personnel at source will be aligned unique credentials for accessing the upload portal. This measure will reduce the time taken for data collection and its processing, which in turn will reduce the turnaround time in publication of NHB RESIDEX every quarter. The system is designed to collate data from multiple sources into one database. It will also converge data from varied formats into a singular format, by automatically mapping the columns of uploaded data and match it to the database structure.

The system automatically detects the anomalies at time of data upload reducing efforts and time undertaken in cleaning the data.

Figure : Data upload format for Banks and HFCs





CHAPTER 4 PHASE I OF REVAMPED NHB RESIDEX

4.1 Source of Data for the updated NHB RESIDEX

In the current phase, NHB RESIDEX has been published to capture two HPIs viz. HPI@Assessment Prices and HPI@Market Prices for under construction properties. The source and structure of the data sets used for computation of these two indices are mentioned below:

Table : Source of Data for computation of HPI

S. No	Indices	Data	Sources	Data Structure
A	HPI@Assessment Prices	Lenders' valuation data	Banks/HFC	Units valued during a period
B	HPI@Market Prices for under construction properties	Under construction projects	Market Surveys[2]	Sum of units unsold at building level at the end of the period

HPI@Assessment Prices

Data for computation of HPI@Assessment Prices sourced from Banks & Housing Finance Companies (HFCs) is based on the valuation undertaken by them at the time of loan origination.

The major steps involved in the data cleaning are as follows:

Step 1 – Identify property address related errors:

The records in which mentioned city, micro location and pin codes are inconsistent are identified. For example, if any address in Mumbai data contains keywords like Aundh (micro location of Pune) or Andhra Pradesh, then it is eliminated. The identification of ambiguous records are done using machine learning.

Step 2 - Define the maximum & minimum property sizes:

Residential flat of size below 100 sq. ft. is not usually available. Similarly, the probability of a residential flat having size above 10,000 sq. ft. is quite low. Thus, 100 sq. ft. and 10,000 sq. ft. are considered as minimum and maximum possible size and all the records outside this range are eliminated from further calculation.

Step 3 – Identification of outliers in the prices:

Outliers in the datasets are identified using Tukey's Method for each pin code and product category.

Out of the entire database received, 42% data was used for computation of HPI@Assessment Prices

HPI@Market Prices for under construction properties

Data on under construction properties across 47 cities has been collected from brokers, developers, builders etc. through market/field survey. The projects are identified via secondary sources and then geo-mapped to ensure all under-construction projects in the cities are duly covered. Post this, field survey is conducted with surveyors visiting the identified projects. The data collated include units of unsold stock, their prices and construction status of each project. The data is updated every quarter. The price considered for computation is the base price which the developer offers to the consumer that excludes charges for floor rise, preferred location charge, car parking, government dues etc.

[2]Data collected by Liases Foras Real Estate Rating Research Pvt. Ltd. from developers, builders and brokers etc.

4.2 Computational Methodology

The Laspeyres Method has been used for the calculation of HPI@Assessment Price and HPI@Market Prices for under construction properties. Weights are applied based on products (i.e., units classified by carpet area).
In previous versions of NHB RESIDEX, transactional weightages have been assigned to boundaries/locations within a city. This restricts the flexibility of studying price at various regional boundaries without distorting the city level prices. Prices at city level should remain constant irrespective of the number of boundaries into which the city is segmented. For example, Greater Mumbai has 24 Municipal Wards, 97 Census Wards/ Sections and 104 Pin codes. Housing Price Indices of a city, when computed using weights of Municipal Wards would be different from Housing Price Indices computed based on weights of pin code. City prices cannot change with change in boundaries. For this reason, weightages of regional boundaries has not been considered. Price should be the weighted average price irrespective of selection of boundary which may be a region, city, pin code, ward, a micro market or colony.

City level or any other boundary level Housing Price Index is computed using the Laspeyres Method with FY 2012-13 as the base year. The formula for computation is as given below:

$$HPI = \frac{\sum_{i=1}^{n} P_{1i}Q_{0i}}{\sum_{i=1}^{n} P_{0i}Q_{0i}} \; x \; 100$$

wherein,
P_{0i} = *Price of i th product in base period*
Q_{0i} = *Quantity of Unsold stock/ Number of transactions of i th product in the base period*
P_{1i} = *Price of i th product in the current period*
$_n$ = *Number of product types*

The detailed steps undertaken for the computation of indices are discussed below

Step 1 – Assessment of Product Level Prices

Data sets (both lenders' valuation data and under construction data) are classified in three product categories based on the carpet area of units. The product classification has been done on the following basis:

Product Category	Basis for Product category (as per CLSS guidelines)
Upto 60 sq.mt	The Government of India has defined the limit for LIG/EWS housing as 60 sq.mt.
Greater than 60 sq.mt. and up to 110 sq.mt.	Government of India has defined the limit for MIG housing as 110 sq.mt.
Greater than 110 sq.mt.	

In addition to checking of alignment to affordable housing, the product categories are statistically tested to ensure each category has enough records to compute the prices and indices thereafter.

Prices at the product level for HPI @Assessment Prices is computed using median. Since the lender valuation data is skewed, median is used to determine the average prices at product level. The formula used for the assessment for product level prices is mentioned below:

P_1 = *Median (Prices)*

Based on the above mentioned formula, the product level prices for Bengaluru for HPI@Assessment price is as shown below:

Product for HPI computation (Figures in INR/ sqft)			
Quarter - Year	<=60 sq.m. ≈ 646 sq.ft.	>60 sq.m. and <=110 sq.m ≈ >646 sq.ft. and <=1184 sq.ft	>110 sq.m. ≈ > 1184 sq.ft.
Jun-12	3,732	4,271	5,008
Sep-12	3,688	4,510	5,293
Dec-12	4,223	4,586	5,129
Mar-13	4,028	4,607	5,463
Jun-13	5,057	4,708	5,400
Sep-13	4,838	4,688	5,458
Dec-13	5,431	4,753	5,702
Mar-14	4,898	4,847	5,666
Jun-14	4,026	4,900	5,773
Sep-14	4,977	5,128	5,967
Dec-14	4,817	5,304	6,118
Mar-15	5,410	5,175	6,120
Jun-15	5,125	5,283	6,243
Sep-15	5,168	5,403	6,506
Dec-15	6,412	5,629	6,543
Mar-16	5,505	5,753	6,580
Jun-16	6,052	6,256	7,197
Sep-16	6,062	6,237	7,491
Dec-16	5,543	6,089	7,132
Mar-17	6,484	6,015	7,270

However, for assessing product level prices for HPI@Market Prices of under construction properties, the weighted average methodology is used. The reason for the change in methodology is due to the change in data structure. The lender valuation data consists of price of each unit transacted, while under construction data consists of prices for unsold units at the building level.

Each under construction building may consist of multiple units with the same price, which is why weighted the average methodology is the best method to assess product level prices. To calculate product level prices, unsold units are considered as weights. The formula for assessing product level prices for HPI@Market Prices of under-construction residential properties is as follows

$$P_i = \frac{\sum P_n US_n}{\sum US_n}$$

wherein,

P_n - Price of n th record
US_n - Unsold stock for n th record

Based on the above mentioned formula, the product level prices of Bengaluru for HPI@Market Prices of under construction properties is shown below:

Product for HPI computation (Figures in INR/ sqft)			
Quarter - Year	<=60 sq.m. ≈ 646 sq.ft.	>60 sq.m. and <=110 sq.m ≈ >646 sq.ft. and <=1184 sq.ft	>110 sq.m. ≈ > 1184 sq.ft.
Jun-12	3,203	4,433	6,362
Sep-12	3,567	4,734	6,610
Dec-12	3,703	4,998	7,373
Mar-13	4,589	5,295	7,770
Jun-13	4,808	5,583	8,157
Sep-13	4,915	5,480	8,380
Dec-13	4,918	5,573	8,488
Mar-14	4,860	5,727	8,510
Jun-14	5,945	6,647	8,869
Sep-14	6,930	6,779	9,011
Dec-14	6,647	6,736	8,937
Mar-15	6,274	6,628	8,898
Jun-15	6,269	6,615	8,904
Sep-15	6,374	6,579	8,562
Dec-15	6,629	6,255	9,025
Mar-16	6,466	6,235	9,018
Jun-16	6,381	6,275	9,129
Sep-16	6,502	6,326	9,283
Dec-16	6,295	6,415	9,251
Mar-17	6,476	6,457	9,499

Post computation of product level prices, the methodology for computation of both the indices are the same.

Step 2- Determination of Base year prices & quantity (P_0Q_0)

Laspeyres Method uses quantity (Q_0) of base year to compute the price trend. For both indices viz., HPI@Assessment Prices and HPI@Market Prices for under construction properties, the financial year 2012- 2013 has been considered as base year. To calculate average quantity during the base year (Q_0), average quarterly records during FY 2012-2013 for each product have been considered. The average of records was computed using the simple average method. Q_0 is a percentage of records for each product against the total number of records. For HPI@Market Prices for under construction properties, the average of unsold stock was considered to compute Q_0.

Determination of Q_0 for HPI@Assessment Prices of Bengaluru

Product Level	Number of Records					Q_0 for FY 2012-13
	Jun-12	Sep-12	Dec-12	Mar-13	Average for FY 2012-13	
<=60 sq.m.	42	38	33	49	41	0.05
>60 sq.m. and <=110 sq.m	423	469	507	609	502	0.59
>110 sq.m.	261	310	294	352	304	0.36

These weights are multiplied to average base year price to calculate P_0Q_0
To calculate average prices for the base year (P_0), simple average of product prices for four quarters viz., June 2012, September 2012, December 2012 and March 2013 was considered.

Determination of P_0 for HPI@Assessment Prices of Bengaluru

Product for HPI computation (Figures in INR/ sqft)			
Quarter - Year	<=60 sq.m. ≈ 646 sq.ft.	>60 sq.m. and <=110 sq.m ≈ >646 sq.ft. and <=1184 sq.ft	>110 sq.m. ≈ > 1184 sq.ft.
Jun-12	3,732	4,271	5,008
Sep-12	3,688	4,510	5,293
Dec-12	4,223	4,586	5,129
Mar-13	4,028	4,607	5,463
Average (P_0)	**3,918**	**4,494**	**5,223**

Determination of P_0Q_0 for HPI@Assessment Prices of Bengaluru

Product Level	P_0 for FY 2012-13 (a)	Q_0 for FY 2012-13 (b)	P_0Q_0 (a*b)
<=60 sq.m.	3,918	0.05	187.39
>60 sq.m. and <=110 sq.m	4,494	0.59	2,664.02
>110 sq.m.	5,223	0.36	1,876.85
Total		1.00	$\sum P_0Q_0$ = 4728.25

Step 3- Determination of P_1Q_0 for all the quarters

To determine P_1Q_0 for each quarter, the product level prices is first multiplied with Q_0.

Determination of P_1Q_0 for HPI@Assessment Prices of Bengaluru

Quarter - Year	Multiplication of product level prices with Q_0 (P_1Q_0)			$\sum P_1Q_0$ = (c+d+e)
	<=60 sq.m. ≈ 646 sq.ft. (c)	>60 sq.m. and <=110 sq.m ≈ >646 sq.ft. and <=1184 sq.ft (d)	>110 sq.m. ≈ > 1184 sq.ft. (e)	
Jun-13	242	2,791	1,940	4,973
Sep-13	231	2,780	1,961	4,972
Dec-13	260	2,818	2,049	5,127
Mar-14	234	2,874	2,036	5,144
Jun-14	193	2,905	2,074	5,172
Sep-14	238	3,040	2,144	5,422
Dec-14	230	3,144	2,198	5,573
Mar-15	259	3,068	2,199	5,526
Jun-15	245	3,132	2,243	5,620
Sep-15	247	3,203	2,338	5,789
Dec-15	307	3,337	2,351	5,995
Mar-16	263	3,411	2,364	6,038
Jun-16	289	3,709	2,586	6,584
Sep-16	290	3,697	2,692	6,679
Dec-16	265	3,610	2,563	6,438
Mar-17	310	3,566	2,612	6,488

Step 4- Determination of Housing Price Index

P_1Q_0 determined in step 3 is divided with P_0Q_0 and multiplied with 100 to compute HPI@Assessment Prices as well as HPI@Market Prices for under construction properties. The computation for HPI@Assessment Prices of Bengaluru is shown below:

Quarter - Year	P_1Q_0 (f)	P_0Q_0 (g)	HPI@Assessment Price (f/g*100)
Jun-13	4,973	4,728	105
Sep-13	4,972	4,728	105
Dec-13	5,127	4,728	108
Mar-14	5,144	4,728	109
Jun-14	5,172	4,728	109
Sep-14	5,422	4,728	115
Dec-14	5,573	4,728	118
Mar-15	5,526	4,728	117
Jun-15	5,620	4,728	119
Sep-15	5,789	4,728	122
Dec-15	5,995	4,728	127
Mar-16	6,038	4,728	128
Jun-16	6,584	4,728	139
Sep-16	6,679	4,728	141
Dec-16	6,438	4,728	136
Mar-17	6,488	4,728	137

4.2.1 Other methodologies available for determination of HPI and their non-applicability in the Indian context

In addition to recommended methodology, following methodologies were also analysed along with their applicability to Indian housing market:

- Repeat Sales Method
- Hedonic Regression

Each of these methodologies along with its applicability in Indian context are discussed below.

Repeat Sales Methodology

The Repeat Sales Method represents the behavior of secondary market transactions by assessing the difference in sale prices of the same property that has been sold at least twice. The existence of a Unique Property Reference Number (UPRN) is an essential pre-requisite to map the transaction trails for repeat sales. US Federal Housing Finance Agency publishes HPI based on weighted repeat sales for single-family housing prices in the United States. S&P/Case-Shiller Indices also publishes HPI based on modified version of weighted repeat sales in the US.

In India, especially in major metros and cities, the real estate market is mainly governed by the primary market i.e., developers' property sales, which is the first time sales. This tendency of the market along with the absence of unique property ids to track the frequency of sale of a given property makes it infeasible to adopt the repeat sales method.

Hedonic Regression Method

The Hedonic Regression Method estimates price movement based on the different attributes of any given property using regression analysis. This method is based on the fact that prices of goods in a market are affected by their characteristics, and estimates the value of a property based on people's willingness to buy it as and when its characteristics change. The variables generally used include performance-related factor as well as service attributes such as age of building, locational views, surrounding, amenities, economic profiling of residents etc. Hedonic Regression Method is currently being used in Australia, Germany, France and UK for assessing HPI.

In India, the factors that attribute to change in housing prices are many in number and also highly variable. These factors not only differ from city to city but also differ among different localities within a city. For instance, in hedonic regression, it is assumed that property price is a function of its distance from the city center. However, in India, a city may consist of more than one city center, wherein, the second center may have been formed later than the first one. The property price thus becomes a function of more than one distance factors. Owing to these limitations, it is infeasible to adopt the said method.

CHAPTER 5 NHB RESIDEX AT A GLANCE

Phase 1 of NHB RESIDEX with updated features comprises of housing price indices computed at the city level. City level indices have been computed using two data sets namely lenders' valuation data received from Banks/HFCs and primary market data for under-construction properties to arrive at HPI@Assessment Prices and HPI@Market Prices for under-construction properties respectively.

Brief on housing price indices for Phase 1 is as given below:

Indices	Data	Sources	Cities
HPI@Assessment Prices	Lenders' valuation data	Banks/HFC	50
HPI@Market Prices for under construction properties	Primary market data for Under-construction projects	Market Data	47

The cities covered in phase 1 are spread across India in 21 states/UTs. Among 50 cities covered under HPI@Assessment Prices; 18 cities are state capitals and 37 are part of the smart city list released by Government of India. Due to paucity of data HPI@Market Prices are not available for Rajkot, Ranchi and Vishakhapatnam.

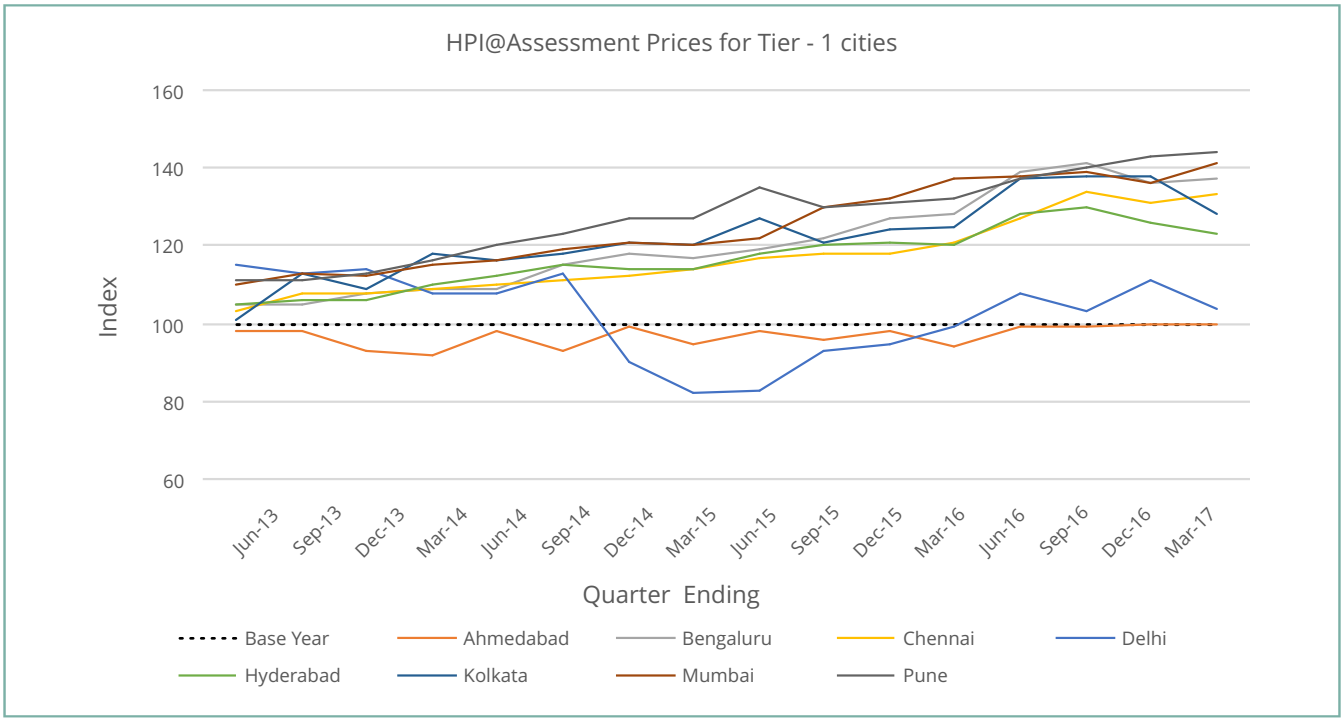
The housing price indices have been computed on a quarterly basis starting quarter Apr – Jun 2013 and updated up to quarter Jan – Mar 2017 with FY 2012-13 as the base year.

5.1 HPI@Assessment Prices

On comparing the current quarter (Jan-Mar'17) with base year FY 2012-13, it is observed that among Tier 1 cities namely Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Kolkata, Mumbai and Pune; all cities except Ahmedabad have witnessed an increment in housing price. The price in Ahmedabad has remained unchanged. Delhi had exhibited a substantial dip in housing prices during FY 2014–15 which has been in recovery since and currently has matched up to prices in FY 2012-13.

Movement of HPI over 16 quarters for Tier 1 cities is as below:

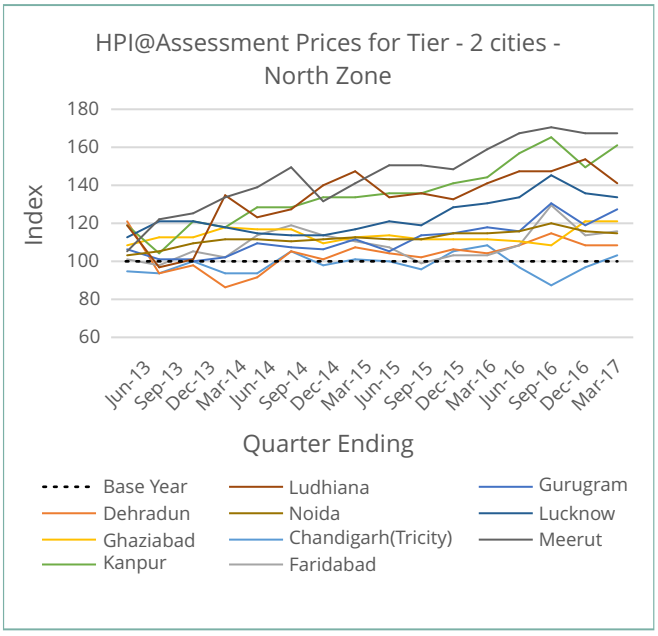
Figure : HPI@Assessment Prices for Tier 1 cities (Base Year FY 2012-13 = 100)

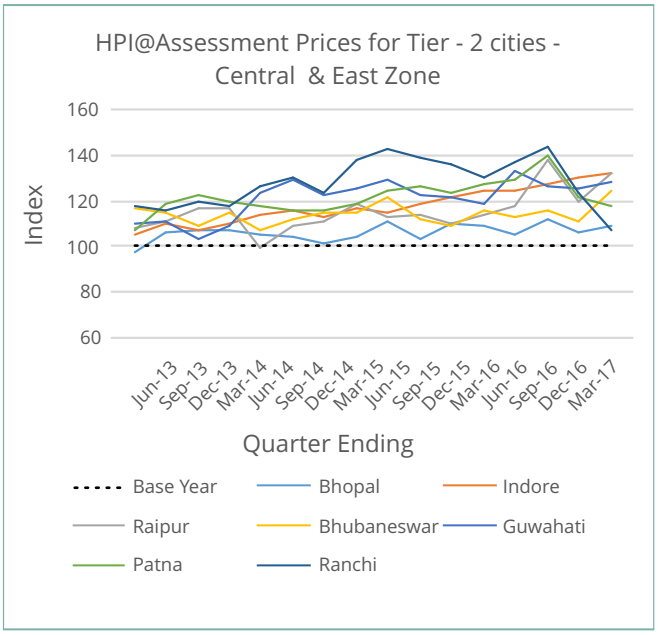


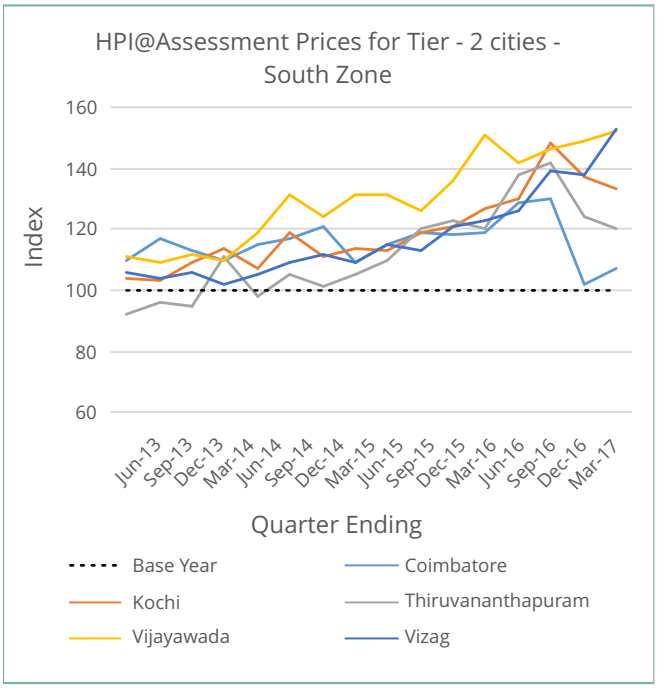
Mumbai, Pune, Bengaluru and Chennai are among cities with the highest increment in housing prices over the period. Housing prices in Pune have increased by 44%, closely followed by Mumbai wherein housing prices have increased by 41%. In Bengaluru and Chennai the rise in housing prices is by 37% and 33% respectively.

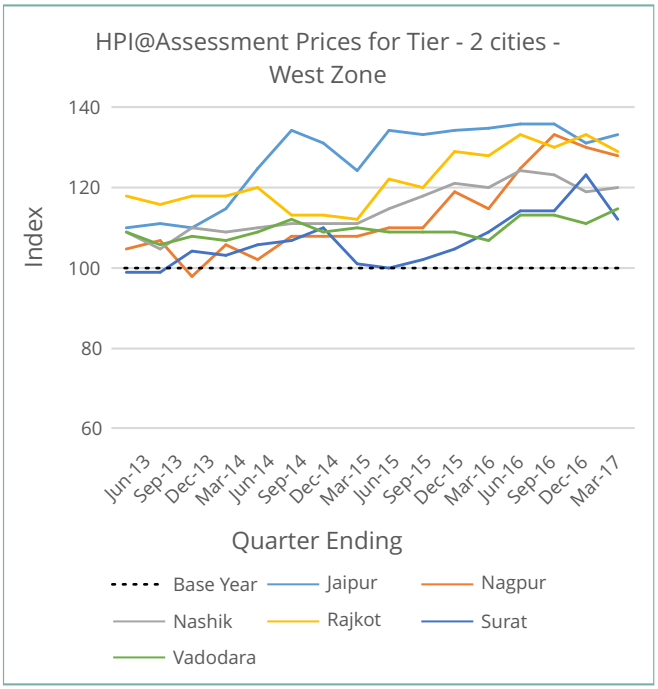
At the product level, in the case of Pune, Mumbai and Bengaluru, units with carpet area less than 110 sq.mt. showed an upward movement in price at an average of 43%. This is in contrast to Chennai wherein large format units with carpet area greater than 110 sq.mt have shown a substantial 72% rise in price.

Figure: HPI@Assessment Prices for Tier 2 cities classified as per geographic location (Base Year FY 2012-13 = 100)







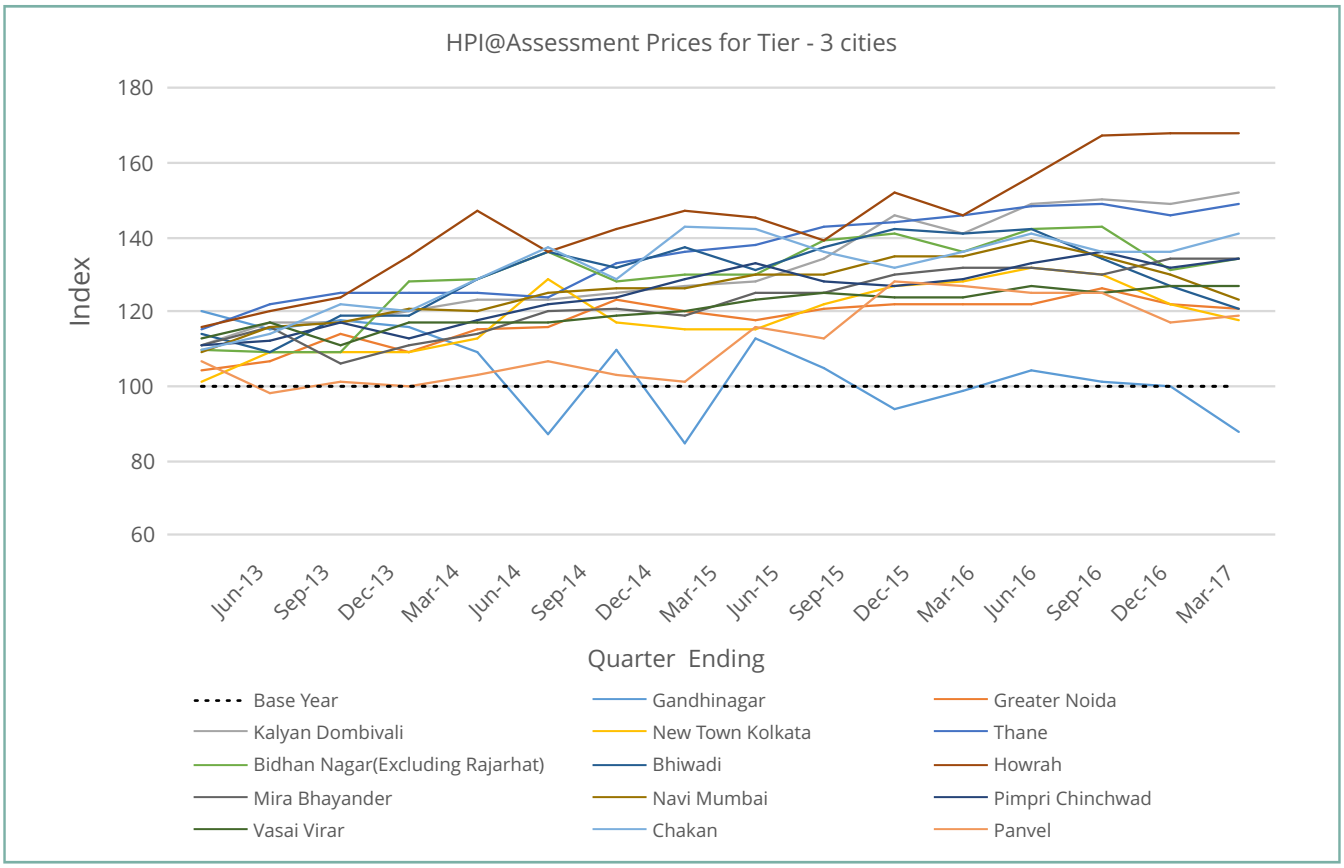


All Tier 2 cities witnessed an increment in housing price during the 16 quarter period with cities in North and South zone namely Kanpur, Meerut, Vijayawada, Vishakhapatnam (Vizag) and Ludhiana featuring among the top 5. Housing prices in Meerut and Kanpur have increased by 68% and 61% respectively whereas in their southern counterparts the increment is limited in the range of 52-53%. A few cities namely, Bhopal, Chandigarh, Ranchi, Coimbatore and Dehradun have shown an under 10% rise in housing prices.

In Meerut, price for units with carpet area under 60 sq.mt has increased substantially having almost doubled over the years. A similar trend is observed in larger format units (greater than 110 sq.mt) in Vijayawada wherein per sft price of units has moved upwards by 78%. In case of Gurugram, housing price of units under 60 sq.mt. has declined substantially to half of those observed during base year.

Among Tier 3 cities all cities except Gandhinagar witnessed an increase in housing price during the period. Howrah and Kalyan Dombivali on the other hand witnessed an increment in price by 68% and 52% respectively. In Kalyan Dombivali the highest rise at 74% was observed in units with carpet area greater than 110 sq.mt. while in Howrah the highest increment at 69% was observed in units with carpet area within the 60-110 sq.mt. range.

Figure: HPI@Assessment Prices for Tier3 cities (Base Year FY 2012-13 = 100)

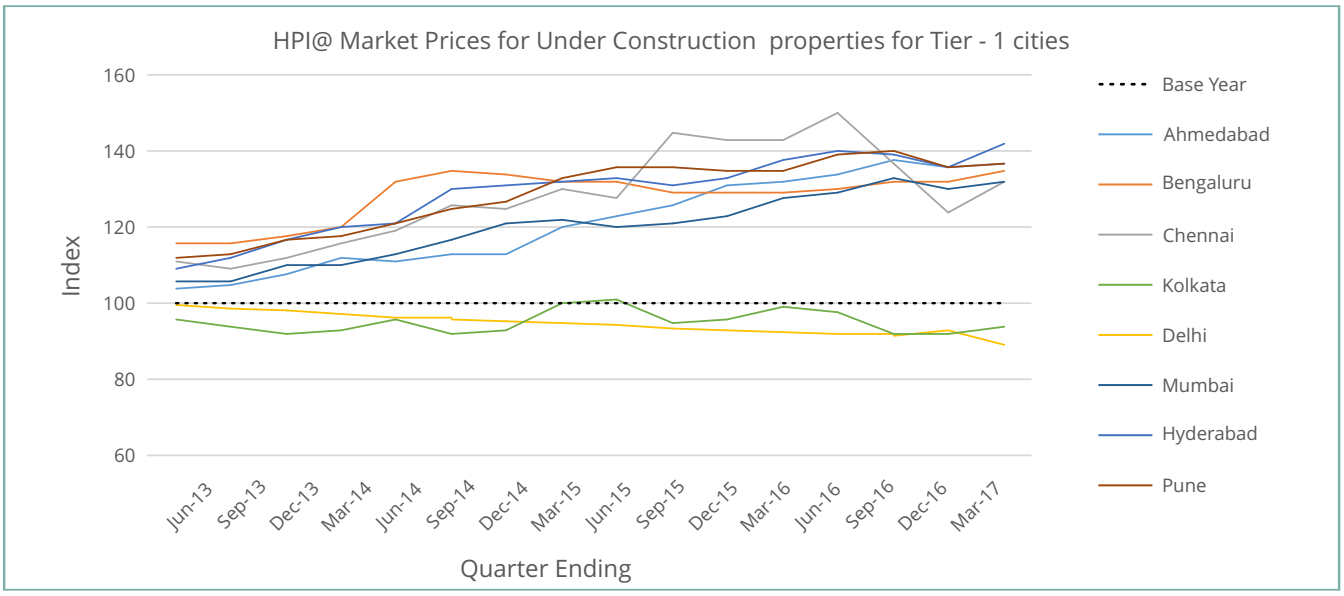


5.2 HPI@Market Prices for under-construction properties

On comparing the current quarter (Jan-Mar'17) to base year FY 2012-13, it is observed that among Tier 1 cities namely Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Kolkata, Mumbai and Pune; all cities except Delhi and Kolkata have witnessed an increment in housing price. Delhi and Kolkata have observed a decline in prices at 11% and 6% respectively. Increment in the rest of the Tier 1 cities remained in the range of 32-42% with Hyderabad topping the list followed by Ahmedabad and Pune at 37%.

Movement of HPI over 16 quarters for Tier 1 cities is as below:

Figure: HPI@Market Prices for under construction properties for Tier 1 cities (Base Year FY 2012-13 = 100)

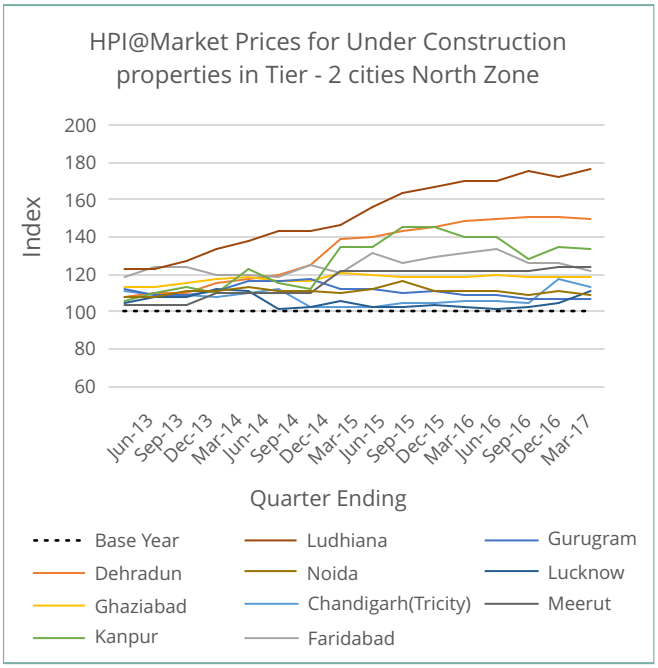


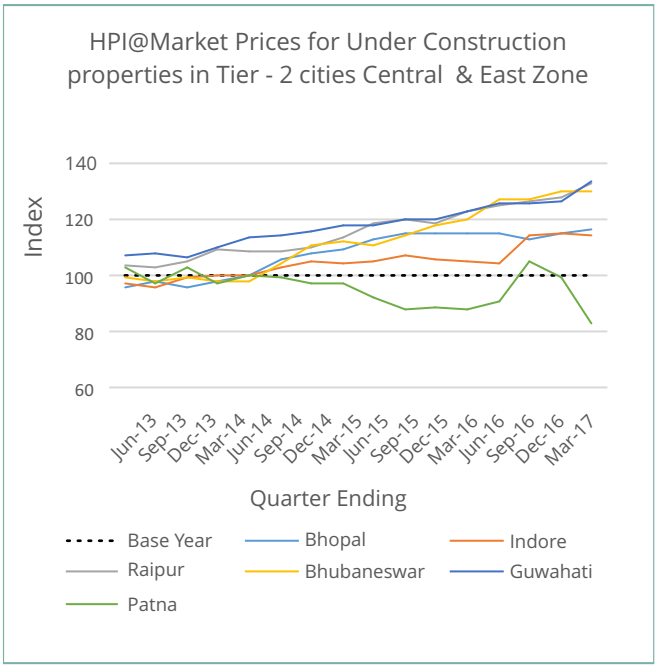
At the product level, in the case of Hyderabad units within all categories have witnessed highest increment at 57% in the under 60 sq.mt. category. In Ahmedabad and Pune however, units with carpet area greater than 110 sq.mt have increased at 40-50% when compared to units with smaller carpet area, wherein prices have increased with the increment limited to 20-40%.

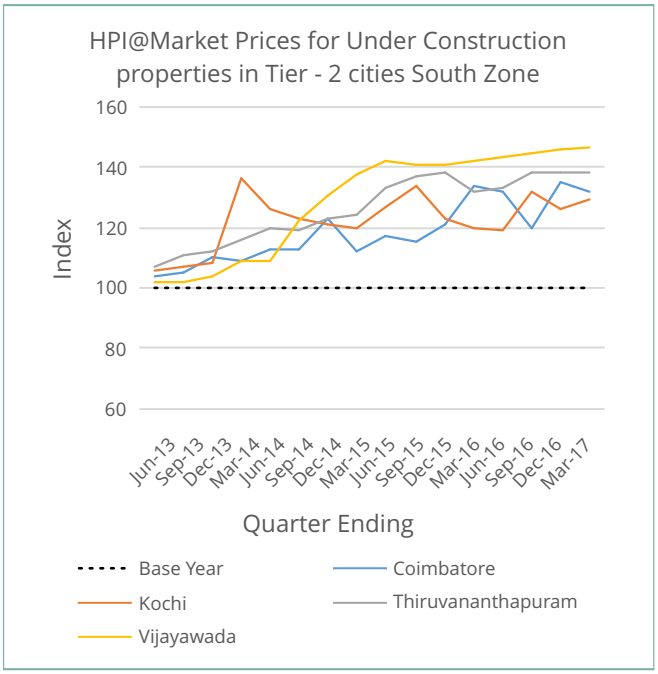
Among Tier 2 cities except Patna all cities witnessed an increase in housing price index. Figure shows the movement of HPI over 16 quarters for Tier 2 cities classified as per geographic location.

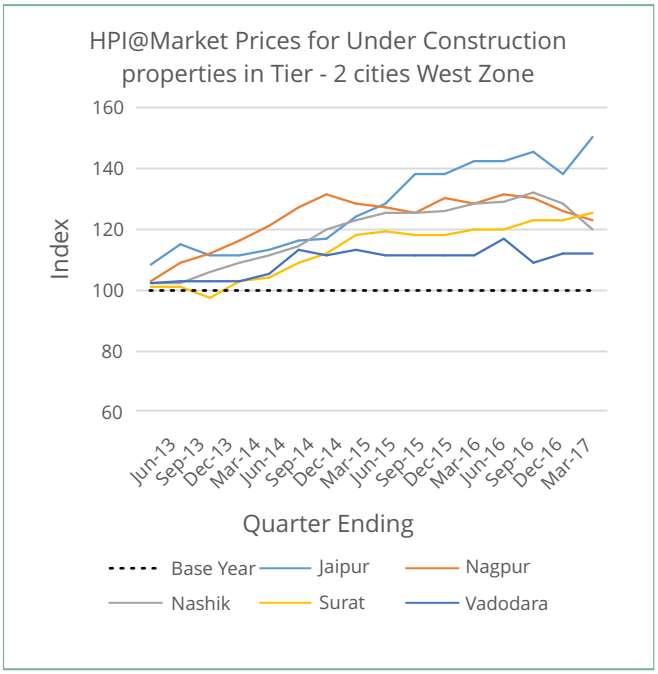
Dehradun, Jaipur, Ludhiana, Thiruvananthapuram and Vijayawada are among the top 5 cities witnessing a housing price increment in Tier 2 cities. Ludhiana features at the top with a substantial 76% increase in price followed by Jaipur and Dehradun with close to 50% increment in housing prices.

Figure: HPI@Market Prices for under construction properties for Tier 2 cities (Base Year FY 2012-13 = 100)



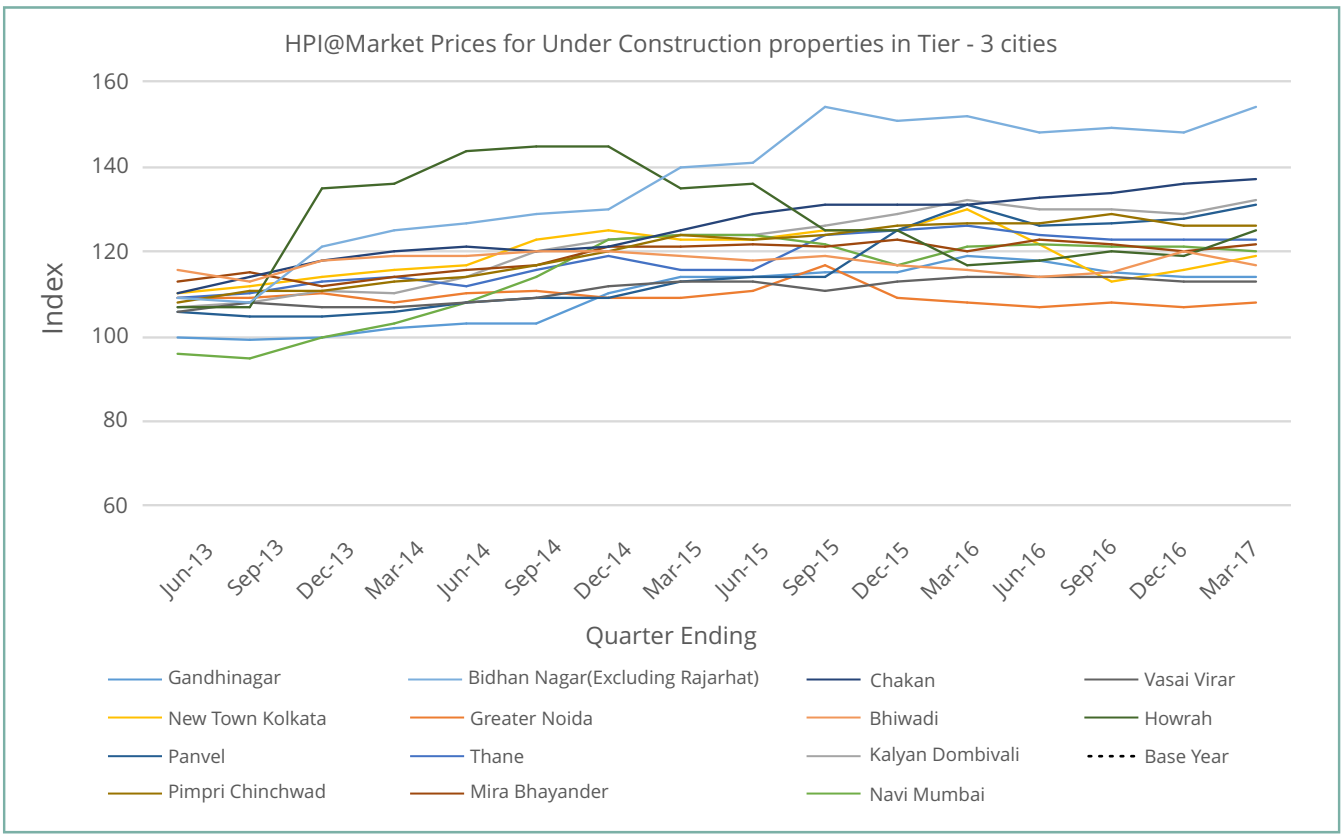






Among Tier 3 cities, all cities witnessed an increase in housing price during the 16-quarter period. Bidhan Nagar at 54% witnessed the highest increase in housing price followed by Chakan at 37%. In Bidhan Nagar, maximum increment in price was witnessed at 62% in units with carpet area within range of 60-110 sq.mt.

Figure : HPI@Market Prices for under construction properties for Tier 3 cities (Base Year FY 2012-13 = 100)



CHAPTER 6 THE WAY FORWARD

Owning a home remains a challenge for many of us due to the rapidly rising housing prices and affordability issues. Housing Price Index (HPI) is a measure of movement in housing prices and depicts a reliable trend on housing prices across cities. NHB RESIDEX, which was the first official housing price index in the country, has now become a brand and in its current phase has published housing and related indices. The coverage of NHB RESIDEX has also been increased to 50 cities. It has been built with the objective to simplify and enable decision-making for the stakeholders on housing. NHB RESIDEX seeks to bring greater transparency into India's housing markets by providing a more structured, scientific and disciplined approach towards house property valuation. The aim is to establish greater confidence among stakeholders, and encourage wider and more competitive participation in the housing market, especially to attract the young home buyers.

Construction of a housing price index for a developing country like India is complex, as there are multiple challenges involved in collection, collation and validation of data, such as unavailability of comprehensive standardized data from any single source, whether private or public, issues related to accuracy and authenticity of data, etc. During the course of building the NHB RESIDEX all these complexities have been deliberated upon and the entire process of data collection, sorting and formulation of indices has been streamlined and automated to minimize manual intervention and possibility of error to publish a comprehensive housing price indices which will serve as a valuable database and channel through which policy makers and researchers can monitor price movements in residential property.

NHB will be updating and improving the NHB RESIDEX continuously, to cover more cities, including State/Union Territory Capitals, Smart Cities, etc. The endeavor will be to widen the number of data sources and also increase the depth of the data collected, which would bring in more quality and better representation of the price movements. The scope of NHB RESIDEX has already been widened to include Housing Rental Index (HRI), Land Price Indices (LPI) and Building Materials Price Indices (BMPI) with the aim of making the indices more comprehensive for deeper insight in measuring the rate of change in housing prices. Thus, further updates in upcoming quarters will ensure that published housing price indices satisfy the user needs, and that relevant information is available for users to make well informed decisions.

We are also examining the possibility of relating the NHB's RESIDEX with the RBI's HPI and the Consumer Price Index (CPI) to arrive at better sectoral linkages.

Finally, as we proceed further, we also anticipate significant improvements in the quality of data fed in at source level, since an important part of NHB RESIDEX's revamp includes building intelligent data entry formats for banks and registration offices, so that the overall system connects together seamlessly.

APPENDIX 1

Table below comprises of HPI@Assessment Prices computed for 50 cities (Base Year FY 2012-13 =100)

Quarter Ending	Jun-13	Sep-13	Dec-13	Mar-14	Jun-14	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Dec-15	Mar-16	Jun-16	Sep-16	Dec-16	Mar-17
Ahmedabad	98	98	93	92	98	93	99	95	98	96	98	94	99	99	100	100
Bengaluru	105	105	108	109	109	115	118	117	119	122	127	128	139	141	136	137
Chennai	103	108	108	109	110	111	112	114	117	118	118	121	127	134	131	133
Delhi	115	113	114	108	108	113	90	82	83	93	95	99	108	103	111	104
Hyderabad	105	106	106	110	112	115	114	114	118	120	121	120	128	130	126	123
Kolkata	101	113	109	118	116	118	121	120	127	121	124	125	137	138	138	128
Mumbai	110	113	112	115	116	119	121	120	122	130	132	137	138	139	136	141
Pune	111	111	113	116	120	123	127	127	135	130	131	132	137	140	143	144
Bhopal	97	106	107	107	105	104	101	104	111	103	110	109	105	112	106	109
Bhubaneswar	117	115	109	115	107	112	115	115	121	112	109	116	113	116	111	124
Chandigarh(Tricity)	95	93	100	94	93	105	98	101	100	96	105	108	97	87	97	103
Coimbatore	110	117	113	110	115	117	121	109	115	119	118	119	129	130	102	107
Dehradun	121	94	98	86	91	105	101	107	104	102	106	104	108	115	108	109
Faridabad	101	98	105	102	113	119	113	110	107	99	103	103	108	129	113	116
Ghaziabad	108	112	113	118	116	117	109	112	113	111	111	110	111	108	121	120
Gurugram	106	101	100	102	109	107	106	111	105	113	115	118	116	130	119	127
Guwahati	110	111	103	109	123	129	122	125	129	122	121	119	133	126	125	128
Indore	105	110	107	110	114	116	113	117	115	119	121	124	124	127	130	132
Jaipur	110	111	110	115	125	134	131	124	134	133	134	135	136	136	131	133
Kanpur	119	104	121	118	128	128	133	134	135	134	141	144	157	165	149	161
Kochi	104	103	109	114	107	119	111	114	113	119	121	127	130	148	137	133
Lucknow	112	121	121	118	114	113	114	117	121	119	128	130	133	145	136	133
Ludhiana	119	97	101	134	123	127	140	147	133	136	132	141	147	146	153	141
Meerut	105	122	125	133	139	149	131	141	150	151	148	159	167	170	167	168
Nagpur	105	107	98	106	102	108	108	108	110	110	119	115	125	133	130	128
Nashik	109	105	110	109	110	111	111	111	115	118	121	120	124	123	119	120
Noida	103	105	109	111	110	111	111	112	111	111	115	114	116	120	116	114
Patna	107	119	122	120	118	116	116	119	124	126	123	127	129	140	121	118
Raipur	108	111	117	117	99	109	111	119	113	114	110	114	118	138	120	132
Rajkot	118	116	118	118	120	113	113	112	122	120	129	128	133	130	133	129
Ranchi	118	116	120	118	126	130	123	138	143	139	136	130	137	144	123	107
Surat	99	99	104	103	106	107	110	101	100	102	105	109	114	114	123	112
Thiruvananthapuram	92	96	95	111	98	105	101	105	110	120	123	120	138	142	124	120
Vadodara	109	106	108	107	109	112	109	110	109	109	109	107	113	113	111	115
Vijayawada	111	109	112	110	119	131	124	131	131	126	136	151	142	146	149	152
Vizag	106	104	106	102	105	109	112	109	115	113	121	123	126	139	138	153
Gandhinagar	120	115	118	116	109	87	110	85	113	105	94	99	104	101	100	88
Greater Noida	104	107	114	109	115	116	123	120	118	121	122	122	122	126	122	121
Kalyan Dombivali	111	117	117	120	123	123	125	127	128	134	146	141	149	150	149	152
New Town Kolkata	101	109	109	109	113	129	117	115	115	122	127	128	132	130	122	118
Thane	115	122	125	125	125	124	133	136	138	143	144	146	148	149	146	149
Bidhan Nagar	110	109	109	128	129	136	128	130	130	139	141	136	142	143	131	134
Bhiwadi	114	109	119	119	129	136	132	137	131	137	142	141	142	134	127	121
Howrah	116	120	124	135	147	136	142	147	145	139	152	146	156	167	168	168
MiraBhayander	111	116	106	111	114	120	121	119	125	125	130	132	132	130	134	134
NaviMumbai	109	116	117	121	120	125	126	126	130	130	135	135	139	135	130	123
Pimpri Chinchwad	111	112	117	113	118	122	124	129	133	128	127	129	133	136	132	134
VasaiVirar	113	117	111	117	117	117	119	120	123	125	124	124	127	125	127	127
Chakan	110	114	122	120	129	137	129	143	142	136	132	136	141	136	136	141
Panvel	107	98	101	100	103	107	103	101	116	113	128	127	125	125	117	119

APPENDIX 2

Table below comprises of HPI@Market Prices for under construction properties computed for 47 cities (Base Year FY 2012-13 =100)

Quarter Ending	Jun-13	Sep-13	Dec-13	Mar-14	Jun-14	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Dec-15	Mar-16	Jun-16	Sep-16	Dec-16	Mar-17
Ahmedabad	104	105	108	112	111	113	113	120	123	126	131	132	134	138	136	137
Bengaluru	116	116	118	120	132	135	134	132	132	129	129	129	130	132	132	135
Chennai	111	109	112	116	119	126	125	130	128	145	143	143	150	137	124	132
Delhi	99	99	98	97	97	96	95	95	94	94	93	92	92	91	93	89
Hyderabad	109	112	117	120	121	130	131	132	133	131	133	138	140	139	136	142
Kolkata	96	94	92	93	96	92	93	100	101	95	96	99	98	92	92	94
Mumbai	106	106	110	110	113	117	121	122	120	121	123	128	129	133	130	132
Pune	112	113	117	118	121	125	127	133	136	136	135	135	139	140	136	137
Bhopal	96	98	96	98	100	106	108	109	113	115	115	115	115	113	115	116
Bhubaneswar	99	98	99	98	98	104	111	112	111	114	118	120	127	127	130	130
Chandigarh(Tricity)	111	109	109	108	110	112	102	103	104	105	106	106	107	105	117	113
Coimbatore	104	105	110	109	113	113	123	112	117	115	121	134	132	120	135	132
Dehradun	108	110	109	115	118	119	125	139	140	143	146	148	149	151	151	149
Faridabad	118	124	125	120	119	120	125	121	131	126	129	131	133	126	127	122
Ghaziabad	113	114	115	117	119	116	117	121	120	118	119	120	119	119	119	119
Gurugram	112	109	109	111	116	115	117	112	112	110	111	109	109	107	107	106
Guwahati	107	108	106	110	113	115	115	118	118	120	120	123	126	126	126	133
Indore	97	96	99	100	100	103	105	104	105	107	106	105	104	114	115	114
Jaipur	108	115	111	111	113	116	117	124	128	138	138	142	142	145	138	150
Kanpur	106	110	113	110	123	115	112	135	136	145	145	140	139	128	135	133
Kochi	106	107	108	136	126	123	121	120	127	134	123	120	119	132	126	129
Lucknow	105	108	108	112	111	101	103	106	102	101	104	103	101	102	105	111
Ludhiana	123	123	127	134	138	143	143	146	156	163	167	170	171	175	172	176
Meerut	103	103	103	110	110	110	110	121	121	121	121	121	121	121	123	123
Nagpur	103	109	112	116	121	127	131	128	127	125	130	128	131	130	126	123
Nashik	102	102	106	109	111	114	120	123	125	125	126	128	129	132	128	120
Noida	108	109	111	112	113	111	112	110	112	116	111	111	110	109	111	109
Patna	103	97	103	97	100	99	97	97	92	88	89	88	91	105	99	83
Raipur	104	103	105	109	108	109	110	113	119	120	119	123	125	127	128	133
Surat	101	101	97	103	104	109	112	118	119	118	118	120	120	123	123	125
Thiruvananthapuram	107	111	112	116	120	119	123	124	133	137	138	132	133	138	138	138
Vadodara	102	103	103	103	105	113	111	113	111	111	111	111	117	109	112	112
Vijayawada	102	102	104	109	109	122	131	137	142	141	141	142	143	145	146	147
Gandhinagar	100	99	100	102	103	103	110	114	114	115	115	119	118	115	114	114
Greater Noida	109	109	110	108	110	111	109	109	111	117	109	108	107	108	107	108
Kalyan Dombivali	107	108	111	110	114	120	123	124	124	126	129	132	130	130	129	132
New Town Kolkata	110	112	114	116	117	123	125	123	123	125	125	130	122	113	116	119
Thane	109	110	113	114	112	116	119	116	116	124	125	126	124	123	123	123
Bidhan Nagar	109	108	121	125	127	129	130	137	140	141	154	151	152	149	148	154
Bhiwadi	116	113	118	119	119	120	120	119	118	119	117	116	114	115	120	117
Howrah	107	107	135	136	144	145	145	135	136	125	125	117	118	120	119	125
Mira Bhayander	113	115	112	114	116	117	121	121	122	121	123	120	123	122	120	122
Navi Mumbai	96	95	100	103	108	114	123	124	124	122	117	121	122	121	121	120
Pimpri Chinchwad	108	111	111	113	114	117	120	124	123	124	126	127	127	129	126	126
Vasai Virar	106	108	107	107	108	109	112	113	113	111	113	114	114	114	113	113
Chakan	110	114	118	120	121	120	121	125	129	131	131	131	133	134	136	137
Panvel	106	105	105	106	108	109	109	113	114	114	125	131	126	127	128	131

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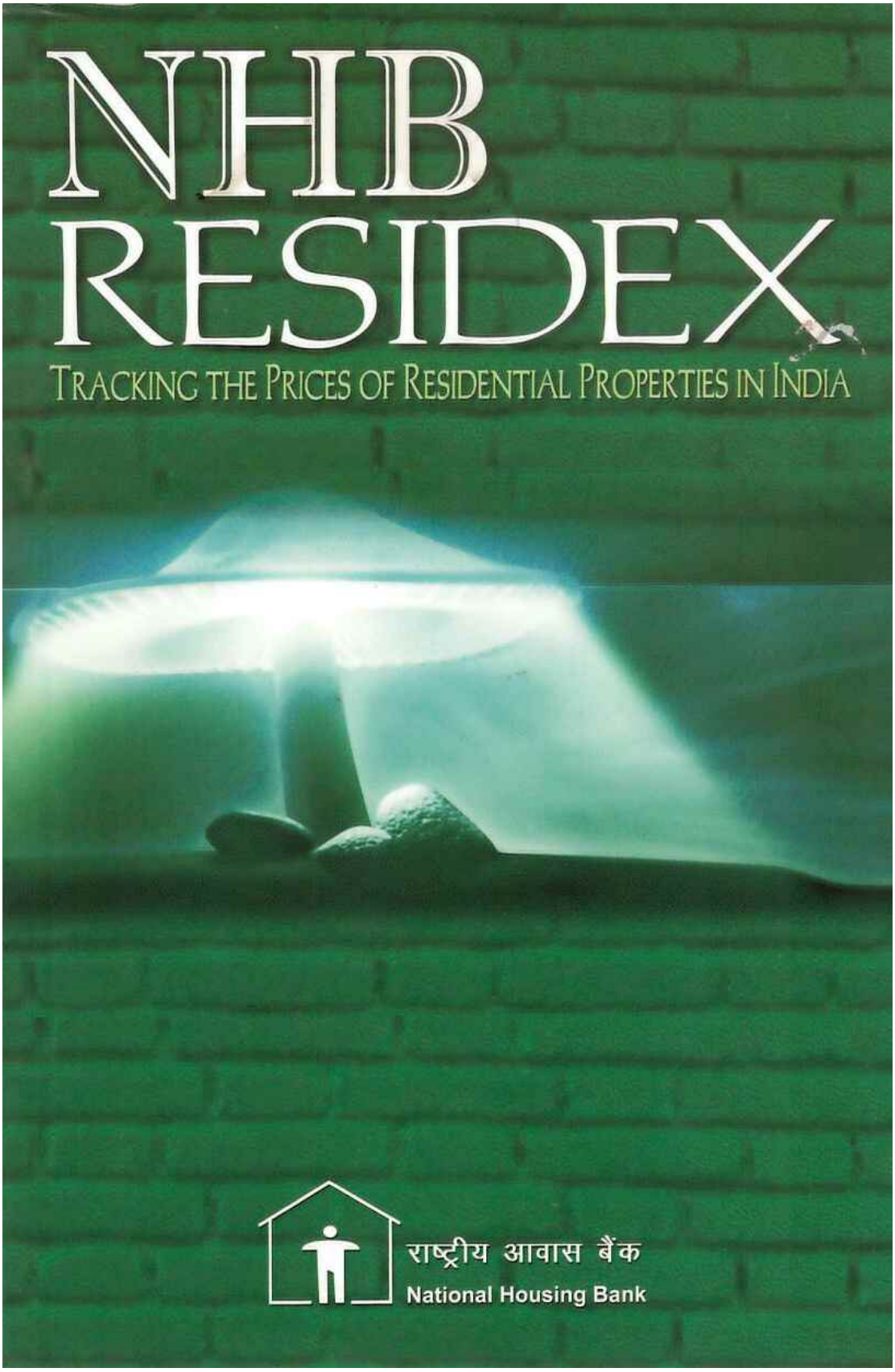
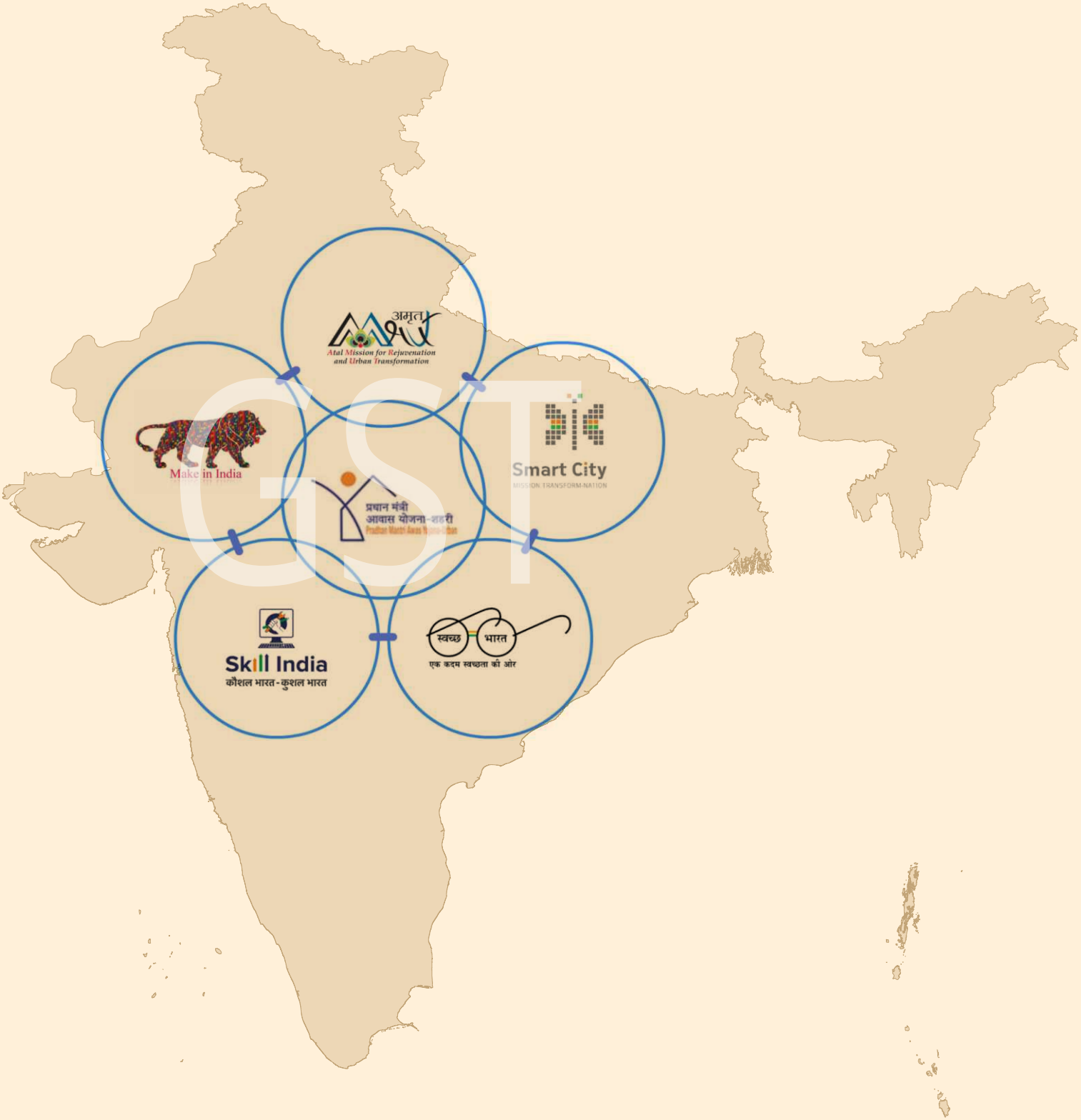
“Cover-page of NHB RESIDEX booklet published in 2007”.





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