Methods Currently Used

10

Introduction

10.1 In practice, the methods used for constructing residential property price indices can be constrained in large part by the nature of the data available. The data required to construct the target index, once defined, are not always available on a regular and timely basis, if at all. Moreover, even where suitable data are available to construct a price index to meet the needs of one set of users, more often than not, the data does not fit the requirements of another set of users. For many countries setting up the required infrastructure and procedures for the collection of the data necessary for producing a property price index can sometimes be prohibitively costly. Also, changes in methodologies and in the underlying data sources can frustrate the construction of historical series, which are often required for econometric modelling and analyses over more than one cycle of housing market developments to inform policy options for the management of the economy. Last but not least, the timeliness and frequency of the data, when available, may not be suitable for producing the kind of house price index that the users want or need.

10.2 For users, this data shortcoming for the construction of house price indices and related indicators has sometimes been a source of frustration. For example, the then Governor of the Bank of Canada in a speech to the Conference of European Statisticians (Dodge, 2003) stated: "Given that the investment in housing represents a big chunk of household spending, and that for most people their homes represent their most valuable asset, it is surprising that in many countries there are no comprehensive, quality-adjusted data on housing prices or rents".

10.3 In addition, the data sources and the methods are not always well documented, and surveys of meta-data on residential property prices confirm that there is a lack of harmonisation in the practices. This represents a further challenge for users. In particular, it compromises the possibility of making meaningful international comparisons of trends in house prices and makes any comparative economic analysis extremely difficult. This can bring into question the credibility of the results.

10.4 Data availability apart, the methods used by countries to compile residential property price indices have also to confront some inherent problems, most particularly, that properties have unique characteristics, resulting in heterogeneity in different dimensions, many of which are difficult to measure objectively, and that transactions of individual properties are infrequent. Both of these issues make the compilation of price indices especially challenging. In addition, the fact that asking prices are negotiable means that the transaction price may differ from the initial or final asking price, the offer price and an expert valuation.

10.5 The identification of the techniques most widely used in compiling indices of residential property prices

also begs the question of whether international best practice in the methods for constructing such indices can be identified, or whether the techniques adopted inevitably are governed and dependent on local conditions.

10.6 Other sections of this handbook provide recommendations on best practice. This chapter describes the range of available indices by different countries and also presents some case studies. It relies on meta-data gathered by various organisations, including the Bank for International Settlements and the European Central Bank and more recently a fact-finding exercise conducted by Eurostat in connection with the inclusion of owner occupied housing costs in the European Union's Harmonised Index of Consumer Prices, which was extended to cover some non-EU countries. Meta-data on residential property price indices published by different countries are available from the website of the Bank for International Settlements (BIS); see www.bis.org/statistics. [1]

Index Availability

10.7 At a European level, Eurostat has started releasing since December 2010 quarterly reports on experimental house price indices in the EU and euro area. [2] These reports contain, for those EU statistical offices that have given their permission for publication, experimental data on house price indices. The annexes to these quarterly reports contain all currently available links to National Statistical Institutes web pages dealing with house price indices, where details concerning the compilation are given.

10.8 It can be seen from the available meta-data on the BIS website [3] that the methods used to compile residential property price indices vary considerably, both *among* countries and even *within* individual countries. The latter raises a key question for users with regard to which series should be used to meet their particular needs. With regards to the former, a key issue is raised for users about the validity of available international comparisons.

10.9 The differences between the available house price indices cover almost every aspect of price index construction. These have been referred to in earlier chapters: the conceptual basis of index (i.e., what is the appropriate target index to suite each user need); data sources (property registrations, tax records, mortgage applications and

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[1] The property price statistics on the BIS website include data from thirty-seven countries and are available at different frequencies. The data differ significantly from country to country, for instance in terms of sources of information on prices, type of property, area covered, property vintage, priced unit, detailed compilation methods and seasonal adjustment. This reflects two facts. First, that the processes associated with buying and selling a property, and hence the data available, vary between countries and, second, that there are currently no specific international standards for property price statistics.
[2] See http://epp.eurostat.ec.europa.eu/portal/page/portal/hicp/methodology/owner_occupied_housing_hpi/experimental_house_price_indices
[3] See http://bis.org/statistics/pp.htm.

completions, real estate agents, print media such as newspapers and other forms of advertisements); market coverage (geographical coverage, type of property, mortgage/cash transactions); quality adjustment (hedonics, mix-adjustment) and weighting (stock or sales weighted). The problems caused by these different factors can be exacerbated by the fact that housing markets can be highly heterogeneous. Thus not only do properties vary in price according to their physical attributes such as floor area and whether they are detached houses on their own plot of land or an apartment in a high-rise complex. The prices can also diverge widely depending on, for example, the region of the country, the area of the town or whether the location is classified as rural or urban. Location affects desirability which leads to different demand conditions, thus explaining why an otherwise identical house may have a different price depending on its location. For instance, a property in a region with a high GDP per capita and low unemployment and in a locality known for the quality of its schools and pleasant surroundings will command a higher price than an otherwise identical property but in an area plagued by high unemployment, low household incomes, poor quality schools, and a high crime rate.(4)

10.10 An overview of the current situation is presented below. It should be noted that the position is changing as more countries develop their residential property price indices and review the indices currently published. The reader should refer to the information from the websites of the BIS, Eurostat and the ECB for more facts about the residential property price indices for a particular country.

Responsibility for Compilation

10.11 In the EU, statistical offices have been cooperating in developing and compiling residential property price indices that are based on broadly harmonised statistical approaches, thereby pioneering the work towards internationally comparable house price indices. Also, several national central banks compile house price indicators, including Belgium, Germany, Greece, Italy, Cyprus, Luxembourg, Hungary, Malta, Austria, Poland and Slovakia. In Austria, the national central bank works jointly with the Vienna University of Technology, while the price index compiled by the Central Bank of Luxembourg is based on the data from the country's national statistical institute. In Ireland, France, Spain, the UK and the USA, residential property price indices are compiled by government departments other than the statistical office. In some instances, such as in the UK, this reflects in part the fact that the statistical system is decentralised with government statisticians located in government departments and working alongside their policy and service-delivery colleagues. In some cases, responsibility for the compilation of the index resides with the department which has policy, operational or legal responsibility for the housing sector. The latter is the case with the Federal Housing Finance Agency in the USA, for example, and in the UK. The government department with policy or operational or legal responsibilities for the sector is often in a better position to gain access to administrative information for statistical purposes and should also be well-informed about the sector and may even have access to additional useful background information.

Data Sources

10.12 In Canada, the USA and several European countries (5), data on residential property prices are collected by the national statistical institutes or ministries. The source of official residential property price indices in Denmark, Finland, Lithuania, the Netherlands, Norway, Hong Kong, Slovenia, Sweden and the UK is data gathered for registration or taxation purposes. In Germany, the Federal Statistical Office collects prices from the local expert committees for property valuation. The statistical institutes in Spain and France calculate price indices from information provided by notaries. In Belgium, Germany, Greece, France, Italy, Portugal and Slovakia, real estate agencies and associations, research institutes or property consultancies are the sources of price data. Data from newspapers or websites are collected for the compilation of residential property price indices in, e.g., Malta, Hungary ("Origo") and Austria ("Austria Immobilienbörse"). The limited number of cases of integration of different data sources to add value and produce a better index is interesting given the number of countries that report multiple sources of information on property prices. In Germany, Ireland and the UK, residential property price data are, inter alia, provided by mortgage lenders. The price index compiled by the UK's Department for Communities and Local Government is based on a mortgage survey conducted by the Council of Mortgage Lenders; the long time-lag associated with the registration of property ownership transfers undermines the use of the latter as a timely indicator. In Germany, the Association of German Pfandbrief banks uses the data of its member banks for compiling a residential property price index.

10.13 Comparability between indices can be very limited as a result of the different data sources listed above – mortgage versus cash purchases; urban versus rural prices; the prices of old properties versus new properties; valuations versus advertised prices versus initial offer prices versus final transaction prices. The net result is that published indices can in practice measure very different aspects of the price development in the housing markets. The deployment of different data sources and compilation practices, and the use to which the index is put (i.e., the index

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(4) See for example Chiodo, Hernandez-Murillo and Oryang (2010).

(5) Regarding the data sources in EU countries, see also Eiglsperger (2010).

purpose) all explain the wide variation both in timeliness and in revisions policy.

Index Methodology

10.14 The inherent difficulties with price measurement and the varying data sources used, lead to an array of different methodological approaches being adopted in the construction of house price indices.

Quality (Mix) Adjustment

10.15 Quality adjustment, to control for compositional changes (mix-adjustment) and for changes in the quality of the individual properties, is an essential part of index methodology. It ensures that price comparisons are on a "like with like" basis and avoids the possibility of bias in the series when, for instance, the quality of the housing stock is improving as a result of, amongst other reasons, renovations to the dwelling, which can take various forms, such as the modernisation of kitchens and bathrooms, the introduction of improved insulation and central heating or air conditioning systems. Quality adjustment techniques also play an important role in the compilation of house price indices because houses that come onto market will change from period to period.

10.16 Quality adjustment is applied in a number of different ways. For instance, a residential property price index for Estonia is derived from unit values, i.e., the average transaction price per square metre of floor space (in this particular case, the sum of the value of all real estate transactions divided by the sum of the square metres of floor space of all real estate sales, with outliers excluded). But unit value indices based on price per square meter of structure floor space, whilst adjusting for the size of the dwellings in each period, does not adjust for differences in the quality of construction or the age of the structure and perhaps more importantly, does not adjust for changes in the mix of plot sizes in the sample of properties sold in any particular period. Other changes to the features of the house can potentially occur which, together with general trends in the housing market, are reflected in compositional changes to the sample such as location, physical and environmental amenities, the general quality of housing, etc.

10.17 The main alternative of *mix-adjustment* (discussed in Chapter 4) utilises a classification of dwellings by what are generally recognised as important price determining characteristics to calculate individual price indices for each cell in the classification matrix. The overall index is then calculated as the weighted average of these sub-indices. Mix-adjustment is in essence a form of stratification. This method is adopted by, e.g., the Australian Bureau of Statistics to control for compositional change to compile

quarterly house price indices for each of the eight capital cities. Their approach stratifies houses according to two characteristics: the long-term level of prices for the suburb in which the house is located, and the neighbourhood characteristics of the suburb, as represented by the ABS Socio-Economic Indexes for Areas (SEIFA)[6]. In practice, the number of characteristics included in the classification is often limited by the number of observations that can regularly be found for each cell, i.e. by the ability to populate the "price-determining characteristics database" from the available data sources as well as by the availability of information on price-determining characteristics.

10.18 The most sophisticated form of quality adjustment used by countries is the *hedonic regression* approach (discussed in Chapter 5) which uses a regression model to isolate the value of each of the chosen characteristics and control for changes in the characteristics of the properties sold. But this method is usually more data intensive. It is sometimes used in conjunction with stratification (by type of structure and location). The use of hedonics in the compilation of residential property price indices is, in large part, a fairly recent innovation. Countries which publish indices that have been compiled using hedonic regression include Austria, Germany, Ireland, Finland, France, Norway and the UK. The hedonic model used in the compilation of the Norwegian house price index includes only a few explanatory variables and does not adjust for housing standards and for the age of the building;[7] the index adjusts only for size and location of the dwelling. The index is likely to be biased (unless the age of the structure and type of dwelling sold is stable over time). This shortcoming is acknowledged by Statistics Norway.

10.19 An additional method used in, for example, the USA and Canada, is the *repeat sales* method (described in Chapter 6); i.e., the Case-Shiller home price index in the USA and the Teranet -National Bank House Price Index™ in Canada. This approach matches pairs of sales of the same dwellings over time. It requires a huge database of transactions and is not used by any of the European index compilers.

10.20 It is interesting to note that one of the residential property price indices for Germany is based on data that is limited to "good quality" dwellings, which might imply that the issue of quality adjustment is by-passed. In practice, there could be a built-in measurement problem, since it is unlikely that the market definition of "good quality" is independent of the general increase in housing standards over time. For this reason there is potential for bias in the resulting index in the longer term. This is in addition to any concerns about sampling and, in particular, the

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[6] See http://www.abs.gov.au/ausstats/abs@.nsf/mf/6464.0.
[7] As was seen in previous chapters using the data for the town of "A", the age of the structure is an important price determining characteristic.

capability of "good quality" housing to be able to represent the price trend of all houses.

10.21 It can be seen from the above paragraphs that two crucial questions for all quality adjustment procedures are: (1) whether the chosen characteristics used for quality adjustment are the main determinants of price differences, and (2) whether the application of different techniques to the same data set will produce the same results (i.e., the issue of statistical robustness). In reality, while some of the price-determining characteristics – such as the size of the living area – are easy to measure, other important factors such as location ([8]) and the quality of construction, can be inherently difficult to capture and measure. Also, it should be noted that the application of different quality adjustment techniques to the same data set will not necessarily produce the same results. ([9])

The Value of Meta-Data

10.22 A number of organisations have websites providing meta-data on the residential property price indices published by different countries. Most particularly, the Bank for International Settlements provides such information (see the earlier reference). This is in addition to any information provided by individual countries on, for instance, the websites of the national statistical institute or central bank.

10.23 As well as providing the user with guidance on the strengths and weaknesses of a particular price index and its appropriate use, a systematic and more detailed analysis of the meta-data on the currently available statistics and data sources can help to identify:

- major gaps in data provision;
- options for filling these gaps cost effectively from readily available sources;
- data coherence issues;
- the scope for further data integration and the need for new data sources.

10.24 Such an analysis of the basic meta-data also provides evidence of the compromises made in relying on readily available data and where one all-purpose house price index is used for a multitude of purposes. For example, the main official house price index published in the UK by the Department for Communities and Local Government (DCLG) uses sales weights and is appropriate for inclusion in, for example, a Consumer Price Index used

for indexation of benefits but does not fully suit the needs of users who want to calculate "wealth", where stock rather than expenditure weights are most appropriate. The latter may be addressed either by a re-weighting of the official index or by reference to one of the many indices published by lenders. However, the latter suffer from limited coverage. Thus re-weighting of the official index may provide a cost effective solution to filling this particular data gap.

10.25 A more detailed gap analysis may point to solutions involving synthetic estimates, based on the integration of data from different sources. For example, it can be noted in the context of the UK that the DCLG house price index referred to above has the advantages of being timely and not subject to revision but has the drawback that it excludes cash purchases.

10.26 A systematic approach to the construction of indices of residential property prices in the UK might conclude that it is possible to supplement the official index with information on cash purchases from the Land Registry. Although the latter is less up to date due to the time-lag in registering transactions in the official registry, time series modelling may be able to address this misalignment. The Land Registry constructs a repeat sales index by tracking the average growth in house prices using multiple transactions associated with the same home in an attempt to hold quality constant.

In the next section a series of case studies are presented relating to the residential property price indices published in a selection of countries.

Case Studies

Case Study: Canada

10.27 In Canada there are four house price indices that are currently available. These are Statistics Canada's New House Price Index, the Teranet-National Bank Composite House Price Index ™, the Canadian Real Estate Association's measure of average house prices, and the Royal LePage Survey of Canadian House Prices. Each one will be explained in turn.

The New House Price Index

10.28 The New Housing Price Index (NHPI) is a monthly price index that measures changes over time in the builders' selling prices of new residential houses. Prices that are collected are from a survey of builders from various areas of the country. It is a constant quality price index inasmuch that the features and characteristics of the units in the sample are identical between successive months; in other words, the NHPI is a matched-model index. Separate

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([8]) The physical location of a property can be measured rather precisely but the problem with "location" is one of grouping of properties. Stratification and hedonic regression methods need to group together sales of properties in the same location but how exactly should the boundaries of a location be determined

([9]) This point is illustrated by the differing indices that resulted from the application of different methods of quality adjustment described in Chapters 4-8 above using the same data set for the town of "A". However, all of the methods did result in roughly similar trends in prices.

estimates provided by the builder about the current value (evaluated at market price) of the lots are also an important part of the survey. Consequently, given this information, Statistics Canada also publishes an independent price index series for land excluding the structure. The residual value (total selling price less land value), provides an indicator of the trend in the cost of the structure and is also published as an independent series. At the present time, the three variants of the NHPI are published for 21 metropolitan areas in Canada.

10.29 Housing market analysts, academics, and the public use the NHPI as a timely indicator of past and current housing market conditions. The NHPI is also used as an input in the compilation of other economic statistics. For instance, it is used for estimating certain shelter components of the Consumer Price Index. Moreover, the Canadian System of National Accounts uses the NHPI in estimating the constant price value of new residential construction. Due to the level of geographic detail provided and the sensitivity to changes in supply and demand, the NHPI series are of particular interest to the real estate industry for providing a proxy estimate of changes in the value of resale houses sold. The information provided by the NHPI is also of interest to building contractors, market analysts interested in housing policy, suppliers and manufacturers of building products, insurance companies, federal government agencies such as Canada Mortgage and Housing Corporation (CMHC), and provincial and municipal organizations that are responsible for housing and social policy.

10.30 The prices collected are asking prices by the builders and exclude the Goods and Services Tax and other tax related rebates. Missing prices as a result for example of the absence of a sale by a builder in a particular month, are imputed using the best estimate the builder can provide as if a house was to be sold. Not all types of housing are included in the NHPI. Condominiums are excluded from the sample, while single-family detached units as well as row (terrace) and detached houses are included. Given that builders do not report the price of building lots uniformly, the land price indices may be less accurate and precise than the overall NHPI. The same caveat applies to the derived residual values that are used for constructing the price indices for the structure only. Large builders as well as smaller independent builders are represented in the sample used for the NHPI.

10.31 From its conceptual basis, the Canadian NHPI measures changes in the price of new houses only, so it is not representative of resale houses in Canada (or for most new houses built in the core of the cities surveyed). The houses surveyed for the index are generally found in new tracts in suburbs of the survey cities where the price of land is significantly lower than in the city core areas. The movements over time in land prices in suburbs are generally different than the movements in the well established areas of Canadian cities. While the construction price index part of the NHPI is likely to be accurate (the cost related to building the house structure is approximately the same regardless of the area), the land component probably understates residential land price inflation for the existing housing stock by a significant amount in recent years.[10]

Teranet–National Bank Composite House Price Index ™[11]

10.32 The Teranet-National Bank House Price Index™ (TNBHPI) is an independent estimate of the rate of change of home prices in six metropolitan areas, namely Ottawa, Toronto, Calgary, Vancouver, Montreal and Halifax. The price indices for the six metropolitan areas are then aggregated into a composite national index. The indices are estimated on a monthly basis using transaction prices for condominiums, row/town houses, and single-family detached homes within the six metropolitan areas.

10.33 The TNBHPI uses the repeat sales methodology. Estimating the indices is therefore based on the premise that houses that are traded more than once in the sample periods are of a constant quality. The TNBHPI attempts to adjust for quality changes of the individual housing units by minimizing or eliminating the influence of any changes in the physical characteristics (e.g., renovations, additions, etc.). Insofar as (net) depreciation of the properties that are resold is neglected, the index is likely to exhibit a small downward bias.[12] Properties that are affected by

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[10] See Figure 10.1 for a comparison of the NHPI with other indices for Canada. This figure provides support for the likely downward bias of the land component of the NHPI.

[11] ©Teranet and National Bank of Canada, all rights reserved.

[12] This downward bias does not seem to show up in Figure 10.1, since the TNBHPI is more or less in between its two competitor indices that cover the resale market, but the latter indices also do not make adjustments for net depreciation. Some housing economists argue that the repeat sales method may have an upward bias due to a sample selectivity problem; it may be that dwelling units that are sold more frequently than the average unit are being more intensively renovated and upgraded and hence the quality of a repeat sales unit has actually increased between the two sale dates (rather than decreased due to depreciation).

endogenous factors are excluded from the calculation of the repeat sales index. These factors may include: non-arms-length sale; change of type of property (for example after renovations); data error, and high turnover frequency (biannual or higher).

The MLS® Average Resale House Price Indicator

10.34 The Canadian Real Estate Association (CREA) tracks, on a monthly basis, the number and prices of properties sold via the Multiple Listing Service® (MLS®) systems of real estate boards in Canada. The statistics are available by paid subscription to those who want to use them. Although the coverage of the indicator is limited to only houses that are sold through the MLS®, the system is quite active with about 70 % of all marketed residential properties using it. The data are available for over 25 urban markets defined by CREA, as well for the provinces and two territories; a national aggregate is also published.

10.35 The indicators are simple arithmetic averages of all sales prices in the market of interest, regardless of housing type. In addition, no consideration is given to the issue of compositional shifts in the sample over time or for disparities in quality in the sample of units. So a change in the price indicator could reflect many factors other than the true price development. These factors range from quality differences that exist in the sample from period to period to the influence of outliers with extremely high or low prices due to special circumstances. In their monthly reports, CREA staff have recently published a weighted version of the national index (available back to 2006 only), with weights corresponding to the share of owned dwelling units by major markets derived from the 2006 Census. However, the price for each major market is still calculated as a simple average, and no attempt is made to track the potentially different trends among various housing types. The one major advantage of the MLS® price indices over other indicators is their timeliness, since data are typically released two weeks after the reference month.

Bank of Canada - Royal LePage Survey of Canadian House Prices

10.36 Prices in the Royal LePage survey reflect the opinions of Royal LePage with regards to the "fair market value" for seven types of properties in a large number of geographical areas. The information obtained is based on local data and market knowledge provided by Royal LePage brokers. The geographical coverage is broad, just like the MLS

data, and the classification of housing is more refined. For example, the survey includes prices on four types of singles or detached houses (detached bungalow, executive detached two-storey, standard two-storey, senior executive), two types of condominium apartment units (standard and luxury), and a townhouse. Royal LePage standardizes each type in terms of the square footage, the number of bedrooms, the number of bathrooms, the type of garage, lot characteristics, the status of the basement, and other criteria. In addition, the properties in the survey are considered to lie within average commuting distance to the city centre and are typical of other housing in the neighbourhood. As long as the broker filling in the survey sticks to these guidelines, this is one way of ensuring some degree of constant quality. A comparative disadvantage of the Royal LePage price data is its long publication lag.

10.37 This survey is a basis for one of the house price indicators used by the Bank of Canada for monitoring developments in housing markets in Canada [13]. Despite the wealth of price information on many other types of houses in the Royal LePage survey, the indicator developed at the Bank relates only to a subset of singles that were regarded as representative of the market when it was created in 1988. [14] For Canada and 11 local markets, the Bank's price indicator is calculated as a weighted sum of the price of detached bungalow (weight of 0.75) and the price of executive detached two-storey (weight of 0.25). The price of each type of housing is in turn a weighted sum of sub-regions, with weights set to be the sub-regional share of units sold as of a fixed date in the late 1980s. The "units" data were obtained from MLS®.

A Comparative Analysis

10.38 A comparative analysis of the four types of property price indices available in Canada is given in Figure 10.1. The period of analysis covers February 1999 to March 2010. All four series show an upward trend in residential property prices over this period. However, the growth rates differ among the four series. The NHPI recorded the smallest increase at 55 % over the entire period. By contrast, the MLS® showed an increase of 122 %, more than double that of the NHPI. The Teranet-National Bank House Price Index™ and the Bank of Canada- Royal Lepage indicator increased by 100 % and 92 % respectively.

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[13] http://www.bankofcanada.ca/en/rates/indinf.html
[14] The Bank of Canada indicator is limited to detached bungalows and executive detached two storey houses.

Figure 10.1. Four Residential Property Price Indices for Canada
(February 1999 = 100)

- MLS®
- Teranet -National Bank™
- NHPI
- Bank of Canada - Royal Lepage
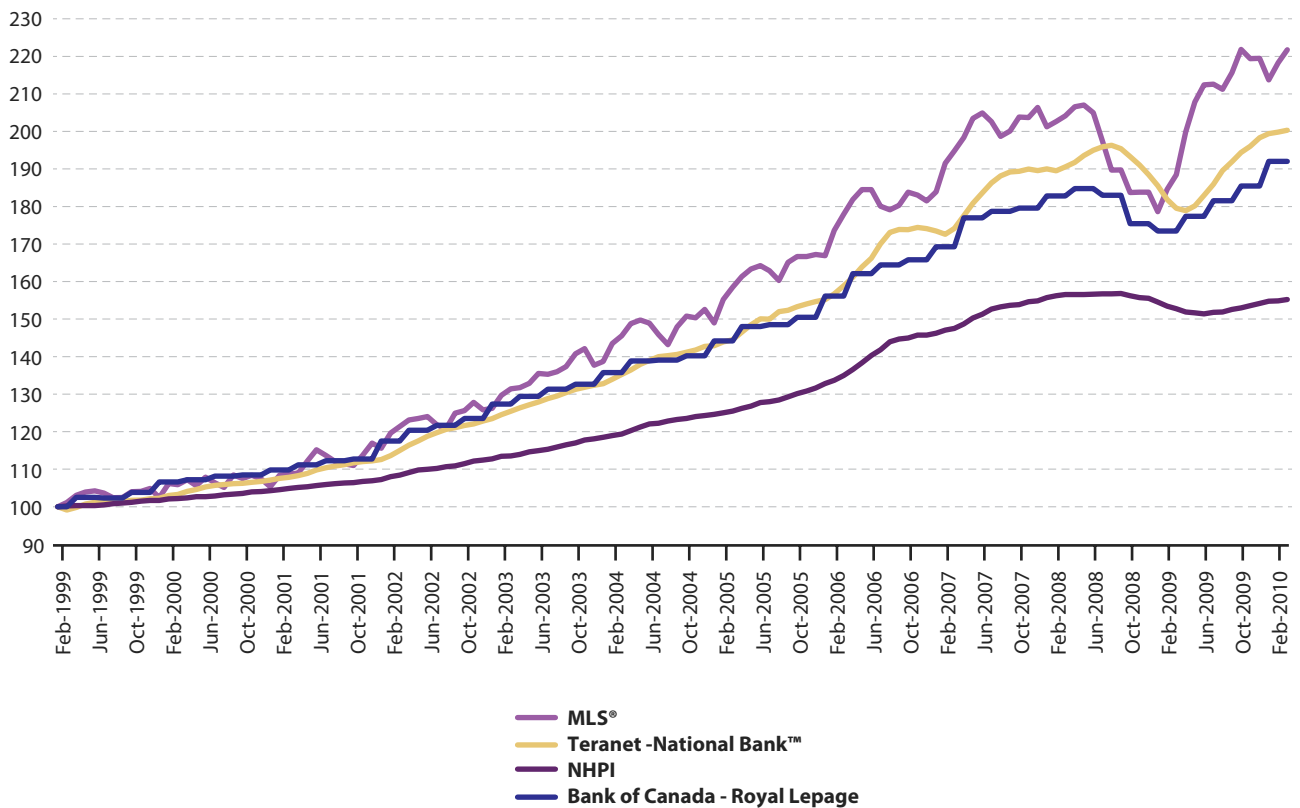
10.39 The higher growth rate of the MLS˚ price indicator may be explained, at least partly, by the average price methodology which is used for its calculation. As is well known, this approach does not control for period-to-period compositional shifts and this can result in a higher rate of increase in the index if there is a shift towards the upper end of the market in the houses being sold. The NHPI's slower rate of increase is probably explained by the fact that the index, although it controls for house type over time, does not control for location. New houses are constructed farther and farther away from the city centre where markets behave differently compared to properties sold in or near the city core.

10.40 All four indices show the drop in house prices that occurred during the economic downturn which began late in 2008. But the MLS® index starts falling slightly sooner than the three others and its drop is deeper. Compared to the other three indices, the fall in the NHPI

starts slightly later and is not as acute. All four indices start to show an upswing early in 2009 but the MLS® index starts to turn earlier while the turning point from the NHPI index occurs last. [15] In terms of volatility, the MLS® is the more volatile around its trend due to the compositional shifts in the sample of houses sold each month. The other three indices, which to some extent adjust for quality changes, show less erratic behaviour over time.

Case study: Germany

10.41 Quarterly residential property price index series for Germany are available from 2000. Prior to that date the situation in Germany could be characterised as an

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[15] For an illustration of the impact on turning points of the different methodologies, see Shimizu, Nishimura and Watanabe (2010).

uncoordinated set of different indicators provided by several private institutes. "These indicators mostly lacked a clear methodological foundation and had a restricted coverage. Moreover they gave – to some extent – contradictory signals." [16]

10.42 The Federal Statistical Office of Germany (Destatis) took action to improve the situation building on available data sources. Germany had well-established construction price statistics and statistics on purchasing values of building land. In addition, at the local level, the nationwide institution of Expert Committees for Property Valuation, regulated by federal law, provided access to comprehensive databases which contained transaction prices of building land and dwellings and the corresponding property characteristics. The main barrier to the exploitation centrally of the available data had been the differences in the collection systems across the federal states and among the individual local committees. The methods followed by Germany provide an interesting example of data integration i.e. the drawing on multiple data sources.

Residential Property Price Indices

10.43 Different data sources and compilation methods are used to construct price indices for different market segments. These are then combined to compute a residential property price index covering all types of properties and sub-indices relating to existing and new dwellings respectively. The weights used in the compilation of a price index for existing dwellings are the transaction expenditures in the base-year broken down into houses and flats and by the federal state. For turn-key dwellings, the weights are derived from official building activity statistics and for self-builds construction weights are used. Indices are published within 90 days of the end of the reporting.

Newly built turnkey-ready dwellings and existing dwellings

10.44 Data is taken from the information gathered by the local Expert Committees for Property Valuation. This data, that is collected at the time a contract is concluded, covers all sales (cash and mortgage) and consists of actual transaction price (both cash and mortgage) and a number of price-determining property characteristics – type of dwelling (single-family house, two-family

house, freehold flat); type of house (free-standing, terraced, semi-detached); type of construction (conventionally built, prefabricated); year of construction; size of plot of land; size of living area; furnishing/luxury elements (kitchen, sauna/swimming-pool, attic storey); car parking facilities; characteristics of location (state, district, municipality; general rating of location: simple/medium/good); number of rooms/floors. In addition, a land valuation is provided.

10.45 A combination of hedonic techniques and stratification (one stratum for single-family/two-family houses and one for flats in apartment blocks) is used to adjust for the effects of quality changes in the type of properties being sold. The hedonic regression method that has been adopted is the "double imputation" approach, which was described in Chapter 5, where prices are estimated both for the base period and for the comparison period. Outliers are excluded.

Newly-built single family residential properties [17]

10.46 The compilation of a price index for this particular type of newly-built properties draws on information from official country-wide construction price indices. Construction price indices are available for various types of structure (e.g., residential/non-residential buildings, roads, road bridges) as well as for maintenance work. Prices are collected quarterly for about 190 construction operations (including materials). In total, about 30 000 prices are reported by about 5 000 enterprises at every collection date. The prices refer to the transaction prices relating to contracts concluded in the quarter, excluding value added tax (VAT), i.e., profits and changes in productivity are taken into account. For self-builds, the construction price index for "conventionally built single-family residential buildings" is used. A matched model approach is followed for the construction of the index.

Prefabricated dwellings

10.47 The price index uses official producer price statistics for industrial products, in particular the price index for prefabricated single-family houses without a basement with a specific set of characteristics. Again a matched

[16] See Hoffmann and Lorenz (2006).

[17] These are sometimes referred to as "self-built properties". The builders include both future owners who do a major part of the building themselves and future owners who involve a building firm that is responsible for the main part of the building work (where the owner finalizes the work).

model approach is adopted for the computation of the index. A specific feature of prefabricated dwellings is that the contracts usually provide for the purchase/sale of complete houses (e.g., single-family house without cellar), the characteristics of which do not change significantly over the short-term.

Building land

10.48 The price indices for prefabricated dwellings and "self-builds" exclude the cost of the land. A price index for building land is compiled from official figures on the transaction prices of building land, recorded at the time a contract is concluded. Each data set incorporates the following characteristics: location; characteristics of the municipality; sale date; size of plot; the details of the outline planning permission e.g. whether for a house or for flats and building size. Unlike Statistics Canada's NHPI, coverage is not restricted to development tracts – the German index attempts to cover all newly-built homes.

10.49 The aggregate price index for developed building land is a weighted average, using the total sales value, of unit value indices for sub-aggregates. These sub-aggregates are formed on the basis of regional differentiation, mainly a differentiation by districts, building area types and municipality size classes within federal states. The federal states are weighted by combining data on the total of prices paid for developed building land in residential building areas and in rural areas, turnover achieved through building activity and the number of building permits for residential buildings with one or two dwellings.

Case study: Japan

Information on Property Prices

10.50 In Japan, official property price indices only relate to land prices. Information provided by the public sector includes the Public Notice of Land Prices (PNLP) conducted by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), the Land Price Survey of each prefecture, the Land Value for Inheritance Tax of the National Tax Agency, and the Land Value for Fixed Asset Tax of each municipal government. All of these sources of information represent appraisal values estimated by licensed real estate appraisers.

10.51 Information on residential property price indices (including structures) is collected by the private sector. The most representative property data set is called REINS, which stands for the Real Estate Information Network System. REINS is a data network that was developed using the multi-listing service (MLS) of the US and Canada as a model; the information is obtained via real estate brokers. The REINS data set contains both the asking price when the property is put on the market and the final transaction price at the time of the sale contract. A second, and quite unique, housing price data source is accumulated through housing advertisement vendors. Both data sources have been used by the private sector to compute and publish housing price indices. However, all of these indices have shortcomings and do not fully meet the needs of users. MLIT has therefore begun a work programme which should lead to the construction of an improved index. This will be the first residential property price index to be published by the public sector.

Table 10.1. Indices of Property Prices Published in Japan

Index	Sample	Method	Seasonally adjusted? And (frequency)	Weighing method	Stage of process
Land Price Cumulative Change Rate Index(MLIT)	Appraisal prices in Public Notice of Land Prices by MLIT	Preceding term index × Avg. Volatility	No (Annual)	No	Appraisal value in January 1st every year (published in the end of March)
Major City Land Transaction Price Basic Statistic (MLIT)	Sales prices	Average value of unit price per square metre, median value, standard deviation, quartile, etc.	No (Quarterly or annually)	No	Survey after sale registration (sales price)
Urban Land Price Index (Japan Real Estate Institute)	Appraisal prices in Public Notice of Land Prices by Japan Real Estate Institute	Preceding term index × Avg. change rate	No (Semi-annual)	No	Appraisal value in the end of March and September every year
Recruit Residential Price Index (Recruit Housing Institute)	Final asking prices in Magazine or Online prices in Magazine or Online	Overlapping Periods Hedonic Regression	Yes (Monthly)	Volume	Offer made (final asking price)
Residential Market Index (Japan Real Estate Institute, At Home Co., Ltd., Ken Corporation)	Asking prices or sales prices	Unit price per square metre (building age adjusted by hedonic regression)	No (Semi-annual)	No	Offer made? (asking price or sales price)
Tokyo Area Condominium Market Price Index (Japan Research Institute, Limited Real Estate Information Network for East Japan)	Sales prices registered at the Real Estate Information Network for East Japan	Hedonic regression	No (Monthly)	No	Completion of sales (sales price)
Newly-Built Condominium Price Change Index (Tokyo Kantei Co., Ltd.)	Asking prices	Moving average	No (Quarterly)	No	(asking price)

Source: Shimizu, Nishimura and Watanabe

An overview of all property price indices in Japan is provided in Table 10.1. This includes indices based on land appraisal values as well as indices relating to property sales. It is the latter that generates the material for residential property price indices.

Asking Prices and Selling Prices

10.52 In Japan, the seller of a house usually sells it through a real estate broker. Individuals that contract with a broker have to sign one of two forms of a sales agent contract: the exclusive agency contract or the sole agency contract. The other option is to select a general agency contract. These contracts are regulated under Article 34-2 of the Building Lots and Buildings Transaction Business Law.

10.53 In the case of the exclusive agency contract, the seller can receive a report at least once a week from the real estate broker, but the seller loses the right to ask another broker to find a buyer and to look for a buyer himself. In the case of the sole agency contract, another broker cannot be asked to find a buyer, but the seller can look for a buyer on his own and the report from the broker will be at least bi-weekly. In the case of a general agency contract, the seller can look for a buyer on their own and ask multiple brokers to find a buyer. On the other hand, the seller does not receive reports from brokers.

10.54 In the case of the exclusive agency contract, the contracted broker must register the listing in REINS within five days of concluding the listing agreement and is required to widely look for buyers. In the case of the sole agency contract, the broker must register the listing in REINS within seven days and do the same. For registration in REINS, brokers are not only required to record the asking price at the moment of registration but also the final transaction price. Thus for some transactions made via brokers, both the asking price and the final transaction price are registered.

Public Data Gathering System of Transaction Prices

10.55 MLIT has compiled and published information on property transaction prices since 2005. Property transactions are registered by the Legal Affairs Bureau which then sends "Change in Register Information" to MLIT. Based on this information, MLIT sends a questionnaire to the buyer on vacant lots, land with buildings, buildings with compartmentalised ownership (such as office, retail, and apartments) asking for the transaction price. Next, information is added by real estate appraisers or their counterparts. This information includes building use, lot conditions (land form, etc.), road conditions (width of fronting road, etc.), distance to the nearest railway station and other information related to convenience, and legal regulations such as city planning. The resulting "Transaction Case Data" collected in this way is then made anonymous so that the actual property cannot be identified, and is then published as transaction price information on MLIT's website.[18] Since neither the supply of information on transaction prices nor the supply of the information requested from real estate appraisers is mandatory, non-response and timeliness are issues. The information supplied, including the transaction price, cannot be independently verified.

Time Line for Buying and Selling a House and Price Accuracy

10.56 The choice of data source is of importance when calculating a housing price index. There are various issues involved, such as the moments at which price data is collected, the change in "price" (from the initial asking price to the final transaction price), and how timely the price data is released. Figure 10.2, which is borrowed from Shimizu, Nishimura and Watanabe (2011), shows the real estate price information which is currently available in Japan on a time axis. On the right, four stages are distinguished with prices P1 to P4. The corresponding time periods between those moments are: the "term" TM1 between the start of the selling process and the moment a buyer is found; the term TM2 from when a buyer is found until the sale contract is finalized; and the term TM3 between the final sale contract and the registration of the selling price in the government's database.

[18] See www.land.mlit.go.jp/webland.

Figure 10.2. Property Information Flow
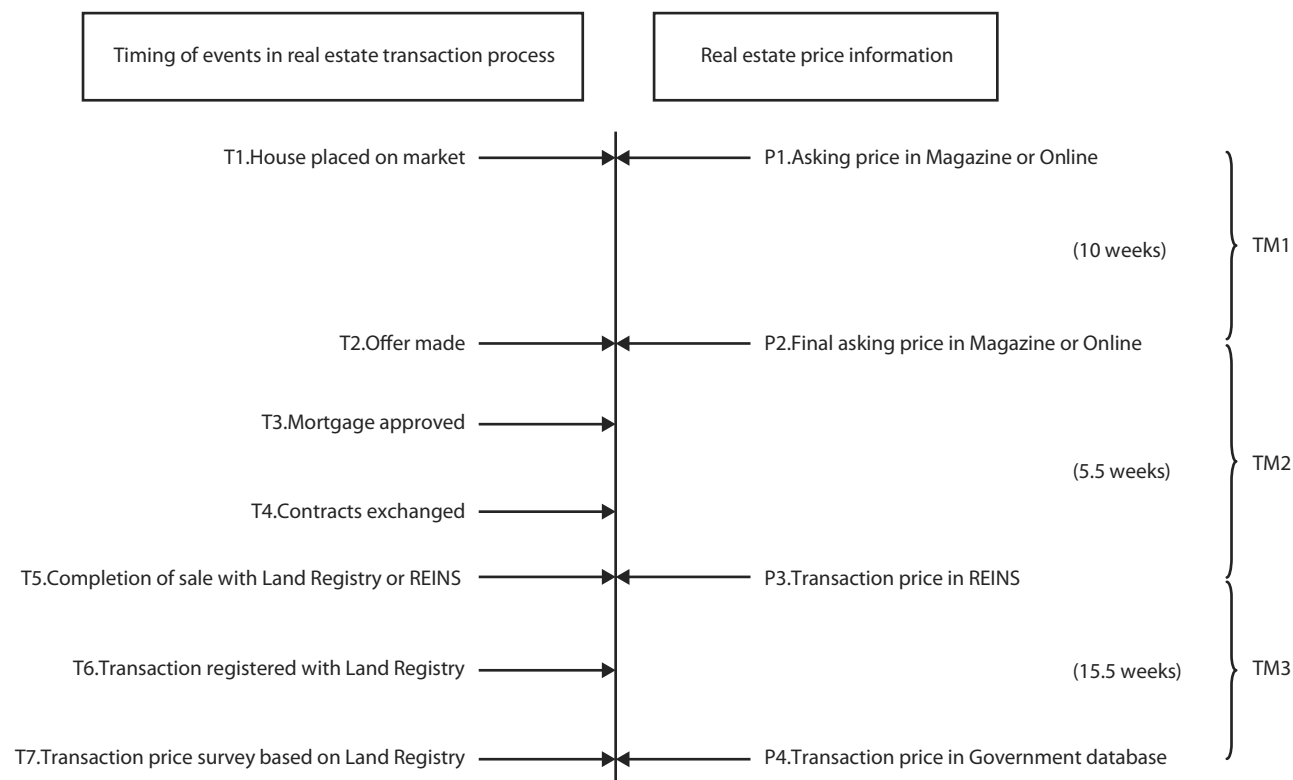
Source: UK Office for National Statistics

10.57 The average duration of TM1 is 70 days. That is, on average a buyer is found 70 days after the seller enters into the selling process; the maximum duration was 3.72 years. The ratio of P2 to P1 is 0.976 on average, meaning that the price drops by 2.4 % from the initial asking price to the last asking price. On average, TM2 is 39 days. The ratio of P3 to P2 is 0.956 on average, i.e. on average the transaction price is 4.4 % lower than the final asking price. TM3 is on average 109 days. This means that (for surveyed transaction price data) there is a time lag of approximately 3 months until the selling price is registered in the government's database. The price differentials at different points in the selling process can, of course, vary over time depending on the state of the owner-occupier housing market.

Figure 10.3. Four Residential Price Indices for Japan (January 1999=100)
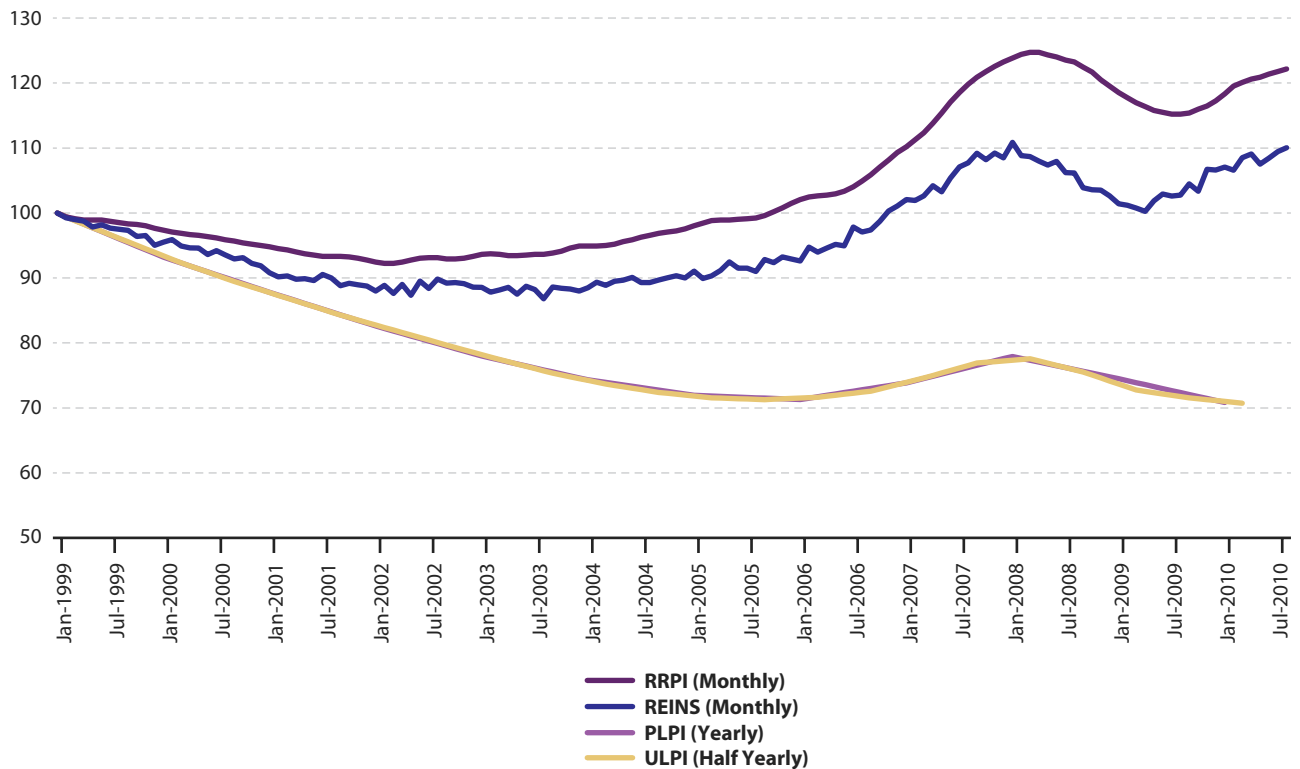
Source: Shimizu, Takatsuji, Ono and Nishimura (2010)

Comparative Analysis of House Price Indices in Tokyo Metropolitan Area

10.58 Figure 10.3 compares four property price indices. The REINS data are used by the Real Estate Information Network for East Japan and the Japan Research Institute who jointly produce the Tokyo Used Condominium Price Index. This monthly index has been published since 1995 and is constructed using a hedonic regression method. The Recruit Residential Price Index (RRPI) is also a hedonic price index [19], based on the final offer price of properties in Recruit's magazine, and relates to re-sold single family homes and condominiums. This index is also monthly and has been published since January 1986 [20], although only widely available in its current form since the beginning of 2000. Two land price indices, thus excluding buildings, are shown in Figure 10.3, the bi-annually ULPI and the yearly PNLP. These are appraisal-based indices. [21] The property price indices that include the structures clearly show a different trend than the land price indices. Also, the former began to recover some years after the financial crisis in 2008 whereas the

latter continued to decrease. Notice that the REINS index is much lower than the RRPI, in spite of the fact that both are hedonic indices.

Case Study: United Kingdom

10.59 The UK probably has more house price indices published on a regular basis than any other country. The range of residential property price indices that are published in the UK mainly stems from the interrogation and exploitation by different organisations of the different data sets which are generated at different points in the process of buying and selling a house. The latter often takes place over a period of several months or more and the particular stage in this process at which the price is abstracted and entered into an index can impact on the measured rate of house price inflation. In the UK the exploitation of data on property prices occurs at the following stages:

- As soon as the property is on the market. *Asking price*. Data source: estate agents. [22] Publisher: estate agents, Financial Times and property websites.

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[19] The Recruit Residential Price Index uses the time dummy method and, in consequence, is subject to revision (see Chapter 5).
[20] See Shimizu, Takatsuji, Ono and Nishimura (2010) for details.
[21] Shimizu and Nishimura (2006) (2007) compare appraisal values and selling prices and point to the problems of valuation errors and smoothing in the appraisal-based indices.

[22] Although not related to the issue of timing, a disadvantage of advertised prices and mortgage approvals is that not all of the prices included end in transactions, and in the former case, the price will tend to be higher than the final negotiated transaction price.

- Mortgage approved. *Valuation by mortgage lender*. Data source: mortgage lenders. Publishers: various mortgage lenders.
- Mortgage completed. *Mortgage completion price*. Data source: mortgage lenders. Publishers: The Department for Communities and Local Government (DCLG)
- Transaction registered. *Transaction price*. Data source: Land Registry.

The time-line for buying and selling a house in the UK, including the different points at which information is collected and used to produce a house price index, is given in Figure 10.4.

10.60 The UK currently has two official house price indices. One is published monthly by the Department of

Communities and Local Government (DCLG) and is based on information provided by mortgage lenders, through the Council of Mortgage Lenders, on valuation price at the point when the sale is completed. It is published about six weeks after the reference date for the house sale – or, on average, about four-five months after a house is first put up for sale. It only covers purchases involving a mortgage. The other is published monthly by Land Registry based on sales of properties registered with them. It is published a month after the reference date; i.e., one month after the registration of the sale but suffers from a lack of timeliness due to delays from homebuyers or their agents notifying the Land Registry of transfers of ownership.

Figure 10.4. House Purchase Time-line
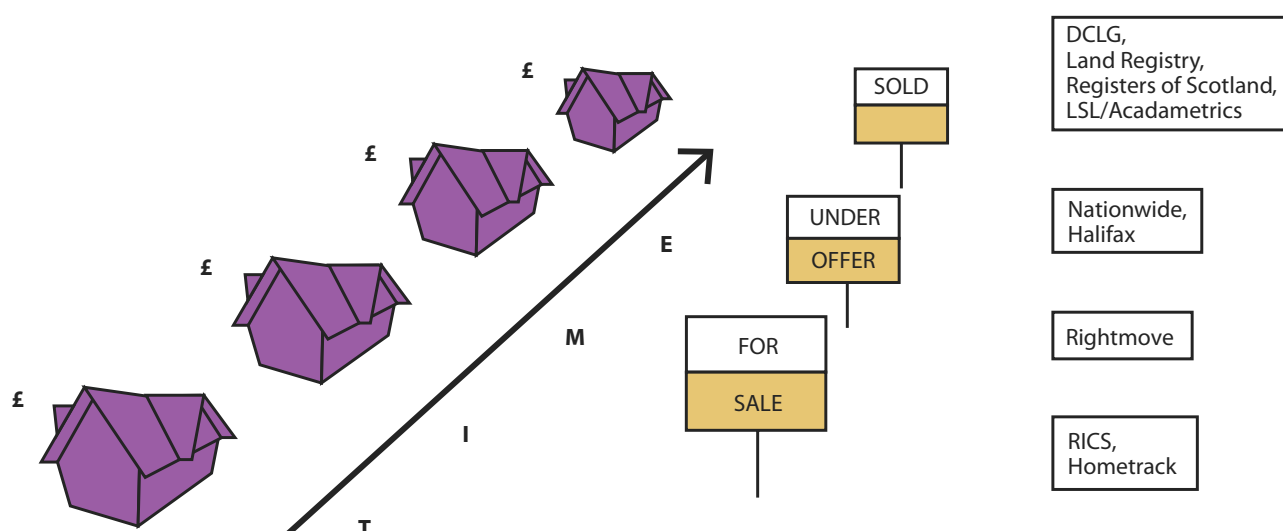
Source: UK Office for National Statistics

10.61 Two mortgage lenders, Halifax and Nationwide, publish indices based on their valuations of a property at the time that they grant a mortgage. These indices are produced within a few weeks of the reference data for granting the mortgage and about three to four months after a property is put up for sale. They are a little more timely than the official DCLG index but have a much more restrictive coverage with no guarantee that the properties that they have granted mortgages on are representative of either all property transactions or all purchases involving a mortgage.

10.62 Another index is compiled by an organisation named Hometrack, a business service company which provides a range of market intelligence on the housing market to organisations across the residential sector including Developers, Housing Associations, Corporate Investors, Estate Agents, and Local and Central Government.

Hometrack conducts a monthly survey of estate agents who are asked to gives their view on the achievable selling price for each of four standard property types. It is the most timely of all the published indices, being published about three to four weeks after the reference period with in effect no other time-lags involved, but it is an opinion survey of the likely selling price of properties on the market.

A research based consultancy firm, Acadametrics, also publishes a house price index based on data provided by the Land Registry. The LSL/Acadametrics index is published a few weeks after the end of the reference period based on an "index of indices" forecast method. The index for each time period is subsequently revised until all transactions have been included. An index based on asking prices advertised on the Rightmove property website is also widely used in the UK.

Table 10.2. Indices of Residential Property Prices – Published in the UK

Index	Sample	Method	Seasonally adjusted?	Weighing method	Stage of process
DCLG (¹)	Sample of Mortgage Lenders	Mix-adjustment and hedonic regression	Yes	Expenditure	Mortgage completion *(transaction price on mortgage document)*
Land Registry (monthly)	Sales Registered in England and Wales with a previous sale since 1995.	Repeat Sales Regression	Yes	Expenditure	Sale registration *(transaction price)*
Halifax	Halifax loans approved for house purchase	Hedonic regression (quality adjustment)	Yes	Volume	Mortgage approval *(valuation price)*
Nationwide	Nationwide loans approved for house purchase	Hedonic regression (quality adjustment)	Yes	Volume	Mortgage Approval *(valuation price)*
Hometrack	Survey of estate agents (valuations)	Mix-adjustment	No?	Expenditure	Achievable selling price
Rightmove	Asking prices posted on website	Mix-adjustment	No	Expenditure	*(asking price)*
LSL/ Acadametrics	Sales Registered in England and Wales	Forecasting model, includes mix adjustment.	Yes	Volume	Sale registration *(transaction price)*

(¹) Department of Communities and Local Government. A review into house prices indices by the UK National Statistician can be found on web pages: http://www.statisticsauthority.gov. uk/national-statistician/ns-guidance-and-reports/national-statistician-s-reports/index.html.

Source: UK Office for National Statistics

10.63 Table 10.2 summarises the scope and definition plus the main aspects of compilation method for the seven indices available in the UK shown in the time-line in Figure 10.4. Given the differences in definition, scope and coverage it is not surprising that these indices when taken together do not always show a coherent picture.

Case Study: India

10.64 Movement in prices of real estate, particularly residential housing, is of vital importance to the macro economy of India as well as to individual households. It is not surprising that there is a user demand for a relevant and reliable index for tracking house price movements. But a lack of transparency in the residential property market transactions and limited availability of price information pose important challenges for keeping track of real estate price dynamics.

10.65 Registration of the property price is a legal necessity for any property transaction in India. So in principle, the official authority of property registration has the details of all transactions during a reference period. In theory the data are available on a daily basis with a month lag from first reporting a change of ownership. However, it is well known that the registered prices of houses are grossly underestimated due to very high registration fees and stamp duty. The subsequent obligations for the payment of property tax acts as a further disincentive to individual purchasers (except corporate bodies) for revealing the exact sale price of a house. Furthermore, the registration procedure and records maintenance are not computerized and the records are maintained in regional languages which necessitates further work with respect to bringing them into common format.

10.66 For these reasons, the administrative data relating to the registration of changes of ownership are not exploited and an alternative source of data has had to be found. This alternative data source relates to market data based on transaction prices collected by the National Council of Applied Economic Research (NCAER), a national level research organisation, from Resident Welfare Associations (RWAs), real estate agents and brokers. The valuation data of housing loans financed by Banks and Housing Finance Companies (HFCs) are collected to supplement the actual transaction price data collected through survey. These data are then used to compile the National Housing Bank's RESIDEX index.

The NHB RESIDEX Index

10.67 NHB RESIDEX is a pioneering attempt by the National Housing Bank (NBH), an apex bank for the housing sector owned by the Central Bank of India, to measure residential prices in India. As a pilot, five cities – Bangalore, Bhopal, Delhi, Kolkata and Mumbai – were studied. The process of data collection posed many challenges. There were also several methodological issues relating to the analysis of data. In the event and after much work, the NHB launched its first RESIDEX for tracking prices of residential properties in India, in July 2007. The index is based on actual transactions using the sale price

plus supplementary data on valuations. Primary data on housing prices is collected from real estate agents by commissioning the services of a consultancy/research organization of national repute, who obtain transaction prices. In addition, data on housing prices are also collected from the housing finance companies and commercial banks. The latter relates to the valuation prices associated with the housing loans contracted by these institutions.

10.68 The salient features of NHB's RESIDEX are:

- It covers all types of residential properties in fifteen cities. [23]

- With 2007 as base, NHB RESIDEX index is produced on a quarterly basis. [24]

- Alternative series are compiled based on transaction weights and stock weights.

- It covers cash purchases and purchases financed via a loan.

- It covers new and old constructions.

- The index is constructed "using weighted averages of price relatives". [25]

[23] In due course, based on experience and depending upon the availability of data, it may be expanded to cover commercial properties, as well.
[24] 2001 was taken as the base year for the pilot index based on five cities to be comparable with the base year(s) of Wholesale Price Index and Consumer Price Index. Year on-year-price movements during the period 2001-2005 were captured, and subsequently updated for two more years i.e. up to 2007. The index was then expanded to cover ten more cities viz., Ahmedabad, Faridabad, Chennai, Kochi, Hyderabad, Jaipur, Patna, Lucknow, Pune and Surat, at which point the base year shifted from 2001 to 2007.
[25] It should be noted that this is a weighted Carli index and as such is likely to have an upward bias; see CPI Manual (2004), page 361.

- No quality adjustment is currently made in terms of location, size etc.

- It is revisable to take account of late data.

- Information on the movement in prices of residential properties by location, zone and city, is also available, e.g., separate indices are available for each zone in each of the fifteen towns covered.

10.69 For a country the size of India the geographical dimension is important. For example, the city-wise price indices, shown in Figure 10.5, help home buyers with their purchase decisions by enabling comparisons between localities and help builders and developers in making future investment decisions.

10.70 Development of the NHB RESIDEX to increase its relevance to users continues:

- The index will be expanded in a phased manner to cover all 35 cities in India having a million plus population as per the 2001 Census.

- There is a proposal is to expand NHB RESIDEX to 63 cities which are covered under the Jawaharlal Nehru National Urban Renewal Mission, the flagship national mission of the Government of India, to make it a National Index.

- In due course, based on experience and depending upon the availability of data, it may be expanded to cover commercial properties.

Figure 10.5. NHB RESIDEX Indices – India Citywise index
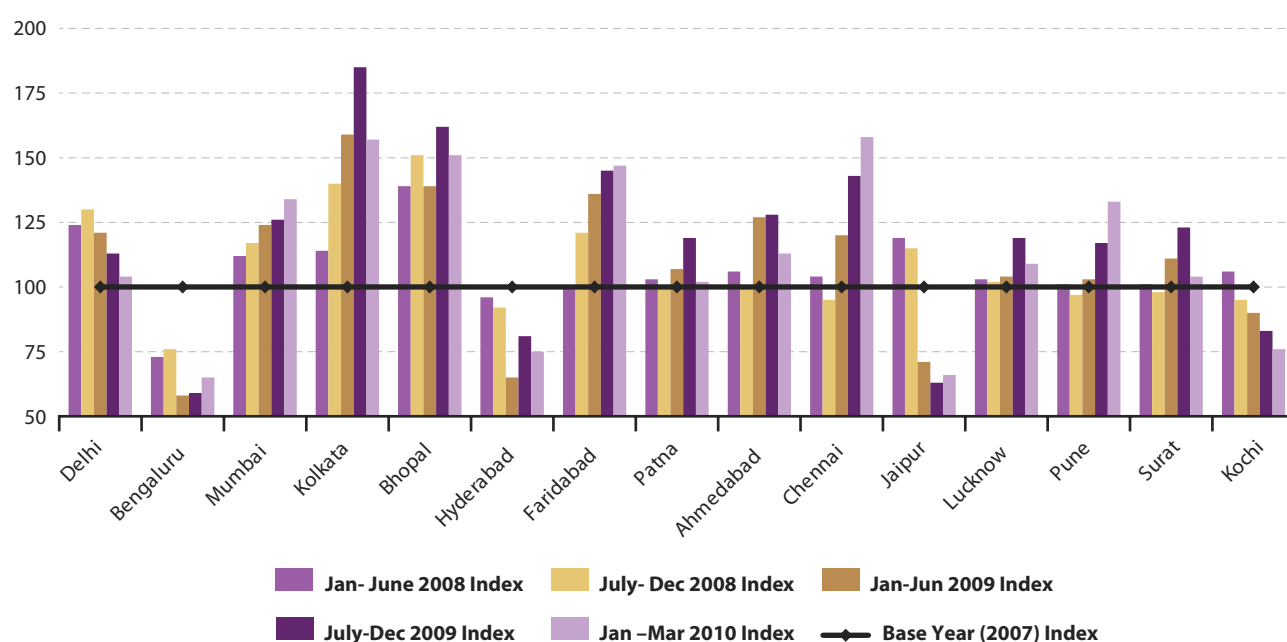
Source: National Housing Bank of India

Case Study: Colombia

10.71 A house price index for existing houses, the IPVU, is compiled by the Banco de la República (Central Bank of Colombia). There are some other indices that relate to construction costs and the prices of new housing units, which are produced by DANE (the national statistics office of Colombia). No series is produced which amalgamates the information from the two series to produce an index covering sales of all residential property in Colombia.[26] In the past, consideration was given to the exploitation of administrative data but this was found not to be possible due to the complexities involved.

The IPVU

10.72 The project to construct a price index for existing houses in Colombia, the IPVU, started in 2003. In the past, the lack of access to basic information had been the principal barrier to the construction of such index. After consulting with several lending banks about the importance of having a measure of the value of existing houses, the project was launched with finance from the Central Bank of Colombia (Banco de la República). The Statistics Section of Banco de la República is in charge of the production and publication of the index.

10.73 The IPVU is restricted to the principal metropolitan areas of Colombia, covering the cities of Bogotá, Medellín, Cali and Soacha in Cundinamarca, and Bello, Envigado and Itaguí in Antioquia. The index is calculated using information from loan's appraisals reported by the mortgage lending banks Davivienda, BBVA, Av. Villas, Bancolombia, Colmena BCSC and Colpatria. In consequence, the index covers only properties purchased using a loan – cash purchases are excluded. The banks provide the Banco de la República with the commercial values and addresses of all approved mortgages. The prices which are entered into the index are taken from independent valuations required by the mortgage lender. The valuation is close to the market price when the disbursement is made. The index is published on the Bank's webpage, on a quarterly basis with a lag of a quarter and is revisable on a quarterly basis, reflecting the repeat sales methodology used

(see below). In addition an index is published based on annual averages. Sub-indices are produced for the principal metropolitan areas: Bogota; Medellin; and Cali.

10.74 Houses are classified according to whether they receive subsidies or not. These relate to the VIS and NOVIS indices, respectively. The receipt of a subsidy depends on the value and location of the house. The term Low-Income Housing (LIH or VIS in Spanish) refers to residences which are developed to guarantee the right to a house for low-income households. On each development plan, the national government will establish the maximum price and type of residences meant for these households. They will take into account, amongst other aspects, households' access to credit markets, the amount of credit funding available from the financial sector, and available government funds aimed to target housing programs.[27]

10.75 The methodology applied is similar to the Case-Shiller repeat sales methodology. There is a lack of detailed information on the characteristics of housing needed to address the constant "mix" requirements of the Case-Shiller method through the use of stratification. However, progress is being made with the expectation that the information provided by the mortgage lending banks will in the future include a wide array of data on house specific characteristics. The current lack of detailed characteristics is dealt with by data editing. If the property shows an "abnormal" price change, i.e. if it is deemed to be an outlier, the price information is discarded and does not enter the index. This is in order to prevent re-modelled or neglected houses from entering the index. The index is revisable, reflecting one of the characteristics of the repeat sales methodology.

A comparative Analysis

10.76 The detailed sub-indices which are available provide the opportunity for a more-detailed analysis of the market in existing homes. An indication of the range of outputs available to the user is given by Figures 10.6-10.10. The "indice nominal" uses the prices reported by the Banks, i.e., it is not deflated; the "indice real" is the IPVU deflated by the CPI average for the year. In the case of quarterly indices the IPVU is deflated by the CPI quarterly average.

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[26] The integration of the two indices would raise the issues of a lack of consistency and incoherence. For example, the IPVU index is based on independent valuations when a mortgage is applied for and the DANE index is based on asking price.

[27] For more information on this topic, see http://www.cijuf.org.co/codian03/junio/c31847.htm.
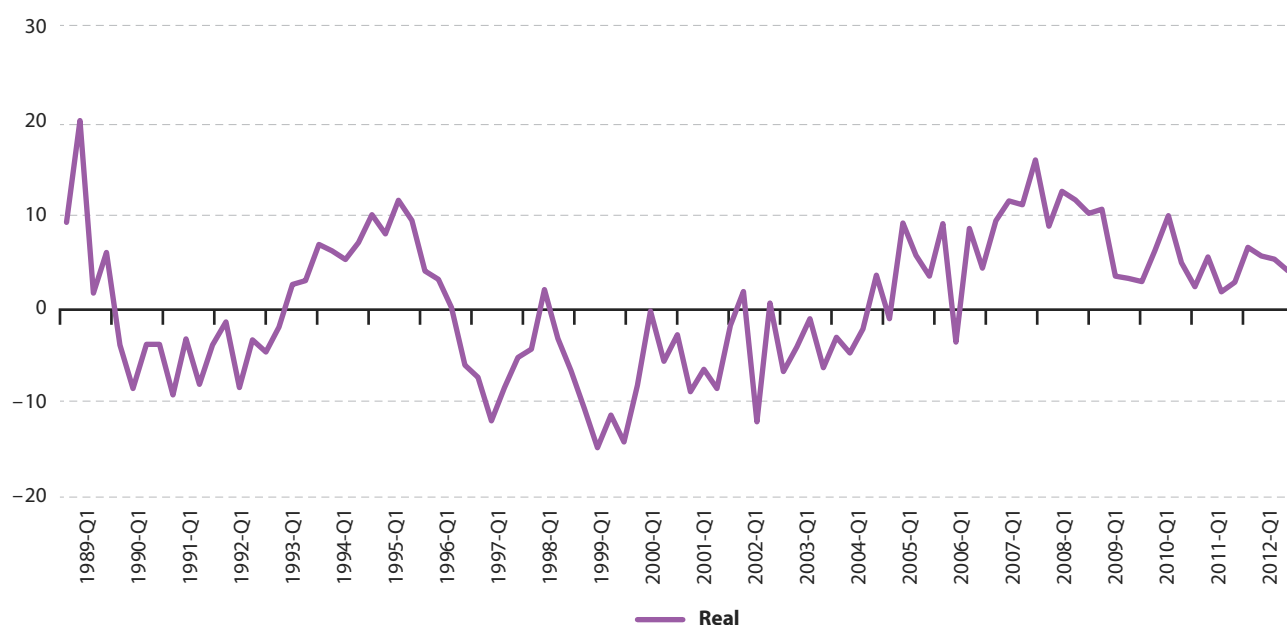
Figure 10.6. Quarterly National House Price Index for Existing Units – Nominal and Real
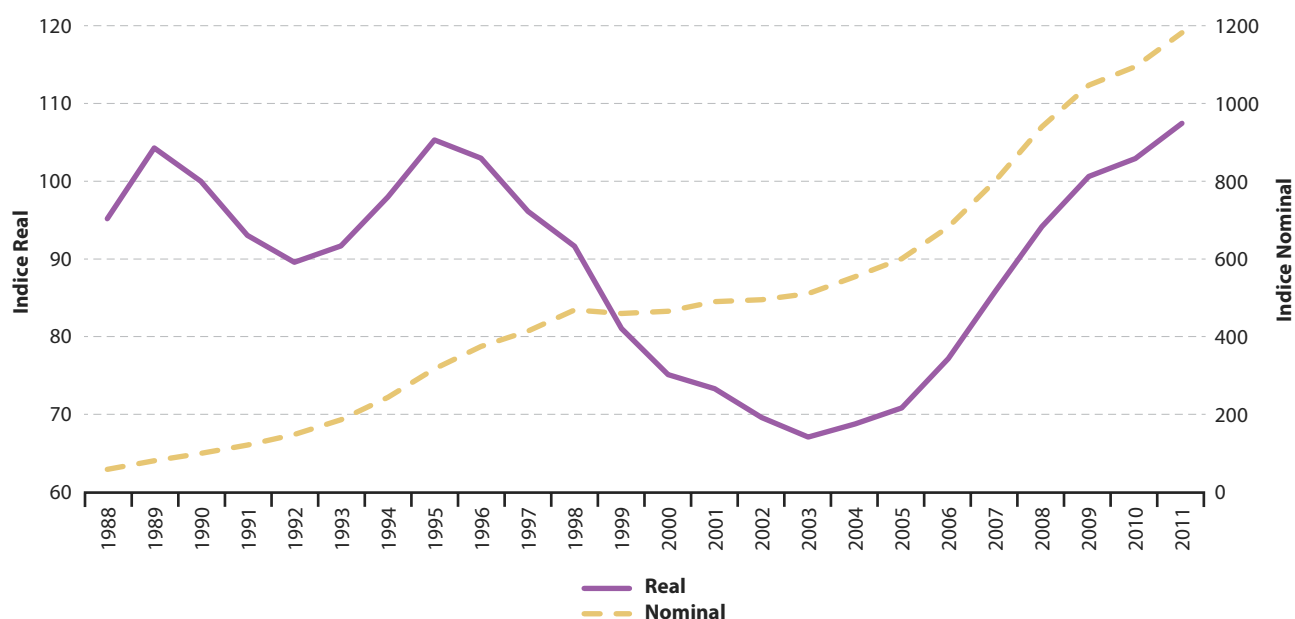(Base 1990 = 100)
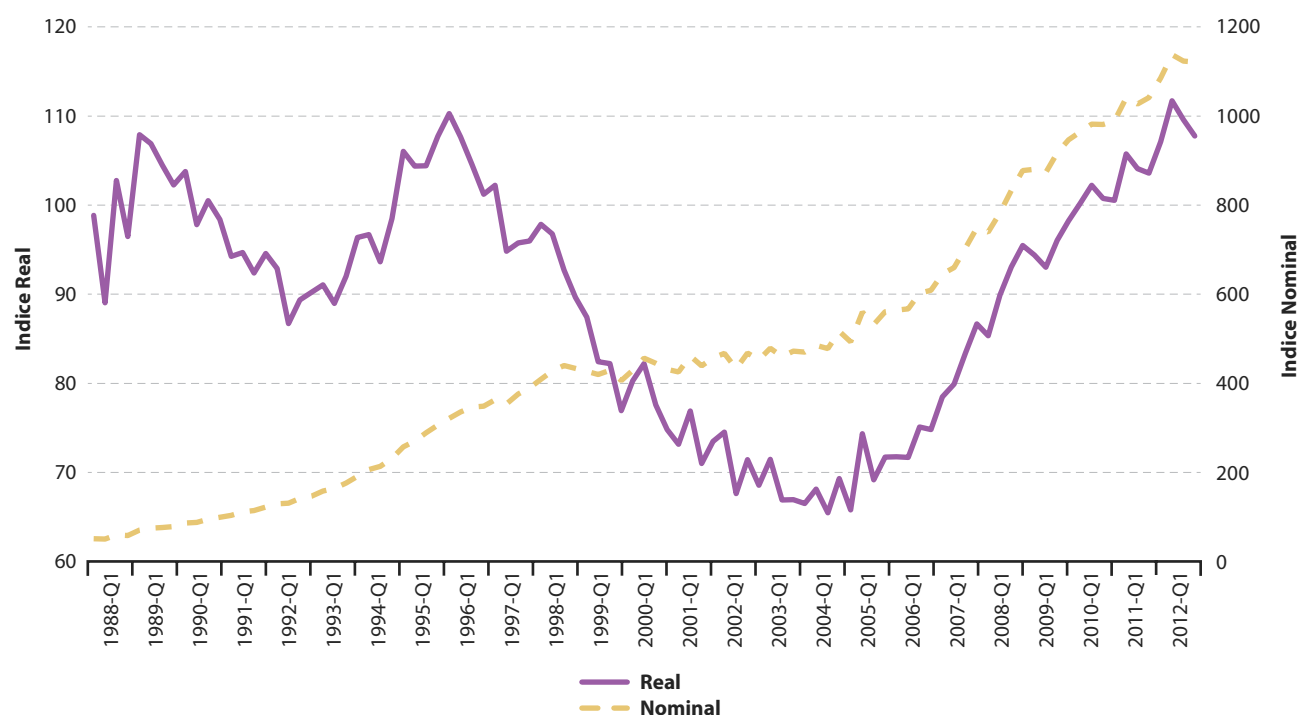
Source: Departamento de Programación e Inflación Banco de la República, Colombia

Figure 10.7. Quarterly National Real House Price Index for Existing Units – Annual Percentage Changes

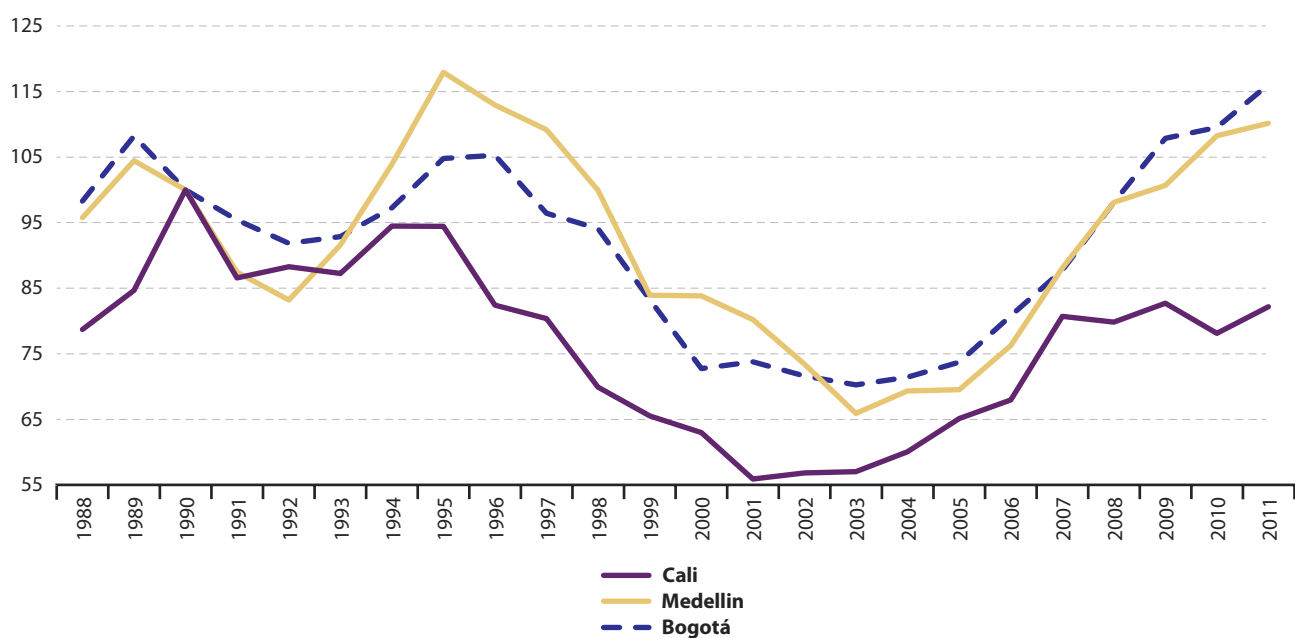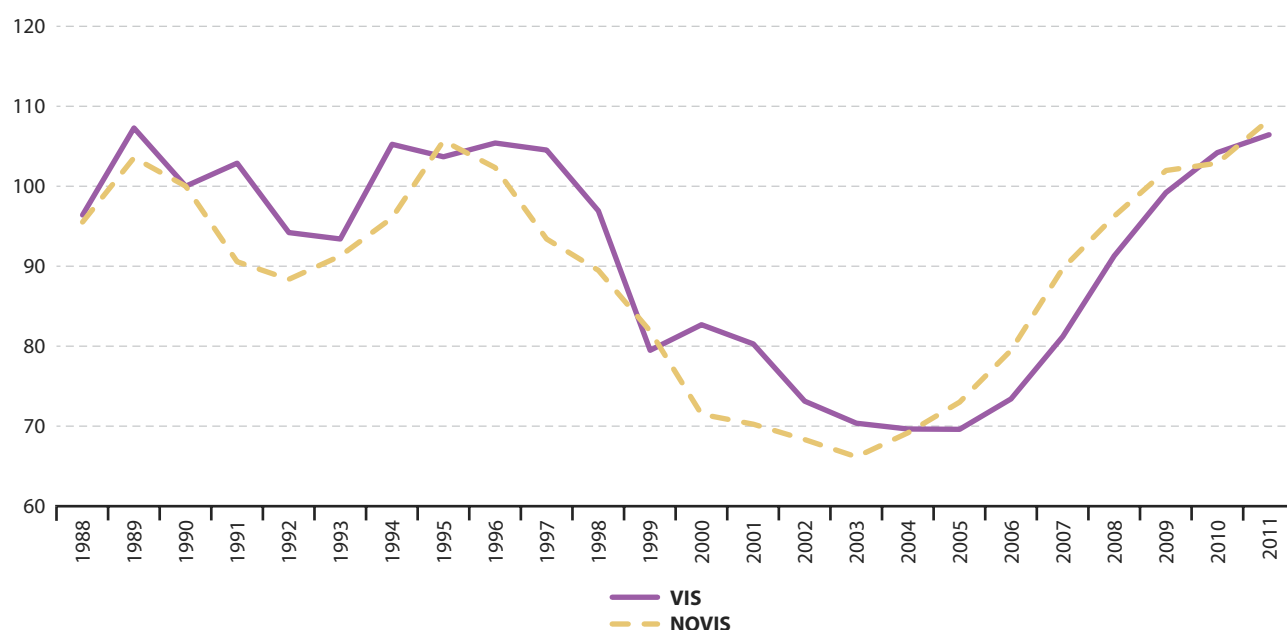*Source:* Departamento de Programación e Inflación Banco de la República, Colombia

Figure 10.8. Annual National House Price Index for Existing Units (^{1})
(Base 1990 = 100)

(^{1}) The annual publication of the IPVU takes the average index level over a period of twelve months and compares it with the average for the previous twelve months.
Source: Departamento de Programación e Inflación Banco de la República, Colombia

Figure 10.9. Annual Real House Price Index for Existing Units – Principal metropolitan areas
(Base 1990 = 100)

Source: Departamento de Programación e Inflación Banco de la República, Colombia

Figure 10.10. Annual Real House Price Index for Existing units: Houses with Subsidies (VIS) and Houses without (NOVIS)
(Base 1990 = 100)

Source: Departamento de Programación e Inflación Banco de la República, Colombia

Case Study: South Africa

10.77 The following case study from South Africa provides an illustration of the obstacles to the compilation of a residential property price index when a significant proportion of the housing stock relates to informal or traditional dwellings.

Introduction to the South African Housing Market

10.78 Diverse dwelling types characterise the South African housing stock; it consists of formal, informal, tribal, and other accommodation in backyard or shared property housing. Formal housing includes stand-alone houses (government subsidised and private houses), attached townhouses and flats (apartments), whereas informal housing, that is housing which does not have planning consent and will not be registered by the authorities, includes shacks (typically built out of corrugated steel plates) and traditional dwellings includes rondavels and huts made of traditional meterials. Backyard housing consists of dwellings that are situated in a backyard of a property with a main house, and shared property housing occurs when more than one dwelling is constructed on a single stand. The distribution of the South African housing market is as in Table 10.3. According to the 2001 Population Census, the number of dwellings in the formal market has increased by 37.1 % from 1996 to 2001; informal housing by 26.4 % and traditional dwellings by 0.6 %. In contrast, backyard or shared property has decreased by 14.5 %.

Table 10.3. Tenure Status – All Housing in South Africa (According to Census 2001)

Housing type	Total	Owner-occupiers (%)	Renters (%)
Houses	6 238 454	66.1	45.6
Subsidised housing (*)	*1 074 028*	*9.6*	*–*
Flats	589 109	2.9	16.3
Townhouses	319 868	3.3	4.1
Informal	1 836 230	10.3	18.4
Traditional	1 654 787	15.0	4.1
Backyard or shared property	532 986	2.4	11.5
Total	11 171 434	100.0	100.0

(*) National Treasury estimate.
Source: Statistics South Africa

10.79 In South Africa, builders and/or property developers construct all residential property, with the exception of tribal and informal housing. For the construction of formal housing, a monetary transaction takes place by financing the dwelling with the money of the buyer and/or a mortgage bond. The dwellings and their values are recorded at the local municipality and deeds office. For tribal and informal housing, very few monetary transactions take place. Where they do take place, the transactions will be small cash expenditures but the dwelling will generally not be recorded by a local municipality. However, due to the demand for basic services, government has begun to record the number of dwellings in informal settlements and rural areas, but the value of the dwelling is not recorded. The situation represents an exceptional challenge for compilers of residential property price indices.

Residential Property Price Indices in South Africa

10.80 There are various house indices published in South Africa, but not by Statistics South Africa. Published house price indices include the First National Bank (FNB) House Price Index, the ABSA House Price Index and the Standard Bank Median House Price Index.[28]

10.81 The FNB house price series is constructed using the average value of housing transactions financed by FNB. To eliminate outliers from the data sample, transaction values included in the sample must be above 70 % of FNB Valuations Division's valuation of the property but below 130 %, while purchase prices recorded as above R10-million are excluded. In order to reduce the impact on the index of rapid short-term changes in weightings of different property segments, due to relative shifts in transaction volumes, the weightings of the different market segments according to number of rooms are kept constant at their 5-year average weighting. A statistical smoothing function

is applied to the data and the data may be revised. The FNB index is calculated monthly.

10.82 ABSA House Price Index (HPI) measures the nominal year on year house price movements of houses purchased through approved mortgage loans from ABSA. The ABSA HPI is based on the total purchase price of houses in the 80m²- 400m² size category, priced at R3 1 million or less (including improvements). Prices were smoothed in an attempt to exclude the effect of seasonal factors and outliers in the data. The index is calculated monthly.

10.83 Standard Bank's index is based on the median house price of the full spectrum of houses, using a five-month moving average. National data from the Deeds Office are available only with a lag of up to nine months, so data from Standard Bank, which has a market share of about 27.7 % and whose data are generally highly correlated with those of the Deeds Office, are considered a good proxy for the national market. The index is constructed on a monthly basis.

Limitations to the Construction of a Residential Property Price Index

10.84 In the construction of the above house price indices only formal housing (i.e., houses, townhouses and flats) purchased by means of a loan are included – cash sales and "informal" housing are excluded. The difficulty in constructing an RPPI in South Africa is mainly due to the lack of acceptable estimates on housing stock and price information on informal and traditional dwellings. These dwellings make up 19.6 % of all structures and therefore constitute a significant sector of the market in South Africa.

10.85 The sector also has its own distinct features. For example, what defines an informal dwelling?

- Residential areas where a group of housing units has been constructed on land to which the occupants have no legal claim, or which they occupy illegally;

[28] ABSA, FNB and Standard Bank have the majority of the banking market share in South Africa

Methods Currently Used **10**

- Unplanned settlements and areas where housing is not in compliance with current planning and building regulations;
- Informal dwellings are typically built out of corrugated steel plates for the walls and roof (shack);
- The households themselves mostly build these dwellings.

What is a traditional dwelling?

- This is a general term, which includes huts, rondavels ([29]), etc. Such dwellings can be found as single units or in clusters.
- The dwelling can be made of clay, mud, reeds or other locally available materials.

Primary Concerns in the Construction of a Residential Property Price Index

10.86 As stated elsewhere in this handbook, two main problems in the construction of a residential property price index are the sporadic nature of transactions and a lack of matching due to the fact that houses have unique price determining characteristics. In the case of formal housing, these two factors apply, but for informal housing, the second factor is much less important. Informal dwellings have, exceptionally, standard attributes since most of them are made of corrugated steel and have one to four rooms. Similarly their location will tend to be in the same types of areas. In these circumstances the matching principle may not be difficult to apply. In addition, the fact that the owner of the shack does not own the land that the dwelling stands on, implies that a decomposition of the index into land and structures is not relevant. The census 2001 indicated that the distributions of rooms are as in Table 10.4.

10.87 For traditional dwellings, the decomposition into land and structures is not relevant either. In this case, the land is allocated to the person or household by the chief of the tribal area, and no cost or only a small fee is levied. However, to estimate the price of the dwelling may prove problematic if, unlike formal dwellings, mainly natural materials are used in the construction.

([29]) A circular often thatched building with a conical roof.

Table 10.4. Distribution of Number of Rooms in Informal Dwellings

Number of rooms	% of total informal dwellings
1	40.0
2	27.2
3	15.1
4	10.5
5 +	7.2

Source: Statistics South Africa

Weighting of Non-Formal Housing

10.88 Weighting of non-formal (informal and traditional) housing will be complex in nature as the owners construct most of the dwellings themselves and monetary transactions are limited. In addition, materials for the construction of an informal dwelling are mostly second-hand and for traditional dwellings, natural materials are used; cost estimates for these types of materials are difficult to obtain and, indeed, they may have been gathered rather than purchased.

10.89 Although most of the characteristics of the dwellings are known from the population census, the value of an informal or traditional dwelling is difficult to estimate because there are no organised markets and the values are not registered at a deeds or land registration office. Also, the movement of informal dwellings from one settlement to another may pose a problem in the estimation of the housing stock. The rate of new constructions and demolitions would be unknown, since it is uncertain whether all dwellings that were broken down were erected once more in the new area.

Pricing of Non-Formal Housing

10.90 Non-formal house prices do not depend on normal market price determinants. The plot area, location, age and renovations typically do not affect the price. The only aspects that influence the cost of the dwelling are the materials used and this is of course influenced by the size of the structure; see Table 10.5.

Table 10.5. Price Determinants

Price determinants	Traditional dwellings	Informal dwellings	Formal dwellings
Area of structure	No	No	Yes
Area of land	No	No	Yes
Location	No	No	Yes
Age	No	No	Yes
Renovations	No	No	Yes
Type of structure	No	No	Yes
Materials	Yes	Yes	Yes
Other price determining characteristics	No	No	Yes

Source: Statistics South Africa

Table 10.6. Percentage of Materials Used in the Construction of Informal and Traditional Dwellings in South Africa

Year	2002	2003	2004	2005	2006	2007	2008	2009
Materials used for roof								
Corrugated iron/zinc	72.1	72.1	71.6	78.2	79.5	78.6	78.6	83.6
Organic materials	23.2	24.2	23.8	16.8	16.2	17.1	15.8	13.3
Asbestos	1.9	1.6	1.4	1.7	1.8	1.2	2.1	0.5
Other	2.6	2.1	3.1	3.2	2.1	3.1	3.1	2.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Materials used for walls								
Bricks	2.6	3.3	2.3	1.8	1.4	1.6	2.3	1.9
Cement block/concrete	2.9	2.2	2.8	1.9	2.5	2.3	2.4	1.4
Corrugated iron/zinc	35.1	36.1	33.9	40.0	43.6	43.9	41.4	42.2
Wood	9.8	9.4	8.9	9.6	10.5	10.8	10.1	8.6
Mud and cement mix	7.0	5.2	6.3	5.0	5.8	6.5	6.7	10.4
Wattle and daub	1.4	1.1	1.7	1.0	0.5	0.9	1.3	1.2
Mud	38.2	39.8	41.8	37.2	33.7	31.8	32.8	31.8
Other	2.6	2.9	2.3	2.6	1.8	2.2	2.9	2.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Statistics South Africa

10.91 Price collection for traditional and informal dwellings would be very difficult, since the owner constructs the dwelling him/herself in most cases and monetary transaction for the complete dwelling rarely takes place (the purchases of materials are normally in cash). The only way to obtain prices of newly constructed informal and traditional dwelling is to conduct a survey of newly constructed dwellings on a frequent basis, since most of these are not registered at the deeds office, and if registered, the value of the dwelling is not recorded. An alternative for these types of dwelling, yet to be explored, is to compile a "notional cost of construction" index based on the pricing of quantity information of the type that is shown in Table 10.6.[30]

[30] See Blades (2009).

Summary

10.92 It would be a very complex task to calculate a comprehensive residential property price index for South Africa, due to the diverse nature of housing in the country. Different methods will be required for the collection of prices for different housing types. In addition, weight estimation for each type of housing will be difficult, as different housing types have different cost determining characteristics. Furthermore, the limited data availability for each housing type exacerbates the problem.

10.93 The primary barriers to the construction of an inclusive residential property price index in South Africa are listed in Table 10.7 and include:

• The absence of an organised market for informal and traditional housing;

- The absence of reliable data estimates on the cost of informal and traditional housing;

- The nomadic life-style. If a survey is conducted, movements of informal settlements from one area to another pose a problem in terms of measuring the price development of this type of housing because prices are normally collected in specific areas;

- There is no registration of property at the Deeds Office;

- Monetary transactions do not always take place to obtain or build the dwelling;

- Prices do not depend on typical price determining factors such as the price of land, and labour and material costs.

Table 10.7. Evaluation of Barriers

Possible problems	Traditional dwellings	Informal dwellings	Formal dwellings
Organised market	No	No	Yes
Reliable price estimates exist about the cost of housing	No	No	Yes
Movements of dwelling from one settlement to another	No	Yes	No
Registration of property at deeds office	No	No	Yes
Monetary transaction at lending institution	No	No	Yes
Transfer of cash for building of structure	Sometimes	Sometimes	Yes
Dwelling constructed by property developer or builder	No	No	Yes
Price depends on typical price determining factors	No	No	Yes

Source: Statistics South Africa
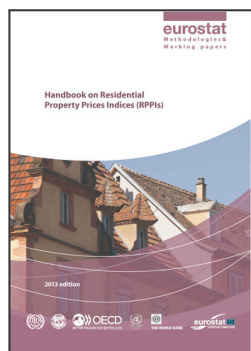
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Handbook on Residential Property Price Indices