Real Estate Price Indices: methodology and use in the Brazilian economy

The repercussions of the Brazilian economy recent expansion on real estate demand and on the trajectory of prices applied in the real estate internal market has stimulated a growing interest for indicators of real estate prices in Brazil. In this context, this box discusses methodological aspects regarding the calculation of real estate price indices and presents some indicators recently produced in Brazil.

It is important to emphasize that the construction of such indices must take into account the underlying aspects of these assets. Thus, their own structural characteristics and the properties' unique location constitute a homogeneity problem. Furthermore, the restrictions imposed to these indices by the sporadicalness with which the transactions involving real estate occur and by the availability of data that enable to identify the transaction value, are evident.

According to the Statistical Office of the European Communities (Eurostat) (2011), there are four methods to calculate real estate price indices: stratification, repeat sales, evaluation, and hedonic regression. Clearly, each method incorporates relative advantages and the choice of the most appropriate one will depend on the index purpose and on data availability.

The repeat sales index is calculated only with properties that are sold at least for the second time, comparing sale price variation, but presents three main disadvantages. This method does not consider alterations in the real estate quality, due to renovations, and, therefore, even comparing the price of the same property, it is possible that the index may be impacted by changes in the property's characteristic and not only variations in prices.

Besides, this method rules out all the properties sold for the first time. Finally, this index may bring an important bias, if the most frequently transacted properties are not a representative sample of the overall properties on which the indicator's interest falls on.

The evaluation method, while considering real estate market quotes, enables to use all the properties of the sample, and not only those sold more than once, and its results may always be reviewed when new information is added. Although this method extends the sample used, its quality depends on the evaluations' strictness and still evinces the inability to grasp changes in the quality of real estate.

The stratification method divides the sample into strata according to the observed criteria, such as geographic region, number of rooms or bedrooms, property age, among others. From this division, measures of prices are calculated (usually average or median) that, when weighted, bring about an aggregate indicator. If the stratification incorporates relevant characteristics, the method allows identifying most part of the changes in the property's quality throughout time, being considered an acceptable index. The other advantage of the index is its ease to be used, while, on the contrary, the restricted stratification may provide small samples or even lack of observations in some strata.

The hedonic regression method requires data regarding real estate prices and information about its attributes, using, as from this basis, statistical techniques of regression. The prices are considered dependent variables and the attributes and dummies (binary variables) of a period, explanatory variables. Starting from these dummies it is possible to calculate a price index in which the property quality (which certainly depends on which other regressors are included in the model) remains constant[1]. Even though this method is, probably, the most efficient one, it requires information about attributes, reproduction difficulty and, depending on the technical specifications chosen, restrictions for the results revision.

[1] Check the study "Differences between the Regional IPCAs in 2007", presented in the Regional Newsletter of the Central Bank of Brazil published on April 2008.

While in several economies, especially the more developed ones, there are representative series of real estate price indices; its construction in Brazil is still beginning, encouraged by construction and real estate credit trajectories. The main indices of this nature in the country are those indicators elaborated by the Institute of Economic Research Foundation (Fipe) and by Getulio Vargas Foundation (FGV), both published on February 2011.
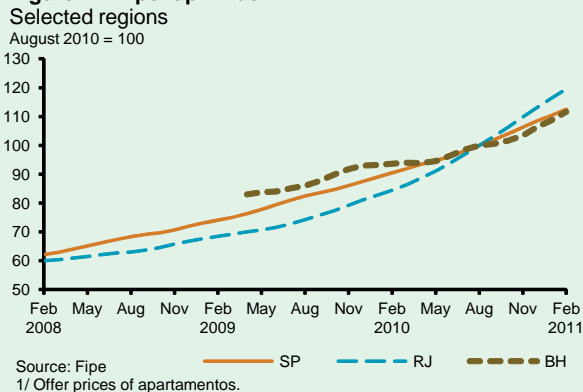
The Fipe Zap Index of Advertised Property Prices (Index Fipe Zap) is based on offer prices of apartments. Its data base is Zap records, a private company specialized in classified advertisements, and its calculation method is the stratification, which comprehends the apartment's location (region of the municipality) and the respective number of bedrooms. In each stratum, it is calculated the median of prices (in R\$/m²) of the observations (offer advertising). In each city, the index (known as regional) corresponds to the weighted average of the price medians of the respective strata. The weighting variable used is the aggregate family income, per stratum, according to data from the 2000 Demographic Census, which provides a price index for the stock of apartments.

The Fipe uses the same weighting criteria for the calculation of indices regarding each class of number of bedrooms, as well as for the Fipe Zap Composite Index, the national aggregate as of seven metropolitan regions[2]. The main index qualities are the data base amplitude, which surpassed one thousand observations per month last December, enabling enough information in each stratum, and its timeliness – the indicator is published about one week after the end of the reference month. One disadvantage of the index is the use of the offer price and not the price of sale, emphasizing that, if this relation is relatively stable, such deficiency is no longer relevant for the analyses of relative evolution of real estate prices.

The first results turned in by Fipe support the perception that there has been a significant rise of real estate prices in the country. The indices referring to Rio de Janeiro and São Paulo presented increases of 99.3% and 81.3%, respectively, within the period
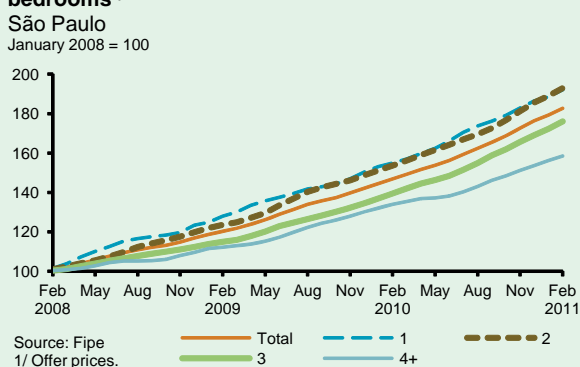
2/ São Paulo, Rio de Janeiro, Belo Horizonte, Federal District, Recife, Fortaleza and Salvador.

Figure 1 – FipeZap[1] index
Selected regions
August 2010 = 100

Source: Fipe
1/ Offer prices of apartamentos.

Figure 2 – FipeZap index by number of bedrooms[1]
São Paulo
January 2008 = 100

Source: Fipe
1/ Offer prices.

Figure 3 – FipeZap index by number of bedrooms[1]
Rio de Janeiro
January 2008 = 100

Source: Fipe
1/ Offer prices.

Figure 4 – Total IGMI-C and components[1]
Brasil
Variation over the same quarter of the previous year
%

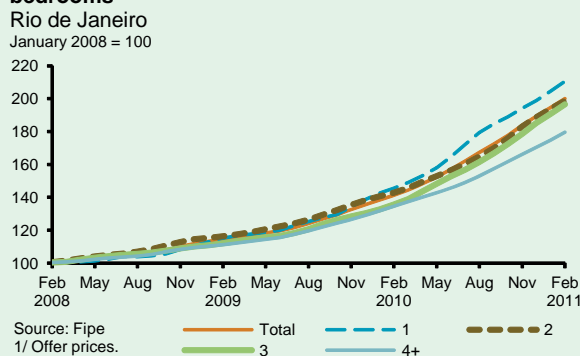Source: Ibre/FGV
1/ Index of return on capital.

of 36 months ended on February 2011, while the index referring to Belo Horizonte increased 29.7% within the period of 18 months ended in the same month, according to Figure 1. In the same figure it is still evident the recent acceleration of real estate prices growth rate in Rio Janeiro when compared to the other two capitals.

It must be pointed out that the prices of one and two-bedroom apartments increased more sharply than those with three and four bedrooms or more. In São Paulo, the biggest market analyzed, the indices regarding one and two-bedroom apartments increased 89.2% and 91.1%, respectively, within the period of 36 months ended on February 2011, while the prices of three and four-bedroom apartments expanded 75.4% and 58%, respectively (Figure 2). This trend has also been observed in Rio de Janeiro (Figure 3).

The General Real Estate Market Index – Commercial (IGMI-C) of FGV is a profitability indicator of the real estate business, displayed in two components – income return and capital return –, besides its aggregate form. The first one corresponds to the ratio between net operational revenue (total of business revenues minus operational expenditures) and the enterprise assessed value. The capital return is defined as the ratio between the real estate appreciation and its assessment in the previous period. The total return is just the addition of both. The basic information consolidated in IGMI-C is obtained from companies connected to the real estate sector, such as institutional investors, property developers, class entities, consultants, administrators and managers of property portfolios. The series periodicity, which could be retroactive to the first quarter of 2000, has a quarterly periodicity. In the last 2010 quarter, the sample comprehended 190 individual real estates, mostly formed by commercial offices concentrated in São Paulo (37%) and Rio de Janeiro (26%). The indicator growth is shown in Figure 4 and evinces a relevant rise in the last quarter, when the total return regarding the corresponding period of 2009 reached 33.5%, the highest variation of the series.
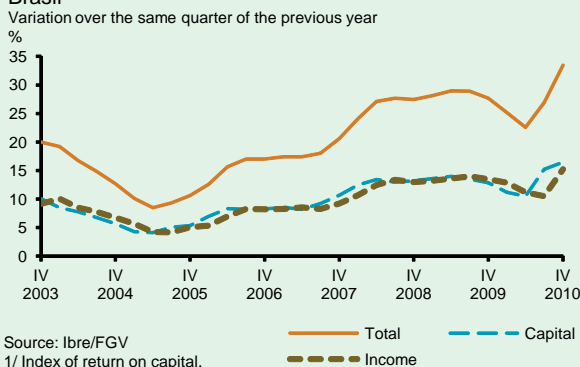
In general, it is possible to say, with the exceptions mentioned, that real estate price indices corroborate the perception regarding the real estate market acceleration in the country. It is important to consider

that the indicator trajectory bears some limitation due to the low number of observations made, making it difficult to distinguish transactions related to the business cycle from those with a trendy nature.