The Housing price index for Chile: Methodology and Results

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Abstract

This document presents the methodology and main results of the construction of a housing price index for Chile (HPI) by the Central Bank of Chile. The HPI is built on the basis of anonymous administrative records from the Internal Revenue Service, corresponding to actual housing transactions at national level. The index considers openings by type of property (houses and apartments) and geographic areas. The HPI will be released semiannually, starting from 2014.

Keywords: Housing price index; residential property price; real state.

1. Introduction

For a household economy, the home usually represents the most important possession, both as a measure of wealth (a nonfinancial asset) and as the source of the family's main expenses (rent, maintenance, associated services, etc.) (Parrado et al., 2009). In addition, the banking system and other financial agents usually have a high exposure to the real estate sector. A sharp drop in house prices, thus, generates, first, a loss in household wealth, giving households a negative perception of their economic situation which, in turn, affects their consumption and payment decisions. Second, it increases the risk in lenders' credit portfolios, since housing property is used as collateral for mortgage loans. Finally, it leads to a loss in the value of assets held by institutional investors.

Consequently, an adequate system for monitoring the real estate sector, in general, and house price dynamics, in particular, is crucial for the analysis of financial stability. This was clearly illustrated during the subprime crisis in the United States and the formation of macrofinancial vulnerabilities in many other economies around the world, including, for example, Ireland and Spain. Furthermore, from a historical perspective, Reinhart & Rogoff (2009) argue that the five worst economic crises have coincided with a downward cycle in the real estate sector.[1]

This report describes the methodology used by the Central Bank of Chile to estimate a housing price index (HPI). The HPI is calculated using a stratification (or mix adjustment) method applied to anonymous administrative records from the Chilean Internal Revenue Service, corresponding to actual housing transactions. The choice of this methodology to calculate the HPI was based on the type of information available in Chile and a comprehensive review of international best practices.

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[1] Spain in 1977, Norway in 1987, Finland in 1991, Sweden in 1991 and Japan in 1992.

2. Calculation Methodology

There is no consensus at the international level on a specific methodology for calculating house prices. In practice, the choice depends on the quality and availability of data for calculating the index.

International practice has converged toward the use of hedonic and average prices, which are the main techniques used in Europe (Eurostat, 2013). For the Chilean HPI, the Central Bank of Chile opted for the stratification or mix adjustment method, based on the characteristics of the available data. This method centers on measuring changes in the price of different types of housing properties, breaking the sample into groups based on characteristics such as price, geographic location, size, etc. The method thus controls for changes in the composition of homes sold between periods, but not within each group.

Measures of central tendency, such as the mean and the median, are constructed for each group, before being combined to construct the mix-adjusted index.

This method does not require a high level of data specificity, since it only needs information to identify and separate the groups. The effectiveness of the measure will depend on the separation criteria used to disaggregate the sample. This method generally controls for compositional changes through the stratification variables defined for each group. Consequently, one of the assumptions is that changes in quality occur at the group level, such that quality remains identical within the group.

3. Database Content and Sources

The data used to calculate the housing price index are obtained within the framework of a collaboration agreement on statistical information management between the Chilean Internal Revenue Service (IRS) and the Central Bank of Chile. The database contains transaction data on residential and nonresidential properties, which is provided by Real Estate Registrars throughout the country, that must complete an ad hoc form (ID 2890) in order to pay the stamp duties levied on the transfer and registry of real estate property. This form is sent to the IRS and provides the basis for compiling the database.

One of the main characteristics that makes this the best data source for measuring changes in house prices has to do with the fact that the prices listed on the registration forms come from actual completed transactions, as opposed to theoretical property assessments. Another advantage of the database is its content, given that the reference population for the HPI includes all natural persons, both resident and nonresident, who acquired a house or apartment in the reference period. It also includes purchases made by public and private legal persons, which did not exceed 8% of total transactions, on average, in the 2002–2013 period. Additionally, the indicator is broad in geographic terms, since it covers the entire country.

The database used contains all transactions, including agricultural and nonagricultural land and all designated uses. The total database, which was updated in November 2014, contains 3.5 million transactions, covering the period from 2002 to 2013. Of these transactions, around 60% were designated residential.

The transaction data received from the IRS contain all the information related to the property transfer, including the following variables: geographic location, time period, property characteristics (square meters of construction, square meters of land), value of the transaction, amount of bank financing and the

identification of the parties involved. In addition, the Real Estate Property Registry includes additional variables for characterizing the housing properties, such as construction materials, age of the building and tax assessment.

The transaction database is not free of errors. In general, the main problems—and their treatment—are as follows:

- Duplicate observations: these are removed from the database.
- Invalid transaction dates: the recorded date is moved to the closest valid date.
- Atypical construction area (very small/very large): the following limits are applied to the sample: 20 m2 < square meters of construction <500 m2.
- Atypical prices per square meter (UF/M2): a confidence interval was established for the logarithm of the price per square meter, equivalent to 1.5 standard deviations of the typified data.

The sample was disaggregated into groups according to the following common characteristics:

- Geographic area (7): North, center (excluding the Santiago Metropolitan Region) and south. The Santiago Metropolitan Region was subdivided into four areas (east, west, central and south).
- Type of property (2): Houses and apartments.

Quarterly prices were determined for the resulting 14 groups (that is, the seven geographic areas separated into houses and apartments) based on the simple average of the corrected observations of price per square meter. Finally, the mean prices obtained are combined to construct the stratified index, using the square meters traded in the previous period as weights.

The HPI is estimated as prices denominated in UFs per square meters (UF/M2).[2] It is thus a real indicator of the evolution of house prices. At the same time, because the prices obtained for each group are aggregated using the total square meters traded in the previous year as weights, the indexes constructed over this moving base must be chained, in order to represent the results relative to a specific reference year—in this case 2008, which is also the reference year for the Chilean national accounts.

4. Main Results

The aggregate housing price index grew at an annual rate of 9% in the fourth quarter of 2013, with an upward dynamic both at the national level and in the Santiago Metropolitan Region (figure 1).

By type of property, the growth of house and apartment prices diverged in the period (figure 2). Through the end of 2009, the two indexes grew at a similar average real annual rate of around 3%. However, starting in the first quarter of 2010, the house price index increased more than the apartment index, posting average real annual growth of 8% in the 2010–2013 period. This trend could be reflecting the earthquake in February 2010, which caused a relative increase in the demand for houses versus apartments.

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[2] The *unidad de fomento* (UF) is an inflation-indexed unit of account used in Chile.

Figure 1. Real Housing Prices (*)
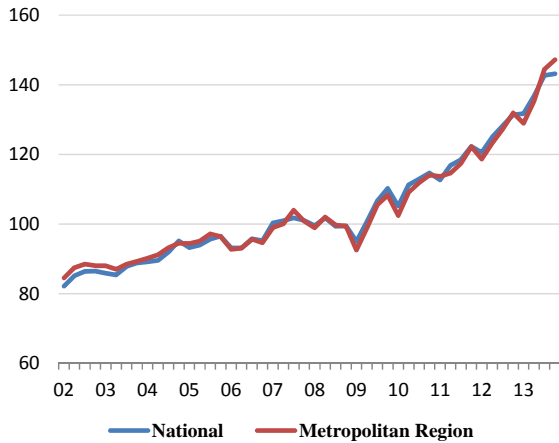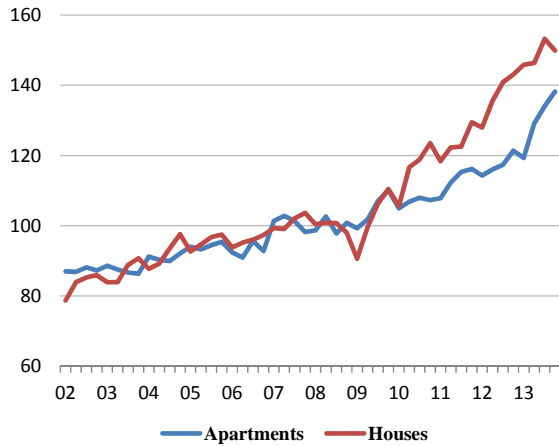*(fixed-base index: 2008 = 100)*

National   **Metropolitan Region**

Figure 2. Housing Prices by Type of Property (*)
(fixed-base index: 2008 = 100)

Apartments   **Houses**

(*) Preliminary results.
Source: Central Bank of Chile, based on IRS data.

The results by geographic area also reveal some important differences (figure 3). The north has grown at a faster rate than the rest of the country starting in the third quarter of 2012. This is due, in part, to dynamic mining investments in the region. A similar trend is found for the eastern sector of the Santiago Metropolitan Region, which has recorded higher growth rates than the rest of the Metropolitan Region since early 2013 (figure 4). This sector is characterized by particularly low inventories and potential land supply restrictions, which could explain the price increase. Finally, in line with the trend at the aggregate level, the house price index has grown faster than the apartment index in East Santiago (figure 5).

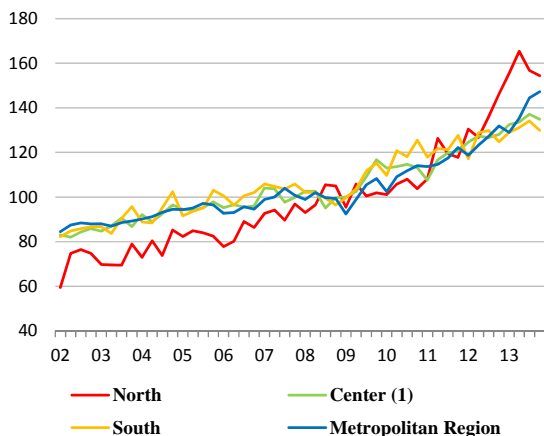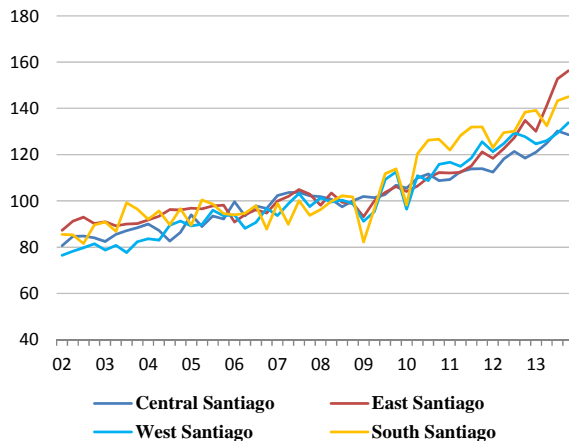*Figure 3. Housing Prices by Geographic Area (*)*
(fixed-base index: 2008 = 100)

North   **Center (1)**
South   **Metropolitan Region**

Figure 4. Housing Prices in the Santiago Metropolitan Region (*)
(fixed-base index: 2008 = 100)

Central Santiago   **East Santiago**
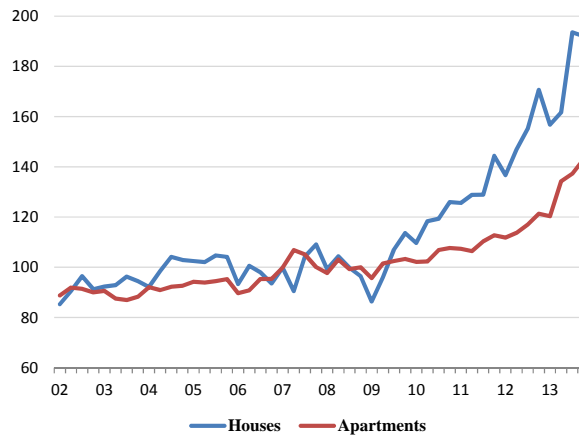**West Santiago**   **South Santiago**

(*) Preliminary results. (1) Excluding the Santiago Metropolitan Region
Source: Central Bank of Chile, based on IRS data.

Figure 5. Housing Prices in the East Metropolitan Region (*)
(fixed-base index: 2008 = 100)

(*) Preliminary results.
Source: Central Bank of Chile, based on IRS data.

5. Conclusions and Extensions of the Analysis

This report describes the methodology and main results of the construction of a housing price index (HPI) for Chile, based on real housing prices taken from the transaction registry maintained by the country's Real Estate Registrars. To construct the index, a calculation methodology was established in line with international practices and with the characteristics of the available data. The results show that the aggregate HPI has grown steadily. However, there is strong heterogeneity in the evolution of prices by groups of housing properties, in particular houses and properties located in the north of Chile and in neighborhoods in the eastern sector of the capital.

The compilation of statistics on the real estate sector, including both residential and nonresidential properties, continues to be a priority in the work agenda of the Central Bank of Chile. Extensions of the analysis presented in this paper will explore the incorporation of new categories for the HPI, such as the legal status of the buyer of a housing property (in order to identify investors), the income segment of the buyer (which is very useful when combined with credit information), the differentiation of new and used homes, and so on. In addition, a quarterly loan-to-value (LTV) ratio is currently being developed and is already being used in financial stability analyses of the sector.

Finally, in the current year, work is being done to extend the price data to include the office market, starting with the Metropolitan Region, and to develop a repository of housing rental transactions. All these efforts are aimed at establishing a set of relevant indicators for adequately monitoring the real estate market.

6. References

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