Data-Based Comparative Analysis of Housing Price per Square Meter Across Regions in South Korea - Including Comparisons with International Metropolitan Areas

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1   Introduction

In recent years, South Korea has been experiencing severe overconcentration in the Seoul metropolitan area, leading to a rapid surge in real estate prices and a widening gap in property values between regions [1]. As population and infrastructure continue to concentrate in the metropolitan area, property prices have persistently risen, while non-metropolitan areas have not showed similar trends. This intensification of regional economic imbalance poses a serious national issue. Such disparities are likely to exacerbate socio-economic conflicts over time and could eventually lead to the disappearance of certain regions and hinder balanced national development. Therefore, this project aims to objectively analyze the current real estate market based on quantitative data.

The primary objective of this project is to analyze the distribution of housing prices per square meter across different regions within South Korea, and to apply the same analytical method to regional real estate data from other countries. Through this, the project seeks to objectively identify and compare the characteristics and degrees of regional price disparities within each country. The main research question is whether there are structural differences in the distribution of housing prices per square meter between South Korea and other countries. Here, "structural differences" refer to distributional features such as mean, variance, skewness, and kurtosis, which reflect the statistical characteristics of regional price gaps.

For the analysis of South Korean real estate prices by region, this project will utilize the Housing Official Appraised Price Data provided by the Ministry of Land, Infrastructure, and Transport (MOLIT). This dataset covers nationwide information on both multi-family and single-family housing, including key variables such as exclusive floor area, appraised price, and administrative location. The data to be analyzed will be based on the most recent available year, and South Korea will be divided into the Seoul Metropolitan Area (Seoul, Gyeonggi Province, and Incheon) and non-metropolitan areas for regional comparison. Comparable datasets from other countries will also be collected, and necessary adjustments will be made using exchange rates or purchasing power parity (PPP) to ensure cross-country comparability.

The dependent variable in this project is the housing price per square meter, while the independent variable is the regional classification. In South Korea, regions will be classified into metropolitan and non-metropolitan areas, and similar classifications will be applied to the datasets from other countries. The project will quantitatively examine whether regional distributions follow a normal distribution or display skewness.

Through this approach, the project aims to evaluate how the phenomenon of metropolitan concentration in South Korea compares to that of other countries and to provide foundational data and direction for future policies regarding balanced national development.

2   Related Works

Recent studies on house price comparison using official valuation systems have applied diverse methodologies to analyze spatial and temporal patterns. In South Korea, cyclical variations in Seoul's housing market are examined using Granger causality tests and vector autoregression models, revealing short-term price impacts on transaction volumes [2]. This aligns with Tehran's housing market analysis [3], which identified spatial diversity in price-transaction ratios through generalized linear mixed models, emphasizing localized factors like employment rates and housing stock attributes. Both studies underscore the limitations of macroeconomic policies in addressing regional imbalance.

The impact of housing policies has been critically evaluated in comparative frameworks. [4] demonstrated that publicly funded rental housing in Korea, particularly purchased units,

stabilizes prices more effectively than private-sector initiatives, highlighting the need for institutional support in supply strategies. This contrasts with other existing mortgage market analyses, which found that low-interest policy loans in Korea reduce prepayment risks in non-metropolitan areas, reflecting regional behavioral differences in housing investment [5].

Collectively, the literature emphasizes two critical insights:

1. Regional price disparities require specified spatial analysis rather than uniform policies.

2. Public-sector interventions show greater price stabilization potential than market-driven approaches.

Based on the insights of related works, we make a hypothesis that regional disparities in South Korea's official housing prices per unit area are significantly greater than those of international metropolitan markets, primarily due to the unique spatial concentration of economic, infrastructural, and policy factors in the Seoul metropolitan area. Throughout this research, we will apply various statistical methods on reference housing price data provided by MOLIT.

3 Application of Statistics [6]

The dataset of MOLIT consists of 22 features, including reference year, reference month, legal district codes, and other property attributes. We focus on administrative region data (such as province, city, and district) and building floor information to calculate the publicly disclosed housing price per unit area (per square meter).

After removing any entries with missing values, we adjust the data for international comparisons. The housing prices are converted using both the exchange rate and the Purchasing Power Parity (PPP). While the exchange rate allows for simple currency conversion, PPP adjustments account for differences in the cost of living and purchasing power across countries. This ensures a more accurate comparison of housing prices, reflecting what citizens can actually afford based on local economic conditions.

Once the data is cleaned and adjusted, we perform point estimation of key parameters such as the mean and variance of unit housing prices, assuming a sufficiently large sample size. To test whether average unit prices differ between countries, we conduct a two-sample t-test. For variations in housing prices across regions within a country, we apply one-way analysis of variance (ANOVA). If the distribution of the data is highly skewed, preprocess the axes with a logarithmic distribution, for example, so that they can be analyzed in a way that resembles a normal distribution.

Finally, we compare the distributions of housing prices between South Korea and other countries using the Kolmogorov-Smirnov (K-S) test. This test will help determine if the distributions of housing prices are statistically similar or different across countries, providing insights into the structure of global housing markets.

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