Examining Inequality in Housing Allocation and Housing Affordability: Evidence from Seoul in Korea*

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** Abstract **

This article proposes that an equality of opportunity to dwell in affordable housing is a key factor for housing welfare in our society. It looks at whether or not inequality of housing allocation is as serious as inequality of income and it examines housing affordability within each income group. Also, the paper proposes a methodological development which uses the logic of income equality measurement, the 10th decile over 1st decile ratio, inorder to estimate inequality of housing allocation. It applies the ratio system rearranged by 5th decile in housing price and income and uses natural logarithms on both sides for the purpose of explaining the main impact bracket of the inequality.

The first finding is that the inequality of housing allocation is as serious as the inequality of household income in Seoul, but the main cause bracket of the inequality in income is a contrast to that of housing allocation. The inequality in income spans a wide range below 5th deciles and that in housing price is due to an excessive gap above 5th deciles. The second finding is that Seoul has a partial disequilibrium problem between supply and demand, what households can actually afford is mismatched with affordable housing stocks. The third finding is that affordability in both the highest and lowest income brackets is poor, because both are twice the PIR threshold (five times) of UN-HABITAT. The final finding is that there is a polarization in housing types. Higher-income households live in apartments, whereas lower-income households live in “Dagagu” and “Dasyedae”, which are small low-priced housing units. Furthermore, the quickening pace of reconstruction projects in Seoul has increased the demolition of relatively low-cost dwellings, thus depriving many of the opportunity to reside in affordable housing.

Keyword: Inequality, housing allocation, affordability, polarization, Seoul, Korea

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I. Introduction

Housing welfare is a key to the government’s health and well-being policies. Because housing stability contributes to labor stability, labor stability leads to added value of industry, and added value promotes economic and social sustainability of cities and communities in turn. To achieve housing welfare, affordable housing has been an important subject for all nations and has received considerable public attention.

When debating the subject of affordable housing, the main issues have centered on the householder’s ability to pay and policy for improving affordability through housing subsidy programs. However, although it is a serious factor in housing welfare for all householders, equality of opportunity to dwell in affordable housing has been overlooked. Because the lack of affordable housing based on income can originally constitute a barrier to affordability and deprive households of the freedom of dwelling in an affordable house, what one would have chosen if one had the choice, is relevant to one’s freedom. Amartya Sen, a winner of the Nobel Prize in Economics, called it ‘counterfactual choice’. Sen (1973) explained that one’s control over the actual process of choice can scarcely be the only reference in the ideas of liberty and freedom, and that characterized equality of opportunities does not amount to anything like equality of overall freedoms. He proposed that a more adequate way of considering ‘real’ equality of opportunities must be through equality of capabilities or through the elimination of unambiguous inequalities in capabilities, since capability comparisons are typically incomplete. Also, Sen (1995) said that equality is not the only social charge with which we need to be concerned, and there are demands of efficiency as well. An attempt to achieve equality of capabilities, without taking note of aggregative considerations, can lead to severe curtailment of the capabilities that people can altogether have. The demands of equality of capabilities need to be seen in the context of the contending claims of efficiency and, in general, of aggregative concerns. Given the motivation underlying the analysis of inequality, it is important not to overlook this momentous perspective.

In this paper, equality refers to having basic abilities and real opportunities in all aspects
of life, including income distribution and housing allocation. This, of course, may not always be desirable or possible, such as when income and housing allocation are generally low or when equal distribution would not produce desirable development outcomes or incentives for growth. However, equity, or the distribution of opportunities such as equal access to health care and education in a manner that is fair and just, is therefore seen as a more appropriate response to growing disparities in societies around the world. Because an excessive distributive polarization of income and housing allocation not only threatens the harmony of cities but also puts the harmony and stability of countries at risk, the issue of equality needs to receive more social attention.

In Korea, Seoul has also joined other major cities in terms of disparities in income and housing allocation. A recently released study by the Seoul City Advisory Committee for the Improvement of Residential Environments (SCACIRE) reported that the most salient issue Seoul faces is the prevalence of unstable dwellings arising from the decreasing number of housing units available for low-income groups, high rents, a gap in housing affordability between income groups, a localized imbalance between the demand and supply of housing through redevelopment, and the increased cost for single and aged households. SCACIRE proposed the development of Seoul’s housing policy strategies to expand the supply of affordable housing units and to increase their affordability. To solve the above problems, Seoul government needs to understand the actual conditions of inequality and affordability in housing, and then tailor-make an affordable housing policy. However, prior research in Korea has used a limited array of perspectives to address affordability issues. The research scope has been mostly a synopsis introducing affordability indices and their measures, rather than comprehensive treatment (Oh, 2001; Ji, et al., 2006; Shin, 2007). On the other hand, previous studies of the issues associated with affordable housing at the global level have suggested various results, which are summarized by three key interventions: the demand side and the supply side and the regulatory (DTZ, 2004, p61). Demand-side interventions are intended to enhance the ability of people to purchase or rent affordable housing (Regional Growth Forum, 2003; Housing NZ Corp, 2004; Katz et al. 2003; AHNRC, 2001). Supply-side interventions are designed to either directly or indirectly increase the supply or
reduce the cost of housing (Katz et al, 2003; AHNRC, 2001; Berry, 2002; RGF, 2003). Regulatory interventions use local government mechanisms to foster the provision of low-income housing, usually as part of a large-scale development (Katz et al., 2003; McKinlay Douglas, 2004; Gallent, 1997; Carmichael et al., 1999; BERL, 1999; Nelson et al., 2003).

This paper focuses on the following research questions in order to help understand the actual conditions of inequality and affordability of housing in Seoul:

1. Is an inequality of housing allocation as serious as an inequality of household income in Seoul?
2. What are the main causes and characteristics leading to the inequality?
3. Does a household’s ability to pay match with existing affordable housing?

The paper aims to investigate whether inequality of housing allocation is as serious as inequality of household income and to examine housing affordability for each income group. Also, the paper aims to develop a methodological approach which is able to measure inequality of housing allocation and find main impact bracket.

II. Methodology and Data

1. Measure of inequality in income and housing allocation

The methodology in this paper is based on an inequality measure used by the OECD: ‘the 10th decile over 1st decile ratio (DDR)’. This can measure the extent to which the distribution of income among individuals or households deviates from a perfectly equal distribution, and can assist in understanding the state of cities with regard to the distribution of income. This paper also applies the logic of DDR to examine the inequality of housing
allocation. We call this the housing price’s 10th deciles over 1st deciles ratio (HPDDR) which is described as equation (2).

\[
DDR = \frac{\text{median income of highest 10\%}}{\text{median income of lowest 10\%}}
\]  
(1)

\[
HPDDR = \frac{\text{median price of highest 10\%}}{\text{median price of lowest 10\%}}
\]  
(2)

However, decile measures of inequality satisfy the transfer principle only in its weak form because any changes in income distribution outside the relevant deciles are not detected by these measures; only the distribution of income between the very rich and the very poor matters, while inequality in the middle plays no role. The paper therefore applies the ratio system rearranged by 5th decile in housing price and income, a method which has been used for many decades in various disciplines such as finance and economics (Lee, 2004). To explain the primary cause of the inequality gap, we divide equation (2) by median price of 5th decile and equation (1) by median income of 5th decile. [B] is the extent of a high-half group among the total inequality [A] in housing price, and [C] is the extent of a low-half group among A as follows:

\[
\frac{\text{median income of highest 10\%}}{\text{median income of lowest 10\%}} = \frac{\text{median income of 10th decile}}{\text{median income of 5th decile}} \times \frac{\text{median income of 5th decile}}{\text{median income of 1st decile}}
\]  
(3)

\[
\frac{\text{median price of highest 10\%}}{\text{median price of lowest 10\%}} = \frac{\text{median price of 10th decile}}{\text{median price of 5th decile}} \times \frac{\text{median price of 5th decile}}{\text{median price of 1st decile}}
\]  
(4)

\[ \frac{[A]}{[B]} = \frac{[B]}{[C]} \]

To transpose [B] and [C] to a percentage, we then take natural logarithms on both sides of above equation 3 and 4 as follow:
2. Measure of Housing Affordability

The PIR and RIR for measuring housing affordability are country-level index. Country-level calculations of PIR often mask the degree of PIR across income groups or housing price groups. That is because national trends cannot explain what is happening in all groups, and the drivers of growth and the reasons for different PIR vary in each group. Therefore, this paper calculates the PIR of each group to determine significant variations in income and housing price distribution in different groups within the same city. PIR for each group is given by:

\[ PIR_{group_i} = \frac{\text{median} P_{price
group_i}}{\text{monthly} \text{median} DI_{income
group_i} \times 12 \text{ month}} \]  

(6)

The rent to income ratio (RIR) is also used for the measure as follows:

\[ RIR_{group_i} = \frac{\text{median} P_{price
group_i} \times JPR \times RJR}{\text{median} DI_{income
group_i}} \]  

(7)

JPR: Jeonse to Price Ratio, RJR: Rent to Jeonse Ratio, JPR is 40% of an average Jeonse to price ratio in 2008 and RJR is 9% of an average rent to Jeonse ratio in 2008. Group is distribution of income and \( i = 1 \) to 10. Here the householder’s income is disposable (DI). DI subtracts income tax (T1), direct tax (T2), and public transfer income (PTI) from gross income (GI).

\[ DI = GI - T_1 - T_2 - PTI \]  

(8)
3. Data

To construct data sets, we set up household income with annual micro-data from the quarterly Household Survey conducted by the Korea National Statistical Office (KNSO) in 2008. In addition, we used the official housing value (OHV) for Seoul property taxes as officially documented in 2008 for housing price data. In Korea, because real contracted housing prices are not announced, many studies have used private price indexes (PPIs) based on the expected prices of houses, as published by private house information companies (Oh, 2001; Ji, et al., 2006; Shin, 2007). Moreover, the PPIs are not price data but index data and have problems that are overestimated and unrealized. Although OHV can be undervalued compared with a real contracted price, OHV is price data and is evaluated by the professional appraisers of appraisal companies and selected by governments. This paper uses OHV. The average mortgage rate data and the rent-to-Jeonse ratio data were from the Korea Housing Finance Corporation.

III. Empirical Results

1. Similar inequality degree and different cause bracket in housing allocation and income

The DDR’ result shows that the level of housing price inequality is as serious as the level of income inequality in Seoul. The DDR of income inequality is 22.8 times and the HPDDR of housing price inequality is 19.5 times. Although the association of the multiples to specific conditions of the DDR and the HPDDR is complicated, we can say that the level of the HPDDR is as high as that of the DDR. The main cause bracket of the inequality in the DDR is a contrast to that of the HPDDR. Table 1 illustrates that the major cause bracket of the total DDR gap is the opposite of HPDDR. DDR’s [C] is 64.8 percent. This shows that
the income inequality originates primarily from a wide difference within the 5th and below deciles; the gap of the low-half income groups is relatively larger than that of the high-half income groups, which is 35.2 percent. On the other hand, HPDDR’s [B] is 64.4 percent. This demonstrates that the housing allocation inequality is due to the excessive gap in housing

<table>
<thead>
<tr>
<th>BRACKET</th>
<th>DDR</th>
<th>ln(DDR)</th>
<th>Percent</th>
<th>HPDDR</th>
<th>ln(HPDDR)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>[A] (10th decile/1st decile)</td>
<td>22.8</td>
<td>3.1</td>
<td>100.0</td>
<td>19.5</td>
<td>3.0</td>
<td>100.0</td>
</tr>
<tr>
<td>[B] (10th decile/5th decile)</td>
<td>3.0</td>
<td>1.1</td>
<td>35.2</td>
<td>6.8</td>
<td>1.9</td>
<td>64.4</td>
</tr>
<tr>
<td>[C] (5th decile/1st decile)</td>
<td>7.6</td>
<td>2.0</td>
<td>64.8</td>
<td>2.9</td>
<td>1.1</td>
<td>35.6</td>
</tr>
</tbody>
</table>

<Figure 1> Frequency in Householder Income & Housing Allocation
prices between high-half price groups; the 5th and above deciles. These results imply that the
difference in income occurs largely between poorer households and that the difference in
housing prices occurs between more expensive houses. These facts result in an excessive
distributive polarization of income and housing allocation (see figure 1). The frequency
distribution of householder income is shown as being fairly even among the full income
range, although the gap of the low-half income groups is relatively larger than that of the
high-half income groups. On the other hand, the frequency distribution of housing is more
concentrated in the higher price bracket in a relatively narrow range.

2. Partial disequilibrium between affordability of household and affordable
housing stocks

The different distribution of frequency in householder income and housing price shows that
poorer households experience decreasing affordability and freedom to dwell in affordable
houses. Low income households face a more serious lack of affordable houses based on
income. Although the housing market has many units in terms of total number, if the income
level of households in need of affordable houses is not commensurate with housing prices,
the lack of affordable houses will be continuous. We can express this conceptually in the
diagram shown in Figure 2, which is created by overlapping two accumulated frequency
graphs showing householder income and housing price. Seoul’s housing supply ratio was
about 94 percent in 2008. However, there is partial disequilibrium between supply and
demand. This is because there is a mismatch between affordability of households and
affordable housing stocks. In Korea, private developers prefer to supply high-priced houses,
which have shown relatively high return rates, in order to obtain high profits. If the size of
A (see figure 2) increases, the probability of Pareto optimality will decrease. If the area of B
is bigger, the unstable dwelling problem will be more serious. Especially, when housing
prices rise, households of A tend to move to houses of B, because their real incomes have
not risen as fast as property values. In cities with many older residents, this has led to a
severe shortage of affordable housing. We call this phenomenon the ‘reverse filtering effect’.
The filtering effect means that when improved houses are supplied in the housing market, that can afford it households move to new houses and, in turn, households having slightly lower incomes move to their old houses. Finally, all households can realize an improving effect. On the other hand, the reverse filtering effect means that when house prices rise and/or real incomes decrease, the upper income households prefer to move to houses that are a level below the housing level they previously occupied. As a result, households having slightly lower affordability face a more serious shortage of affordable housing. Finally, all households can have an unstable dwelling problem. The problem may not be solved by the private sector because affordable housing allocation does not consider the concept of Pareto optimality. This is an issue that Amartya Sen has discussed in his book, Reexamining Inequality. Sen (1980) demonstrated that the Pareto optimality was devolved precisely to eliminate the need for distributional judgments, because Pareto optimality only guarantees that no change is possible such that someone would become better off without making anyone worse off. If the lot of the poor cannot be made any better without cutting into the affluence of the rich, the situation would be Pareto optimal despite the disparity between the rich and the poor. The extent of a person’s deprivation may be substantially muffled in the utility metric, despite the fact that he or she may lack the opportunity even to be adequately nourished, decently clothed, minimally educated or properly sheltered.
3. Highest PIR and RIR in the bottom and the top groups of income: ‘U’ Curve

Figure 3 shows the housing affordability of each income group using PIR between a median price and a median income of each group. They were divided such that the lowest 10 percent comprises Group 1 and the highest Group 10. The result suggests that if households in Income Group 1 wanted to buy housing units in Price Group 1, they would need to save their disposable income (DI) for approximately 9.77 years. In addition, if the same households wanted to buy housing units in Price Group 10, they would need to save their DI for approximately 8.35 years. Even though Group 1’s PIR is more serious than that of Group10, both are at twice the PIR threshold (five times) of UN-HABITAT. According to UN-HABITAT (2003), multiples of more than five times the annual household income makes new market entrants unable to afford new housing, even when good housing finance systems are in place. Figure 4 shows the U Curve of RIR that means the highest RIR is in the bottom and top income groups.
4. Polarization among house types in housing affordability

Table 2 illustrates that the affordability of each house type for homeowners differs severely. Seoul’s housing market has 5 types: apartments, detached houses, row houses, dagagu, dasedai. Apartments are multiple buildings on one site with services such as convenience stores, parking areas, landscaped green areas, 24-hour guards, etc., with a median price of is $280,000. Detached houses and row houses are similar to those in other countries. The median price of detached houses is $156,000, and that of row houses is $116,000. Dagagu is an apartment building under 5 stories in which residents rent units from a single owner, and its median price is $61,000. Dasedai is an apartment building under 5 floors in which each unit is owned individually, and its median price is $88,000. Households below Income Group 5 would be able to afford only Dasedai and Dagagu units. Accordingly, the other housing types would not be affordable to new market entrants. In addition, there would be a clear propensity for Dasedai and Dagagu units because of the wide income gap. Higher income households live in apartments, whereas lower income households dwell in Dagagu units. The polarization between house types has caused another problem in Seoul. In recent years, fifty percent of all new housing units are from reconstruction and redevelopment.
projects. These projects usually involve demolition of small, various, and low-priced housing units (especially dasedai and dagagu), and in 98 percent of the projects only one type of apartment is currently being developed to replace such units. That the number of projects expands quickly implies that the number of old housing units such as dagagu, dasedai, and detached houses is decreasing, thus displacing low-income households. Because the occupants of these places have generally preferred to live in nearby areas, a sudden increase in demand for lower-priced housing in these areas has materialized, resulting in increased prices for both renters and would-be homeowners. Also, affordable housing for low-income households is found mostly in the Northeast and the Southwest, but, during the last four years, the demolition of low-priced housing units has been concentrated in the Northwest, the Southwest, and the Northeast. This fact leads has led to spatial polarization in Seoul (Lee, 2009).

<Table 2> PIR of House Types each Income Group

<table>
<thead>
<tr>
<th>House Type Income</th>
<th>Detached house</th>
<th>Dagagu</th>
<th>Dasedai</th>
<th>Row house</th>
<th>Apartment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 10</td>
<td>1.8</td>
<td>0.7</td>
<td>1.0</td>
<td>1.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Group 9</td>
<td>2.7</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>4.8</td>
</tr>
<tr>
<td>Group 8</td>
<td>3.3</td>
<td>1.3</td>
<td>1.9</td>
<td>2.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Group 7</td>
<td>3.9</td>
<td>1.5</td>
<td>2.2</td>
<td>2.9</td>
<td>6.9</td>
</tr>
<tr>
<td>Group 6</td>
<td>4.5</td>
<td>1.8</td>
<td>2.6</td>
<td>3.4</td>
<td>8.1</td>
</tr>
<tr>
<td>Group 5</td>
<td>5.5</td>
<td>2.1</td>
<td>3.1</td>
<td>4.1</td>
<td>9.8</td>
</tr>
<tr>
<td>Group 4</td>
<td>6.7</td>
<td>2.6</td>
<td>3.8</td>
<td>5.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Group 3</td>
<td>8.7</td>
<td>3.4</td>
<td>4.9</td>
<td>6.5</td>
<td>15.6</td>
</tr>
<tr>
<td>Group 2</td>
<td>13.3</td>
<td>5.2</td>
<td>7.5</td>
<td>9.9</td>
<td>23.8</td>
</tr>
<tr>
<td>Group 1</td>
<td>41.5</td>
<td>16.2</td>
<td>23.4</td>
<td>30.8</td>
<td>74.4</td>
</tr>
</tbody>
</table>

Note: red cells are PIR ≥ 5 times, this is the threshold reported by UN-HABITAT

IV. Conclusions

We concur with the claims that housing welfare is a key to the government's health and well-being policies, and that affordable housing has been an important subject for all nations;
a subject which received considerable public attention in order to achieve housing welfare. This paper proposed that the equality of opportunity to dwell in affordable housing is a serious factor for housing welfare in our society. The remaining question, then, is how to determine. Therefore it sought to investigate whether inequality of housing allocation is as serious as inequality of income and examining housing affordability within each income group. There are some findings.

First, the inequality of housing allocation is as serious as the inequality of household income in Seoul, but the main cause bracket of the inequality in income is a contrast to that of housing allocation. The inequality in income spans a wide range below 5th deciles and that in housing price is due to an excessive gap above 5th deciles. These facts result in an excessive distributive polarization of income and housing allocation.

Second, although Seoul’s housing supply ratio was about 94 percent in 2008, there is partial disequilibrium between supply and demand because there is a mismatch between affordability of household and affordable housing stocks. Also, there is the reverse filtering effect which can cause all households to have an unstable dwelling problem when housing prices rise and/or real income decreases.

Third, affordability in both the highest and lowest income groups is poor, because both are at twice the PIR threshold (five times) of UN-HABITAT. The households in Income Group 1 that wanted to buy housing units in Price Group 1 would need to save their disposable income (DI) for approximately 9.77 years, and the households that wanted to buy housing units in Price Group 10 would need to save their DI for approximately 8.35 years.

Finally, there is a polarization in housing types. Higher-income households live in apartments, whereas lower-income households live in “dagagu” and “dasyedae”, which are small low-priced housing units. Furthermore, the development of reconstruction projects in Seoul has quickly increased the demolition of these latter two types and has deprived additional relatively low-income households of the opportunity to dwell in affordable house.

To resolve the above problems we offer some direction regarding affordable housing policy. Above all, the government should promote policies that will increase the ratio of affordable housing units relative to the total stock by expanding affordable units. This would
involve increasing housing stocks that are below the middle housing price groups and include the expansion of the public rental housing supply and ‘Bogumjari’ houses, which are houses developed and supplied by the government for homeowners in Korea’s middle-income group. It would also involve the extension of ‘SHift’ houses, which are long-term rental units purchased and managed by the Seoul metropolitan government. The rent for these units is approximately 80% of the ‘Jeonse’ price, and the rental period is up to 20 years. For middle-income households, the Shift-type long-term rental units would be more effective, but the government would need large-scale funding to supply SHift units. However, a key success factor is also the funding. Another measure would be purchasing existing housing units, which would require less capital than other direct development measures. Also, the affordable housing stock needs to be expanded by increasing Bogumjari and SHift housing units through incentives in the floor area ratio given to private sector projects. Local authorities would need to build strong working relationships with developers, infrastructure providers, and regeneration agencies to assess the need for housing and to develop effective spatial strategies. They would also need to involve and engage the local community in the planning process for new development projects. They would need to use their own resources and leverage to deliver housing-related infrastructure and services.

In addition, governments need to then control renewal development projects so they are not all concentrated in a given timeframe, in the same life zone, and only during booming economies. For successful control, local governments should establish a complex affordable housing supply plan and monitoring system which can select real construct permit data and apply it to new project decision making processes. Also, the public sector should promote diverse types of housing units for low-income households to be supplied through projects such as the Korean lodging house, the Korean one-room house, and the collective Dasedai.

These findings support continuing policy interventions by national and local government authorities and indicate the need to increase affordable housing units for both sale and rent, thus making housing more accessible for low-income households. In this regard, the central government should prepare a long-term budget plan for affordable housing investment as a social infrastructure. The housing policy architecture for Korea needs to be newly designed.
The government may have to play a significant role in creating the new framework. The key issues revolve around how the nation would finance, plan and manage housing. Such efforts should link local, regional, and national objectives. An effective housing policy should be less concerned with strategic land use planning than with an integrated plan for dwelling area and the delivery of place projects in both regeneration neighborhoods and growth localities. Appropriate vehicles have been created to generate gains from the renewal and infrastructure provision and to capture as much of the gains as possible for local communities undergoing change. An important function would be the allocation of land for affordable and social housing before the start of any development. To deliver successful affordable housing supply policies, Korea would need an effective housing policy system. In this regard, the Ministry of Strategy and Finance should devise a national middle-term finance plan, including affordable housing investment directions. The Ministry of Land, Transport and Maritime Affairs should form a new housing policy master plan to achieve a more responsive housing supply system and to enhance the environment. Further, the respective roles of participants as well as the monitoring, coordination, and evaluation systems should be evaluated and clarified, and local governments should establish detailed implementation and action plans. These concepts have been largely missing in Korea’s housing policies.

References


15. Regional Growth Forum, Auckland Regional Affordable Housing Strategy. Auckland


국문요약

서울 가구의 부담가능능력과 부담가능주택의 불평등 분석

이 논문은 주거복지 실험을 위한 핵심요소로서 부담가능주택에 기후할 수 있는 기회 균등의 중요성을 제기하는데 목적이 있다. 이를 위해 내가지 분석을 실행하였으며 그 결과와 방법은 다음과 같다. 첫째, 소득분배의 불평등만큼 주택할당의 불평등도 존재할 뿐 아니라 심각하다는 것을 10분위분배분을 통해 제기하였다. 둘째, 그 격차내에서도 계층별 영향정도가 소득의 경우와 주택의 경우가 유연히 다르다는 것을 경제학적 비용 개념을 적용하여 개발한 지표에 의해 설명하였다. 즉, 소득분배의 불평등 격차는 5분위 이하에서 64.8%가 주택할당의 불평등 격차는 5분위 이상에서 64.4%가 설명되는데 소득 분배는 소득이 낮은 집단의 격차가 더 크고 주택할당은 주택가격이 높은 집단의 격차가 더 크다는 것을 알 수 있었다. 셋째, 소득과 주택가격의 변동성을 통해 저소득계층의 주택가격계층별 부담가능성에 대한 수급불균형이 심화될 수밖에 없는 여건이라는 것을 보여주었 다. 마지막으로 각 소득계층별 부담가능성을 분석하기 위해 기존 PIR 지표를 소득계층과 주택가격계층을 10개 그룹으로 나누어 동일그룹간의 PIR을 산정하였는데 그 결과 최 저소득-최저가격 그룹인 그룹1의 PIR은 9.77배, 그룹10의 PIR은 8.35배로 두 그룹 모두 UN-HABITAT에서 제시한 PIR의 일제지(좋은 주택금융시장이 형성되어 있는 상황에서 도 신규주택구입이 어려운 정도) 5배 보다 훨씬 큰 것으로 나타났다. 또한 주택유형의 양극화도 나타나고 있는데 낮은 소득 계층의 부담가능 주택은 다세대와 다가구 주택에 한정되어 있으며 상대적으로 저렴한 이들의 주택들이 뉴타운과 재개발사업으로 인해 멸실 되어가고 있어 주택유형의 양극화는 심화된 것으로 예측하였다.