Housing Services and Housing Indicators in the U.S.A.*

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< Abstract >

A consistent measurement of housing services through different time and space is a prerequisite for a sensible housing policy. This paper examines widely accessible housing service indicators in the U.S. According to the indicators, the housing services enjoyed by Americans have been improved substantially on average. The main reason for this improvement can be attributed to the continuously rising income and relative abundance in land supply. Recently, in the metropolitan areas where land supply is limited, price of housing have been increasing quite substantially for the last decade. However, given the low interest rates, housing affordability has not been eroded too much. In case of Korea, a more systematic periodic housing survey may be recommended in order to create data base for sound housing policy decisions. Moreover, more accurate and useful housing price indicators are necessary.

Keyword : Housing Services, Housing Indicators, U.S.A.

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I. Introduction

Housing is an essential element of human existence. Not only it protects from dangerous natural and anti-social elements such as rain, snow, and criminal activities, housing is an anchor to one’s daily lives. It is a place that most of our daily commuting to the workplaces, schools, shopping, and most of recreational activities originates and ends. It is a place where household living takes place as a family unit. Therefore, the satisfaction toward one’s housing (dwelling unit and its neighborhood) is one of the most essential elements of human happiness.

The level of satisfaction toward one’s housing comes from many aspects of housing. First of all, the size, type of facilities, and the quality of the housing unit are important. The size of the space (measured in floor space, number of bedrooms, number of bathrooms, etc) and its quality (measured in the various amenity measures such as working toilets, central air conditioning, architectural style, craftsmanship, etc) are major determinants of residential satisfaction. Also, the size and quality of lot sizes (or exclusive outdoor space available to the residents) matter. But, in many cases, the surrounding neighborhood is an important element of resident’s housing satisfaction. Not only its accessibility to the resident’s other activities (such as workplace, shopping, and so on), the characteristics of physical surroundings as well as other residents affect one’s residential satisfaction significantly.

Obviously, it is difficult to summarize this multi-dimensional aspect of housing service into a small number of aggregated statistics. However, a consistent measurement of housing services through different time and space is a prerequisite for a sensible housing policy. After all, those policies are aimed to improve housing satisfactions by the constituency. In this regard, efforts in building and refining housing service indicators will payoff in the long run.

The main purpose of this paper is to overview the level and the trends of housing services in the U.S.A. by making use of several housing service indicators. We would like to define and analyze several housing service indicators that may reflect important changes of housing services from readily available data sources. By doing so, the paper also wants to provide some broad implications for Korean housing policy. Over the last several decades, Korean
government has focused its attention to the expansion of housing supply without much consideration of the level of housing services that it provides. The natural consequence of such supply-based policy is that the key indicators of housing have been the number of existing and newly constructed housing units. Indicators that reflect the housing services provided have not gained much attention. The focus on housing service indicators will shift the attention from the supply side to the demand side of the housing market. The consideration of comprehensive housing service indicators in the U.S. would provide a wider viewpoint than the single-mindedness of quantity expansion. Also, it would give us a better perspective in evaluating the nation’s performance in the housing sector compared with other countries.

The structure of the paper is as follows. First, we will start off by creating some housing service indicators. Certainly, we do not claim that it is the exhaustive list. Rather, they are the ones that can be constructed most easily. Next, we will examine the level and trends of these indicators. Such exercise will help us to understand the improvement of housing condition that has happened during the last decades from a consumers’ perspective. Then, we will try to explain the socio-economic and political factors that may have caused the changes. Finally, we will suggest some policy implications to Korean housing sector that arise from the analysis.

II. Definitions and Data Sources of Housing Service Indicators

Since housing provides a variety of physical, social, and economic functions, the choice and definitions of housing service indicators should reflect the various important functions that housing provides. Namely, the housing indicators should not only reflect how functional the housing unit is in terms of physical convenience, but it also should be able to tell something about social and economic functions of the unit in the context of changing socio-economic environment.

However, one of the primary considerations in the choice of housing service indicators is the data availability. Even though we could envision a number of sensible housing service in-
icators that may reflect the level of housing services in the U.S.A., the number of indicators that we could adopt in this study is limited by easy access to the data. We have relied on several data sources for making the indicators. The most important data source is the American Housing Survey (AHS). The AHS has been carried out since 1985. Before 1985, it had been carried out annually by the name of Annual Housing Survey between 1973 and 1983. Naturally, the indicators from 1973 to 1983 have been made from data included in the Annual Housing Surveys, and the indicators since 1985 have been made from data included in the AHS. However, the data in the Annual Housing Survey are more restricted than those in the AHS. Because of these restrictions, about 8 indicators have been made for 1973 to 1983.

Previous to the Annual Housing Survey, no comprehensive housing surveys had been conducted. However, we used data included in the Census that has been conducted decennially in order to make indicators between 1940 and 1970. We can generate only 5 indicators between 1940 and 1970 because of the availability of data. We have used data for population, family, and household from the Current Population Survey that the Census Bureau has conducted every year since 1940s. For housing price and affordability information we obtained data from the National Association of Realtors (NAR, www.realtor.org) and the Office of Federal Housing Enterprise Oversight (OFHEO, www.ofheo.gov).

Overall, we decided to make use of 17 housing service indicators. Moreover, we have classified the 17 indicators into 5 groups according to their characteristics. Classifying the indicators will benefit us because it will allow us to grasp more easily the housing service conditions in the Unite States.

The first group, “Quantitative Indicators”, is a set of indicators that show the quantitative aspect of housing services. From the quantitative indicators, we can acquire information about amount of housing services provided to people. There are four quantitative indicators - “Units per 1,000 Persons”, “Units per Family”, “Square Meters per Unit” and “Square Meters per Person”.

The second group is a set of indicators related to the qualitative level of housing services, which we call, “Qualitative Indicators”. These indicators let us know about the quality of the
housing services. The following are the four qualitative indicators that we used: “Homeownership Rate”, “Rate of Households in Unsuitable Unit”, “Rate of Households Unsatisfied with Neighborhood”, and “Rate of Inadequate Units”.

The third group is a set of indicators that shows the economic and financial aspects of housing. We will call this group “Economic Indicators”. The first of these indicators is the “Housing Price Indicator”. The rest of these indicators show how high the housing cost relative to income is. The following are the five indicators of housing cost burden: “Housing Affordability Index”, “Price to Income Ratio (PIR)”, “Rent to Income Ratio (RIR)”, “Payment to Income Ratio (PTI)”, and “Loan to Value Ratio (LTV)”.

The fourth group, called “Indicators of Resident Stability”, is a set of indicators that shows how stable people’s residence is. These indicators deal with the issue of how often people move and why they move. The following are two indicators that we have made as the indicators of resident stability: “Resident Moving Rate” and “Compulsory Moving Rate”.

The fifth category is an indicator that shows inequality in housing service consumption across different income classes. We call this group “Indicators of Inequality in Housing Service Consumption”. We can measure the inequality by using indices such as Gini coefficient or Theil coefficient. Alternatively, the inequality can be measured by the proportion of households that do not have access to acceptable units. Acceptable units are the housing units that are ‘adequate’, ‘suitable’, and ‘affordable’. An adequate unit does not have any severe problems in structure and function (such as leaky roof or no working toilets), and therefore, it is not adequate for people to live in. A suitable unit is one that has enough rooms to accommodate the household. An affordable unit is the one whose cost (including utility cost) is not too burdensome (generally 30%). However, we calculated only Gini coefficient as the indicator of inequality in housing service consumption because of the restriction of available data.

In the following, we give the operational definition of each indicator:
1. Quantitative Indicators

1) Units per 1,000 Persons

This indicator shows us how many housing units exist in comparison with the number of people in a country. This measure roughly reflects the adequacy of housing supply in comparison to the size of population without any regards to household size or the housing unit size. The existing units in the U.S.A. consist of seasonal units and year-round units. Seasonal units can’t be counted as primary housing units, because they are places that people stay in temporarily, e.g. log cabin, hut, or cottage during the summer or winter vacation. In the U.S.A., units that can be counted as houses are year-round units\(^1\). Therefore, we define the ‘Units per 1,000 Persons’ as follows:

\[
\text{Units per 1,000 Persons} = \frac{\text{Year round Units}}{\text{Resident Population}} \times 1,000
\]

2) Units per Family

The above-mentioned indicator, ‘Units per 1,000 Persons’, does not reflect the household or family size. For example, if the average household size is bigger, the number of housing units needed to house the population would be smaller. It is a family or a non-family household\(^2\) will needs a housing unit. Since non-related households (e.g., roommates and housemates) can be formed endogenously depending on housing prices, we did not consider the non-related households.

This indicator, ‘Units per Family’, shows whether the stock of units in a country satisfies the demands for units. Therefore, we define this indicator as:

\[
\text{Units per Family} = \frac{\text{Year-round Units}}{\text{Families and Non-Family households}} \times 100
\]

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1) From now, we regard every unit in an apartment or condominium as a housing unit.
2) Non-family household is an adult who lives alone without family.
If total housing units are equal to the number of families, the indicator will become 100%. However in order to cope with the demand for units, the indicator may not be exactly 100%. The first reason is that there are always vacant units due to frictional factors. The second reason is that non-related households may be formed or dissolved in part due to the changes in housing market. For example, in general, higher housing price encourages the formation of non-related household, sometime doubling-up families.

3) Square Meters per Unit

This indicator shows how large the average size of units is. When the average size becomes larger, it is likely that people can have a chance to use more space and to spend better quality of housing services than before. The US Census Bureau publishes median square feet of units every other year. If we change square feet to square meters and employ median instead of mean, we can use the data directly. However, the data have a problem. It is calculated on the basis of single detached and manufactured houses, not on the basis of all units. Usually the size of a single detached and manufactured house is larger than one of other type of houses. Therefore, it is likely that the indicator overestimates the median size of housing units in the U.S.A.

4) Square Meters per Person

This indicator shows the average size of space that residents occupy. If the average size of space becomes larger, quality of housing services that people enjoy would become greater.

The US Census Bureau publishes median square feet per person every other year. Like the above indicator, we can use this data directly if we change feet to meters and employ median instead of average. However, this indicator also would overestimate the size of space per person because the data is made on the basis of single detached and manufactured houses like the above-mentioned data.

3) For example, there can be houses that have been vacant for a limited period because owners of the houses could not find appropriate renters or buyers even if the demand for units exceeds the supply of units.
2. Qualitative Indicators

1) Homeownership Rate

This indicator shows the proportion of households who own the housing unit that they occupy. A household with homeownership is one that lives in the one's owned unit (owner occupied). It is not an indicator that shows how many households own housing units. In the U.S.A., the number of owner-occupied households is equal to the number of occupied units in which the owner is living⁴). Thus, we define the 'Homeownership Rate' as follows:

\[
\text{Homeownership Rate} = \frac{\text{Owner-Occupied Units}}{\text{Occupied Units}} \times 100
\]

2) Rate of Households in Unsuitable Unit

This indicator shows how many households live in unsuitable units. An unsuitable unit is the housing unit that has not enough rooms to accommodate household persons. The higher the rate is, the lower the quality of housing services in a country is.

However, it's not easy to measure how many unsuitable units exist in a country. Whether a unit is suitable or unsuitable depends on genders and ages of household persons, relationship among household persons, and the number of household persons. For example, a suitable unit is usually supposed to have rooms for each couple and each independent adult. And a suitable unit is expected to have rooms for each child with different gender.

The US Census Bureau does not survey how many units are unsuitable. Therefore, we have to find another data that approximates the amount of unsuitable units. Fortunately, the Census Bureau has published the amount of occupied units by persons per room at 0.5-person intervals. We can guess that the more persons per room a unit has, the higher opportunity that the unit is unsuitable there is.

The highest class of classification by persons per room is '1.51 or more persons per

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⁴) Occupied units are composed of owner-occupied units and renter-occupied units. Owner-occupied unit is one in which owner is living, renter-occupied unit is one in which renter is living.
room'. We have used the amount of occupied units with '1.51 or more persons per room' instead of the amount of unsuitable units. We define the 'Rate of Households in Unsuitable Unit' as follows:

\[
\text{Rate of Households in Unsuitable Unit} = \frac{\text{Occupied Units with 1.51 or more Persons per Room}}{\text{Occupied Units}} \times 100
\]

3) Rate of Households Dissatisfied with Neighborhood

This indicator shows how many households are dissatisfied with their neighborhoods. If a person is living in the area where the rate is high, one may enjoy low qualitative housing services. This indicator is a based on the subjective judgments by the respondent.

The Census Bureau in the U.S.A. has made a survey about overall opinion of neighborhood in AHS. The neighborhood is included all of the environmental factors for residence, e.g., noise, smell, transportation, education, crime, public services, etc.

In this survey, an overall opinion of neighborhood is evaluated from 1(worst) to 10(best). We have regarded households who give their own neighborhood 1 or 2 grade as households dissatisfied with neighborhood. With this measure, we would like to measure the proportion of households that are deeply dissatisfied with their neighborhood. In our opinion, 1 or 2 grade would reflect the deep dissatisfaction. We define the 'Rate of Households Unsatisfied with Neighborhood' as follows:

\[
\text{Rate of Households Dissatisfied} = \frac{\text{Households Dissatisfied with Neighborhood}}{\text{Occupied Units}} \times 100
\]

4) Rate of Inadequate Units

This indicator shows how many units are inadequate. An inadequate unit is one that has severe physical problems so that it is not adequate for people to live. If there were so many inadequate units in a country, quality of housing services that people enjoy would become
lower than those of other countries.

The US Census Bureau surveyed how many units with severe physical problems are. The operational definition of inadequate housing unit includes housing units without any direct exit to outside, indoor water plumbing, or no toilet facility with water flush. We have regarded units with severe physical problem as inadequate units. Therefore, we define the ‘Rate of Inadequate Units’ as follows:

\[
\text{Rate of Inadequate Units} = \frac{\text{Occupied Units with Several Physical Problems}}{\text{Occupied Units}} \times 100
\]

3. Economic Indicators of Housing

1) Housing Price Indicator

Housing price is an important indicator in the housing market. Although the price itself does not tell you much directly about the housing service delivered. It serves the two main functions. First notion is the idea of “price of housing” from the perspective of consumption of housing. Unlike usual reproducible goods, housing units needs lands, which are not reproducible. Therefore, it is common that as the urbanization intensifies and income level of the society rises, housing price naturally increases, because more urbanization and higher income increase the demand for land. Therefore, how much housing service can be bought depends on the level of housing price. Obviously, holding other things constant, the higher the housing price, the smaller the housing service can be bought with the same money.

The second notion that is related to housing price is the asset value of housing units. Since housing is the major vehicle for wealth accumulation and a primary source for holding asset, the price level of housing indicates the level of wealth of the society. In general, the level of housing price is determined by many factors including the changes in size of population, number of families, income level, land supply, construction capacity, and interest rates for mortgage and construction.

There are three widely used housing price indexes in the United States. The first one is by
National Association of Realtors (NAR). It tracts the median price of homes sold in various metropolitan areas monthly and quarterly. Since NAR has a ready access to the most housing market activities such as Multiple Listing Services (MLS), the index is quite timely, and consequently used widely in public arena. However, the NAR index does not adjust for quality differences of the housing units sold during the period. Over time, there has been a significant improvement in housing quality, but NAR's simple index does not capture the improvement. Consequently, NAR index is likely to overestimate the price appreciation over time.

The Office of Federal Housing Enterprise Oversight (OFHEO), which oversees major housing financial institutions such as Fannie Mae and Freddie Mac, recently started to publish quality-adjusted housing price indexes. Their index is based on the repeated-sales method of the single family houses up to the range of approximately $350,000 price range. The repeated sales method estimates the price changes by considering only the units that are sold multiple times during the estimation period. Although, it is conceivable that a totally different method such as the hedonic price index can be done, the less data requirement of the repeated sales methodology has been adopted by the OFHEO.

Although OFHEO index takes into account the quality differences, the sample is limited to the low and middle price ranges. In high-price regions, the sample selectivity bias can be quite significant. For example, in California, less than 20 percent of homes sold are in the OFHEO sample. It is common that the higher-priced houses appreciate faster in the boom period and depreciate more in the slump period. Therefore, OFHEO is likely to overrepresent the housing units in low and middle price ranges. The initial designer of repeated sales methodology, Karl Case and Robert Shiller, corrected the sampling bias of the OFHEO index in order to reflect better representation of the housing units in the whole price range. The Case-Shiller index gained quite a popularity among business world since the was bought by Fiserv CSW, Inc. in 2002 (CSI, Case-Shiller Index).

2) Housing Affordability Index

The most commonly used affordability index is NAR national affordability index for all
Buyers. This index measures actual median income relative to the income needed to qualify to buy a median priced home with 20 percent down at the average conventional mortgage rate. The qualification of mortgage is determined housing finance companies such as Fannie Mae. Typically, the two commonly used qualification rule is that the monthly income must be greater than 28% of the sum of the monthly mortgage and property tax payment or greater than 35% of the sum of the monthly mortgage, monthly tax, and other monthly debt payments (such as credit card, school loan, or alimony payments). Therefore, the housing affordability index depends on not only the house price, but income level and the prevailing mortgage interest rates. Higher value in the NAR affordability index means that consumers are more able to afford homes.

\[
\text{Housing Affordability Index} = \frac{\text{Median Household Income}}{\text{Income Needed to Qualify Median Value House with 20\% down at Current Mortgage Rate}}
\]

The introduction of adjusted rate mortgages (ARM) in the end of 1970s made the amount of income needed to qualify the same-value house greater than the conventional fixed rate mortgages, because the former shifts the risk of interest rate fluctuation from lenders to borrowers. When there is a substantial rate difference between ARM and the fixed rate mortgages, the affordability index may differ to that extent. The “Composite” housing price affordability index take into account the composition of fixed and ARM mortgages together.

3) Price to Income Ratio (PIR)

This indicator shows the level of a housing price is in comparison with the household income. If the ratio were high, people would have hard time to buy houses. It is defined as follows:

\[
\text{Price to Income Ratio} = \frac{\text{Value of House}}{\text{Household Income}}
\]
However, it’s not easy to measure the ratio. First of all, we face difficulty in pricing houses because houses are not traded frequently. And it’s difficult to get data for household income because sources of household income are various.

Fortunately, the Census Bureau has published median ratio of value to current income in the AHS. In the AHS, value means housing value that the owner estimates subjectively. And current income means household income except non-family income. Therefore, the ratio of value to current income can be regarded as the ‘Ratio of Price to Income’. So, we use this ratio as the ‘Price to Income Ratio’.

4) Rent to Income Ratio (RIR)

This indicator lets us know how much the rent that a renter has to pay is in comparison with the household income. The higher the ratio is, the heavier the burden of rent that a renter has to pay is. It is defined as follows:

\[
\text{Price to Income Ratio} = \frac{\text{Rent}}{\text{Household Income}} \times 100
\]

But it is difficult to measure accurately how much a rent is because a contract rent that renter pays includes often utilities cost or realty tax as well as rent for the housing unit only. Fortunately, the Census Bureau has surveyed “Monthly Housing Costs as Percent of Current Income” in the AHS. Housing costs includes utilities cost as well as pure rent. We use this ratio as the “Rent to Income Ratio”.

5) Payment to Income Ratio (PTI)

In the U.S., a substantial portion of households who buy their houses get mortgages. Usually households who have mortgages on their houses pay back their mortgages by making monthly payments (interest and principal amortized) over a long time (up to 30 years). This indicator shows the financial burden of mortgage for the households who have existing mortgages. This ratio is defined as follows:
PTI = \frac{\text{Monthly Mortgage Payment} \times 12}{\text{Family Income of Owner-Occupied Household with Mortgage}} \times 100

The Census Bureau has surveyed mortgage payment in the AHS. Also, it has published family income of owner-occupied household with mortgage. We can measure the ratio by using the data.

6) Loan to Value Ratio (LTV)

As we mentioned on the above part, banks take borrower’s income into consideration when they determine an amount of mortgage. The loan to value ratio is the ratio of the mortgage loan amount to the value of the house, which is defined as follows:

\text{LTV} = \frac{\text{Outstanding Mortgage}}{\text{Value of House}} \times 100

Like the above-mentioned ‘PIR’, it is not easy to measure this ratio because it is difficult to find value of a house. Fortunately, the Census Bureau has surveyed the ‘Current total Loan as Percent of Value’. We can use this percentage as the ‘LTV’. However, current total loan includes the loan of an old owner-occupied household as well as the loan of a new owner-occupied household. Usually the ‘LTV’ of an old owner-occupied household decreases because of amortization of the loan. We need the ‘LTV’ of households newly bought homes. Luckily, the Census Bureau has also published “Current Total Loan as Percent of Value” of household recently moved. A Household with Homeownership that recently moved may be a household purchased a house recently. So we use this indicator as the ‘LTV’.

4. Indicators of Resident Stability

1) Resident Moving Rate

This rate is an indicator that shows how long households have lived in an area or how often they move. The higher the rate is, the lower the residential stability is. The Census
Bureau has surveyed whether a household has ever moved within the past year. We use the data in order to measure the ‘Resident Moving Rate’. We define the rate as follows:

\[
\text{Resident Moving Rate} = \frac{\text{Households moved within the past year}}{\text{Occupied Units}} \times 100
\]

2) Compulsory Moving Rate

We define 'compulsory moving' as having to move apart from one's own will. For example, moving by landowner’s request when the resident does not want to move, is regarded as a kind of compulsory moving. The Census Bureau has surveyed the main reasons of moving from households moved within the past year. Among the main reasons, we regard moving by the following reasons as compulsory moving.

- Private displacement: moving by landowner’s demand
- Government displacement: moving by government’s demand
- For the lower rent: moving because the resident wanted a lower rent

We define the ‘Compulsory Moving Rate’ as follows:

\[
\text{Compulsory Moving Rate} = \frac{\text{Households moved compulsorily with recently 1 year}}{\text{Households moved with recently 1 year}} \times 100
\]

5) Indicator of Inequality in Housing Service Consumption

As we mentioned on the above part, we measure only Gini coefficient as the indicator of inequality in housing service consumption. In order to measure Gini coefficient, we need data on the amount of housing services that people spent and the amount of households by income classes. Fortunately, the Census Bureau has published ‘households by family income and square feet per person’. Multiplying square feet per person by households, we can obtain quantity of square feet by income classes. Therefore we can calculate Gini coefficient by using these data.

However, these data has a weakness. These data are based on detached single-family
houses. Usually a detached single-family house is occupied by an owner, not by a renter. Inequality in housing service consumption among owners is lower than that among renters. Therefore, there is a possibility that the data based on detached single-family houses make inequality underestimated.

We calculate “Gini Coefficient” by the following formula:

\[ GI = 1 - \sum (Y_i + Y_{i+1})(N_i - N_{i+1}) \]

\[ Y_i = (f_1 + f_2 + \cdots + f_i)/f \]

\[ N_i = (h_1 + h_2 + \cdots + h_i)/h \]

\( f_i \): square feet that households belonged in ith income class use

\( f \): total square feet

\( h_i \): households belonged in i-th income class

\( h \): total households

III. The Status and Trends of Housing Services in the U.S.A.

The housing service indicators for 1970 to 2003 are shown in the <Appendix 1>. We also arranged the indicators by owner/renter in the <Appendix 2>. The indicators prior to 1970 would be referred to in our explanation of the features of the indicators.

1. Features of Housing Services in the U.S.A.

For the last five decades, housing services in the U.S.A. have been improved continuously. We think there are three turning points in the trends: late 1960s/early 1970s, mid 1980s, and late 1990s/early 2000s.

For example, the quantitative indicators have shown that the housing services in the U.S.A.
are getting better quantitatively. Both of the ‘Units per 1,000 Persons’ and the ‘Units per Family’ have shown increasing trends. Also the ‘Square Meters per Unit’ and the ‘Square Meters per Person’ are increasing continuously (see the <Appendix 1>). These trends can be found on both of the owner group and the renter group. Both of the ‘Square Meters per Unit’ and the ‘Square Meters per Person’ are increasing even in the renter group as well as in the owner group (see the <Appendix 2>).

Moreover, the <Figure 1>, which shows the long-term series of the ‘Units per 1,000 Persons’ and the ‘Units per Family’, lets us know that there are changes in the trends on the late 1960s/early 1970s and mid 1980s. Both indicators are increasing slowly until 1970. But they are increasing fast from 1970 to mid 1980s. Finally, they are stable after mid 1980s. Also, in the <Appendix 1>, we can observe that both indicators have declined slowly since early 2000s. However, it is not obvious whether this trend will continue.

![Figure 1: Trends of the quantitative indicators](image)

*left y-axis: Units per 1,000 Persons
  right y-axis: Units per Family (%)*

In the qualitative indicators, the ‘Homeownership Rate’ shows a remarkable change. In 1945, the rate was 53.2%. But the rate has increased to 68.2% in 2003. Even though the rate declined a little in 1980s, it has shown a long-term increasing trend. Owning one’s home has
been considered a part of the 'American Dream'. In 2003, 7-in-10 households in the United States owned their own homes; in 1940's, only one half owned their homes.

Generally, homeownership encourages the households to improve their neighborhood. The <Figure 2> shows the relation between homeownership and quality of neighborhood. In the <Figure 2>, we can find that the 'Rate of Households dissatisfied with Neighborhood' is moving in inverse direction to the 'Homeownership Rate'. The inverse correlation between them is so close that the correlation coefficient is -0.79. Especially, the 'Rate of Households Dissatisfied with Neighborhood' has declined fast since late 1990s when the 'Homeownership Rate' started to increase over 67.0%.

![Figure 2] Rate of Owner-occupied Units and Rate of Households Dissatisfied with Neighborhood

The 'Rate of Households in Unsuitable Unit' also has declined although the direction of the moving of the rate is not obvious from 1980s. The post-1980 trend shows different pattern depending on data source. The data from census data has increased slowly, but the data by the survey has declined slowly (see the <Figure 3>).

The trend of this rate seems to be related to the trends of the quantitative indicators. We
can infer that if houses are supplied enough, a household could have more opportunity to find a suitable unit. Practically, the 'Rate of Households in Unsuitable Units' shows close inverse correlation with the 'Units per 1,000 Persons'. The correlation coefficient between them is -0.91.

![Figure 3] Rate of Households in Unsuitable Unit by Data Sources

The 'Rate of Inadequate Units' is stable at around 2.0 percentage point. It means that although buildings are getting older, building owners keep good condition through continuous maintenance. However, the rate of the renter group is different from that of the owner group. The rate of the owner group has declined slowly. On the contrary, the rate of the renter group is stable or has increased slowly.

*Figure 4* shows the changes in price of the four major assets: housing, bonds, stocks, and Real Estate Investment Trust (REIT). For the last ten years, the four major assets exhibit quite different patterns. During the late 1990s, there has been a tremendous boom in equity market, mainly fueled by internet bubbles. The stock market has dropped sharply between 2000 and 2003, after which it has started to increase again. On the other hand bond market and housing has shown a steady increase. During the late 1990s, the bond market shows higher appreciation than the housing market. Since 2003, however, housing shows higher growth than the bond market. The REIT shows a pattern what are quite different from stocks, bonds, and housing.
<Figure 4> Trends in four major assets

Source: Chicago Mercantile Exchange, Inc.

<Figure 5> Quality-Adjusted Housing Price Index by U.S. Census Division

Source: The Office of Federal Housing Enterprise Oversight (OFHEO), www.ofheo.gov
<Figure 5> shows the changes of housing price for the longer time period. The index is from the OFHEO, which used repeated sample methodology to adjust for the quality changes in housing prices. Between 1975 and 1984, housing prices in the U.S. has been quite stable. During the mid-eighties, there has been a housing bubble first in the New England and Middle Atlantic states, but California started to catch up later. The housing boom in the late eighties was followed by the housing bust during the nineties, but there has been an acceleration of housing prices since 2000.

However, the housing price changes in the U.S. are very region-specific. According to <Figure 6> which depicts the Case-Shiller Index for the 10 major metropolitan housing market, during the period of 1990 and 2005 (the last bust-then-boom period), the housing price in Denver has been increasing steadily. On the contrary, the price in Los Angeles declined substantially during the bust period, but rise much more substantially in the boom period. The regional variations in housing price changes reflect the demand and supply of housing stock are very different across cities.

*Figure 6* Case-Shiller Housing Price Index for Major US Cities

Source: Chicago Mercantile Exchange, Inc.
<Figure 7> shows the change in the national housing affordability index. Based on the observation that housing prices can vary greatly across metropolitan areas, the housing affordability indexes are also very different across areas. The Figure above only shows the national trend. There has been a sharp decline in the affordability index during the 1970s. The decline is due to the two factors: rising interest rates and lowering income as the US economy adjusted for the supply shock caused by the OPEC petroleum embargo. As the interest returns to single digits, the affordability index record a steady increase even when the housing price started to increase during the mid-1980s. The recent housing boom that started in 2000 does not decrease housing affordability index very much as the interest rate has been quite low for the time period. However, there has been a noticeable deterioration of the affordability index due to the continuously rising mortgage rates for the last two years. However, the affordability index is still relatively high from a longer time perspective.

In the indicators of housing cost burden, the ‘PIR’ and the ‘LTV’ are stable. For example, the ‘PIR’ was on the whole stable at 2.3 more or less times until 1990s. From 2001, the ratio has increased because of a rise in housing price fueled by low interest rate and rising
housing demand. The ‘LTV’ is stable at 75% to 80%.

The ‘PTI’ has increased slowly from 10.8% in 1985 to 13.5% in 2003. However, the level is not so serious that households with mortgage fail to pay their payments. The ‘RIR’ also has shows steady increase from 24% in 1973 to 30% in 2003. It seems to result from a rise in rent according to improvement of housing service quality. But the housing cost burden of renters seems to be on the maximum that renter can pay.

In the indicators of housing stability, the ‘Residential Moving Rate’ has declined from 29.3% in 1975 to 15.9% in 2003. The rates by owner/renter have shown the similar trend. The ‘Compulsory Moving Rate’ has shown an increasing trend. However, it’s not sure whether the trend will continue.

As the last indicator, the ‘Gini Coefficient’, which is an indicator of inequality in housing service consumption, has continuously declined. Moreover, the level of inequality is very low. Of course, we must recall that the inequality could be underestimated because the coefficient has been measured from the data based on households in single-family house.

2. Determinants of the Changes in Housing Service Indicators

We think that there are several factors that may influence the housing service indicators. First, housing demand is determined by the changes in population structure and household formation. The U.S.A. has experienced sudden growth of population from 1945 to late 1950s. After the World War II that ended in 1945, many soldiers returned home and started a family. The so-called baby-boom started at that time. After the baby-boom period, there was another smaller baby-boom in 1980s which represents that the baby boom generation got married and had babies. These babies are called a baby-boom-echo generation (see Figure 8).
Population growth is followed by family and non-family household growth with the interval of about 25 years. When children become independent adults, non-family households increase. Subsequently, when they get married, families increase. Practically, the U.S.A. has experienced fast growth of family and non-family caused by the baby-boom generation from early 1970s to early 1980s. It seems that growth of family and non-family begins to rise again from early 2000s. We think that the growth may be caused by the baby-boom-echo (children of baby-boom) generation.

However, household formation also depends on the economic prosperity. During the economic boom, it is common that more young adults become independent and live away from their parents. With better economic conditions, single householders need fewer roommates and housemates. On the contrary, in economic difficulty, less household formation is observed.

The general economic condition also affects housing demand directly (that is, not indirectly via more household formation). Higher income encourages home ownerships and larger and more expensive houses. If the housing supply is perfectly inelastic, higher demand will be directly translated to higher housing prices. But as long as the housing supply is not perfectly inelastic, more housing will be supplied as the price of housing increases. Therefore, the rise in housing price will depend on how elastic or inelastic housing supply is in the housing
market. For example, if the city is completely built up and the supply of land is limited, housing supply will be more inelastic, therefore housing price will appreciate more during an economic boom. On the other hand, if the city has abundant land supply, housing supply will be relatively more elastic, and the higher demand in housing will encourage more construction with relatively low housing price appreciation.

Interest rate, particularly long-term interest rates plays a very important role in the housing market. Low interest rate encourages borrowing for housing purchase or refinancing. Given the same housing price, lower interest rate implies lower monthly payment. Therefore, lower interest rate will increase housing demand. Although lower interest rate reduces the cost of housing construction, thereby increase housing supply. However, the impact of interest rate on housing supply would be slower and smaller than more direct and immediate impact on housing demand. Therefore, lower interest is rate is commonly associated with housing boom (particularly, more appreciation of prices).

The long-run improvement of housing services in the U.S.A. can be mostly attributed to the rise in income and relative abundance in land in the U.S. Although, cities in the Northeast, Mid Atlantic Region, and California are characterized with constrained additional land for building more housing, cities in the South and Midwest have still have great deal of land suitable for urban development. Therefore, the rising income have increased housing services in the Midwest and the South without raising housing prices, while cities in New England, Mid Atlantic states, and California experienced a big price appreciation along with improving housing services.

Housing and land policies may affect the housing services. In the U.S., land policies are mostly controlled by local governments. Although some governments restrict urban development in order to prevent urban sprawl (rapid low-density urban development), the competition among local governments to increase property tax revenues by more houses in the jurisdiction typically ensures relatively flexible land supply unless there are natural limitations such as lack of water as in California.

The biggest federal housing policy in the U.S. is the subsidy given to homeowners through preferential tax treatment of mortgage interest and property tax. They can be deducted from
the federal income tax. For practical purpose, it affects all homeowners. Since the households with high income tend to own more expensive homes and they have higher marginal tax rate, such housing subsidy is greater for households with higher income.

Another important housing policy is the low income housing subsidies. Approximately 3,300 Local Public Housing Authorities (LPHA) in the U.S. own 1.3 million housing units. Each LPHA operates their stock individually at subsidized prices. Second, the Department of Housing and Urban Development (HUD) provides housing vouchers to about 2 million household. The housing voucher program is a cash subsidy that can only be used for housing expenditures to qualified households. Third, since 1986 the federal government runs Low Income Housing Tax Credit program. The program gives tax incentives to the developers and local government when they meet certain conditions in the provision of housing units specifically set aside to low income households.

IV. Conclusions and Policy Implications to Korea

Various housing service indicators reflect substantial positive changes that happened during the last several decades in the U.S. More housing units are supplied, and more housing units have better amenities. Crowding has decreased and substandard units have been declining. The main force behind this aggregated improvement in housing conditions is the economic growth. Higher income allows the residents to demand more housing with better quality. The supply response has been successful as well. In the region where land supply is not severely constrained, housing supply has been fairly elastic resulting in modest housing price increases reflecting increase in construction cost. However, in the region where land supply is constrained, housing price appreciation has been much faster than the income growth. However, even in the region where housing price has gone up, the affordability of housing has not been seriously jeopardized.

However, such aggregate evaluation would not hold uniformly across different regions and socio-economic classes. Although we have not dealt with in this paper, there is a serious ra-
cial issue of housing in the U.S. Apparently, the measure for social inequality in housing by using the Gini coefficient of floor space of single family housing units do not seem appropriate. Another aspect that this paper did not deal with adequately is the government policies toward low income households. Federal, state, and local government spends substantial resources toward the goal of the improvement of housing condition for the low and moderate income people. In fact, the explicit U.S. government housing policies are mainly housing policies toward low and moderate income.

The homeownership rate in the U.S. is close to 70% recently. The relatively high home ownership rate is partly cultural. The idea of “American Dream” contains the notion of single family house on the range. At the same time, the government subsidy to home ownership is quite substantial (estimated $150 billion), mainly through mortgage interest and property tax deductions. There is a recent debated on whether such a high public subsidy to housing, particularly larger subsidy to the rich, is a desirable policy under the recent Bush’s new tax plan. However, the federal income tax deduction in housing expenses has been one of the most popular American institutions.

Another reason for the improvement in housing services in the U.S. is the fact that U.S. is endowed a great deal of land suitable for urban development. In most Midwestern and Southern cities, there has been continuous urban sprawl with relative little natural barriers or strict government regulations. The picture is different in the cities in more historic regions of New England and Mid-Atlantic regions (such as Boston, New York, or Washington, D.C.). The growth of these regions has been accompanied by stiff housing price appreciation.

Inter-governmental competition and lack of strong central development control has been blamed for urban sprawl (a low density urban development). Although the debate has been waged for several decades regarding the merits and negative impacts of urban sprawl, the efficiency and equity this urban structure is not clear. What is clear is the fact that spatial structure of American cities has been more decentralized.

The American Housing Survey (formerly Annual Housing Survey) has been collecting micro-level (individual specific) information on housing services for more than two decades in the U.S. The Survey collects detailed micro-level information on housing units as well as
households. It has been the major data source for the studies in housing consumption and investment behavior. Although it is not a panel survey (in the sense that follows the individual every year as in Panel Study of Income Dynamics), it follows the same housing unit (with some replacement to supplement the lost units each year). Korea may need to consider this type of more systematic data gathering on housing. For example, Korea Labor Institute has been collecting panel information on labor market for more than five years.

Another thing that Korea may want to focus its energy in the short run is to develop a set of more reliable and well-defined housing price indexes. Although the Kookmin Bank has been publishing housing price indexes for several years, their accuracy and usefulness has been limited. In order for the housing price index to be useful, it requires a careful thinking that what the index supposed to measure. As was mentioned earlier, housing is a financial asset as well as a consumption good. As a consumption good, housing can be treated as a part of the consumer price index basket. In this case, quality of housing is an important consideration to be adjusted for the construction of the indexes. Also, the weighting scheme for different quality housing (and different price ranges) should be considered carefully, because the primary usefulness for this index is to compare the price of housing over time from the perspective that housing is a consumption good.

Housing is also an important financial asset and an instrument for investment. The conversion of real estate into a financial asset has been pioneered by the use of REIT, which allows individual investors to buy a share of ownership of one or a collection of real property. Recently, there has been a proposal to develop a derivative (such as options or futures) based on housing price indexes. The value of housing stock in the U.S. is roughly the same amount with the value of stocks and bonds. In Korea, where stock and bond market is not as developed as in the U.S., and the limited land resources, the value of housing and other real estate would be many times more than the value of other assets. In this environment, the housing price fluctuations would be watched as closely as the stock price changes. Therefore, a sensible housing price index from the perspective that housing is an investment good would be a very useful indicator.

Up until now, the Korean government has focused its resources toward the increase of
housing supply for owners. Obviously, this policy mainly benefits middle and upper income groups. In particular, there have been substantial capital gains associated with this policy. Moreover, the gains due to housing price appreciation for the last several decades have not been distributed evenly, which has been one of the main reasons for the social discourse in Korea. Explicit and effective housing policies toward low and moderate income group, many of whom on chonsei, needs to be developed as well as the policies to deal with more justifiable redistribution of capital gains.

References

www.census.gov/population/www/
www.census.gov/hhes/www/housing/census/
### <Appendix 1> Housing Service Indicators in the U.S.A. (1970 to 2003)

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국문요약

미국의 주거서비스와 주거서비스 지표

본 연구의 주요 목적이 주거 서비스의 상태를 보여주는 지표들을 통해 미국의 주거서비스 상태와 그 추세를 살펴보는데 있다. 이를 위해 본 연구에서는 17개의 주거서비스 지표를 만들었으며, 이를 양적 지표, 절적 지표, 경제적 지표, 주거안전성 지표, 주거형 평성 지표로 분류하였다. 17개의 주거서비스 지표를 살펴본 결과, 대부분의 지표들은 미국의 주거서비스가 과거 몇 십년 간 지속적으로 개선되어 왔다는 것을 보여주고 있다. 미국의 경험에 비추어 볼 때, 한국은 우선 주거와 관련된 자료를 체계적으로 수집할 필요가 있다. 그리고 보다 신뢰할 수 있고, 보다 잘 정의된 주택가격지수를 발전시킬 필요가 있다. 신뢰할 수 있고, 잘 정의된 주택가격지수는 정부의 정책수립뿐만 아니라 자본시장의 부동산 투자자들에게 매우 유용한 정보가 될 것이다.