# Upgrading Existing Dwellings As a Housing Strategy: The Korean Experience

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*Developing countries are confronted with the twin problems of producing adequate number of housing units to meet the increasing demand for dwelling units in the urban sectors, and of regulating the cost of housing to be within the reach of households in the lower ranges of the income distribution. Korea is one of such countries. Compounded by its government's policy of restricting the construction of core housing, upgrading the existing dwelling units as a means of improving the present housing condition of this country is imperative. The extent and determinants of upgrading existing dwelling units in the 31 urban centers of Korea are therefore analyzed to be able to develop housing strategies for developed countries.*

## The Issues

The two premier issues in the housing sector of developing nations have been (1) the production of an adequate quantity of new dwellings to keep pace with high rates of household formation and urbanization, and (2) keeping the cost of housing low enough to be affordable by households in the lower ranges of the income distribution. These issues are closely related, since a larger supply of dwellings will lower the price per unit in the market and since more housing will be built if it is affordable by a larger segment of society. On the other hand, they are independent to a degree because aggregate construc-tion levels are often controlled by the state, generally through the channeling of the essential financial resources to other "more productive" sectors.[1]

In concentrating on these issues, the governments of these countries (and those who advise them) often overlook the potential role of upgrading the existing stock of housing as a vehicle for improving the overall housing situation. To be sure, some specific instances of the rapid upgrading of units at sites and service projects and of squatter housing

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[1]For further discussion, see O.F. Grimes, Jr., *Housing for Low-Income Urban Families* (Baltimore, Maryland: Johns Hopkins University Press, 1976) and J.F.C. Turner, *Housing by People: Towards Autonomy in Building Environments* (New York: Pantheon Books, 1976).

upgrading have been documented.[2] But upgrading on a wider scale has been largely ignored. This is hardly surprising, given the scant systematic attention that even many developed countries pay to this source of change. Most do not have reliable data on the extent of investment in the existing stock, although many monitor gross changes in dwelling conditions through censuses and other periodic surveys.

### The Korean Experience

This paper presents an analysis of the extent of upgrading in the urban areas of the Republic of Korea — as measured by changes in the floor area of dwelling units in the stock at the beginning of the observation period, 1970-1975. The analysis explores the determinants of upgrading by studying the causes of the variation in the extent of upgrading across the 31 largest cities in Korea. It then goes on to draw the implications of these findings for housing strategies in developing countries.

The Republic of Korea is an especially good subject for this analysis. It is characterized by extensive crowding in the housing sector. Table 1 shows that in urban areas nationally in 1975 there were only half as many dwelling units as households. (There is little crowding in rural areas). Moreover, the trend between 1960 and

1975 was toward greater crowding, although higher rates of building new units in the Fourth Five-Year Plan (1976-1981) should reverse the trend. Reversing this trend, however, is extremely difficult in the face of high rates of household formation and sustained rural to urban migration. Combined, these forces produced a 47 percent increase in urban households over the 1970-1975 period and are expected to cause a 43 percent rise by 1981.[3]

Two factors have worked in tandem to restrict the rate of construction of new residential buildings. First, the government has had a consistent policy of keeping funds out of housing. The government-controlled Korea Housing Bank has been virtually the only source of mortgage loans, thanks to a highly balkanized financial sector. It has had funds sufficient to finance only about one new unit in four, and these loans have had an average loan-to-value ratio of about .25. The lack of mortgage funds has contributed to a serious affordability problem, with only high income households able to afford privately built units. Even the modest walk-up apartments constructed by the Korea Housing Corporation using efficient industrial techniques can be afforded (purchased) only by households in the upper one-third of the income distribution if they devote 30 percent of their gross incomes to housing. The World Bank has sponsored a limited amount of construction of low initial cost core housing units on serviced sites. These units are affordable by households as

[2]The World Bank is now completing several studies: see Emmanuel Jimenez, "The Value of Squatter Dwellings in Developing Countries," in *Economic Development and Cultural Change* (forthcoming) and M. Bamberger, U. Sae-Hau, and E. Gonzales- Polio, *Evaluation of a Sites and Services Project in El Salvador* (Washington, D.C.: Urban and Regional Economics Division, World Bank, forthcoming).

[3]For more on urbanization in Korea, see E. Mills, and B. N. Song, *Urbanization in Korea* (Cambridge, Massachusetts: Harvard University Press, 1980).

Table 1. Indicators of Korean Housing Situation
in Urban Areas, 1970, 1975-1981

|  | 1970 | 1975 | 1981 |
|---|---|---|---|
| Number of households (000) | 2,474 | 3,657 | 5,237 |
| Number of dwellings (000) | 1,378 | 1,940 | 3,404 |
| Ratio: dwellings to households | .56 | .53 | .65 |
| Space per person (pyeong)[a] | 1.7 | 2.0 | 2.9 |
| Space per households (pyeong)[a] | 8.5 | 10.0 | 13.1 |
| Average number of persons per household | 5.00 | 4.91 | 4.55 |

[a] Pyeong = 3.3 square meters.
Source. Economic Planning Board and Korean Development Institute.

far down as the 40th percentile of the income distribution, when graduated payment mortgages with loan-to-value ratios of .7 are part of the financing package. In brief, new housing that meets truly minimum quality standards is not within the grasp of one-third to one-half of the population. Because of the policy of the government to restrict the total resources in the sector and to prevent extensive construction of core housing, potential demand for newly-built units has been sharply constricted.[4]

Under these circumstances, upgrading existing dwelling units may be a major element in improving the country's housing condition. While owner-occupants will carry out the

improvements, the principal beneficiaries may be renter-households; that is, households sharing a dwelling with its owner-occupant, in that they may realize a modest gain in space and quality beginning from a very small base.[5] It follows that upgrading may be the key to providing short-term relief from the recorded considerable dissatisfaction with the housing situation of families in the lowest one-third of the income distribution.

Table 2 shows the expansion of the floor area of units in the 1970 stock between 1970 and 1975 for all units and for those in Seoul. The change in the size distribution results from the combination of the demolition of some units (presumably the worst) and the improvement of others. Demolitions, though, have been slight. Indeed, Seoul shows a significant net increase in the number of units. While some of these changes might be due to reporting errors (i.e., the household not knowing if the unit had been built since 1970), a more convincing explanation is that some single-unit

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[4]For a general discussion of the housing sector in Korea, see B.N. Rong and R. Struyk, "Korean Housing: Economic Appraisal and Policy Alternatives," in C.K. Kin (ed.), *Essays in the Korean Economy (II): Industrial and Social Development Issues* (Seoul: KDI Press, 1977) and R. Struyk, *Housing in Korea's Fifth Five-Year Plan: Possibilities and Constraints*, report of the World Bank and the Republic of Korea (Washington, D.C.: The Urban Institute, 1980).

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[5]Note that very few units are rented from absentee landlords.

Table 2.  Size Distribution of the 1970 Housing Stock
          in 1970 and 1975 in Entire Country and in
          Seoul City[a] (in percentages)

| Floor Area (pyeong)[b] | Whole Country | | Seoul[c] | |
|---|---|---|---|---|
|  | 1970 | 1975 | 1970 | 1975 |
| under 7 | 18 | 09 | 14 | 08 |
| 7-10 | 15 | 12 | 11 | 09 |
| 10-15 | 32 | 30 | 29 | 22 |
| 15-20 | 19 | 24 | 21 | 24 |
| 20-30 | 12 | 17 | 16 | 23 |
| 30-40 | 02 | 04 | 04 | 07 |
| 40-50 | 01 | 01 | 02 | 03 |
| 50 + | 01 | 01 | 02 | 03 |
| Total units (000) | 4,334 | 4,244 | 574 | 622 |
| Share of units 20 pyeong or less | 84 | 75 | 75 | 63 |

[a]Only units classified as housing units (i.e., fit for human habitation) are in-
cluded. This, therefore, excludes 25,468 units in 1970.
[b]One pyeong is 3.3 square meters.
[c]In 1970, Seoul contained 13 percent of all dwelling units in Korea and 42
percent of all units in major urban areas.
    Source: R. Struyk, *Housing in Korea's Fifth Five Year Plan Possibilities and
Constraints*, unpublished report of the World Bank and the Republic of Korea
(Washington, D.C.: The Urban Institute, 1980).

dwellings have been expanded and subdivided into separate units, each of which meets the definition of a habitable dwelling unit. In any event, the distributions show substantial upgrading, with the small units (under 15 pyeong) falling from 65 percent of the stock in 1970 to 51 percent by 1975. Viewed in other terms, upgrading the existing stock accounted for the net addition of 5.9 million pyeong of space to the national housing stock over the 1970-1975 period, while newly-built dwellings contributed 11.8 million pyeong. Hence, upgrading provided one-third of the total expansion of floor space even after allowing for losses through demolition.

The remainder of this paper explores the economic determinants of upgrading. The next section specifies the model; then the data used are outlined. The final section presents the results of estimating the models.

## The Model

Ideally, one would analyze the extent of upgrading the existing stock with a simultaneous model of demand and supply in which investment in all types of improvements is the dependent variable; if certain key data are unavailable, a reduced form specification might be employed.[6] Un-

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[6]For an example of the reduced form approach, see L. Ozanne and R. Struyk, *Housing from the Existing Stock: Comparative Economic Analysis of Owner-occupants and Landlords* (Washington, D.C.: The Urban Institute, 1976.)

fortunately, owing to severe data constraints, the specification falls short of ideal, even in a reduced form model. The dependent variable is the percentage change in the average size of dwellings for those dwellings in the housing stock both in 1970 and in 1975. Moreover, the only relevant data available for this analysis is from the quinquennial Census of population and housing for major urban areas (over 50,000 population). The Census, unfortunately, does not gather information on income or occupation. Hence, proxies for variables more directly measuring demand and supply conditions must be employed.

The variables defined fall into three classes: those measuring (1) the ability to expand units, i.e., those affecting the cost of expansion; (2) pressures for expanding units, i.e., those affecting the return to investment in expansion; and (3) factors reducing the return to expansion aside from cost. Measures of each of these phenomena are discussed in turn below.

(1) Ability to expand:

    (a) Share of units in detached dwellings in the base year: such units are hypothesized to be easier to expand than those in apartments or row-houses.

    (b) Population density in the base year: greater density is hypothesized to imply units being more closely spaced and thus make expansion more difficult.

(2) Raising the return on expansion:

    (a) The extent of crowding or sharing units in the base year: the greater the extent of crowding, holding dwelling size constant, raises the value of additional space per dwelling.

    (b) Increase in the number of households over the period: holding supply constant, this implies increased crowding and increases the value of marginal space.

    (c) Demolitions over the period: reduces supply and increases crowding, holding other factors constant.

(3) Reducing return on expansion:

    (a) The extent of new building over the period: holding demand fixed, this should reduce the return from improving existing units.

    (b) The conversion of large units into multiple small units: permits increased privacy which is hypothesized to be partial substitute for additional space.

    (c) Reduction in average household size over the period: makes small units more acceptable (holding incomes and, hence, the demand for space constant).

All variables that are directly influenced by the size of the city, e.g., increase in number of households, are expressed on a percentage change basis or standardized by the appropriate base year to avoid spurious correlations.

Table 3. Description and Labels of Variables
Used in the Analysis

| Description | Label |
|---|---|
| Percentage change in the average floor area of units of the housing stock in pyeong (3.3 sq. km.) between 1970 and 1975 [a] | DLSZE |
| (Gross change in floor space 1970-1975 of units built before 1971) / 1970 units | GDLSZE |
| Percentage of dwellings in single unit structures in 1970 | SINGLE |
| Ratio of households to dwelling units in 1970 | CROWD |
| Percentage change in the number of households in the city, 1970-1975 | DLHH |
| Percentage change in household size, 1970-1975 | DLHSZ |
| Percentage change 1970-1975 in number of dwellings built before 1971; may be positive or negative, depending on whether subdivided units outnumber those destroyed | DEMOL |
| Number of units built 1970-1975 as a percentage of units present in 1970 | NEW |
| Persons per sq. km. | DENSITY |
| Floor area per household in 1970 in pyeongs | SZEHH70 |

[a]For units constructed before 1971: DLSZE = 100 (average floor space 75-average floor space 70)/average floor space 70.

[b]For units constructed before 1971: GDLSZE = (gross floor space 75-gross floor space 70)/1970 units.

Definitions of variables used in the analysis are listed in Table 3. Note that two specifications of the change in the floor space variable (DLSZE and GDLSZE) are given. The distinction between them is in the treatment of changes over the period in the number of units built before 1971. Because a unit existing in 1970 could have undergone no change, been demolished, or been converted into multiple units over the period, it is possible for the average floor space of 1970 or earlier units to have declined over the period, even though the gross floor area increased sharply.

The first specification (DLSZE) is simply the difference between the average floor area of 1970 units in 1970 and in 1975, expressed as a percentage. GDLSZE, on the other hand, is the change in gross floor area over the period divided by the number of units present in 1970; as such, it avoids the potential problem that conversions might create in defining change over the period.

Data and Estimation Procedure

With a single exception, all data employed are from the 1970 and

*1981*

1975 Population and Housing Censuses. Most of the figures are from the printed reports, but some for 1975 were compiled from data tapes. The exception is land area data which are taken from the *Municipal Yearbook of Korea.*

The models were estimated using ordinary least squares regression. The observations (for cities) were weighted by the square root of the number of households in the city to avoid problems of heteroskedasticity and, hence, inefficient estimates.[7]

## Results

The estimated regression models are given in Table 4. In general, the results are consistent with our expectations; and they are quite robust across the two specifications of the dependent variables and model specifications. The explanatory power of the models is strong, with about 75 percent of the variance in the change in floor area being explained. Below, we concentrate on the results for DLSZE.

Three independent variables — capturing the initial level of crowding and increased number and size of households over the period — are consistently significant. A 10 percent increase in the initial extent of crowding — from 1.8 to 2.0 households per dwelling — is associated with an increase in the floor-area of about ten percentage points. The elasticity of average floor area change to change in the number of households is .5, while that of average floor area change to household size change is about 1.5.

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[7]For an explanation, see A. Goldberger, *Econometric Theory* (New York: John Wiley and Sons, 1965).

With household size falling over this period, and household numbers increasing, the two effects are somewhat offsetting. But for the "average" city, the effect of the increased number of households swamped the household size effect by about ten to one. The average amount of floor space per household in the base year also had a powerful effect. An extra pyeong of space per household, or about 12 percent, is associated with eight percentage points less expansion in the floor area per unit over the period.

The effect of changes in the number of 1970 or earlier units over the period (DEMOL) is also quite strong in explaining DLSZE. The elasticity of DLSZE with respect to DEMOL is 1.4. On the other hand, when GDLSZE is the dependent variable, DEMOL is insignificant, consistent with the importance of conversions in the 1975 counts of 1970 or earlier vintage dwellings.

The two variables specified to capture the differential cost among cities in expanding dwellings—SINGLE and DENSITY — were consistently insignificant. By contrast, the variable measuring the extent of new residential building over the period was highly significant but of the wrong sign, i.e., more new construction was associated with greater upgrading of the existing stock. While this result is contrary to the hypothesis stated earlier, it might be capturing broader market effects that are not elsewhere in the model. Specifically, a high rate of new construction may reflect vibrant local economy and, perhaps more important, the availability of credit (at least through the informal sector) to finance new units and, presumably, expansion of existing units as well.

Table 4. Estimated Regression Models for 31
Korean Cities, 1970-75
(t- statistics in parenthesis)

| Independent Variable | Dependent Variables | | | |
|---|---|---|---|---|
| | DLSZE | | GDLSZE | |
| | (1) | (2) | (3) | (4) |
| Constant | 41.4 | -71.6 | -15.4. | -7.37 |
| | (.57) | (1.92) | (1.46) | (1.35) |
| SZEHH70 | -8.55 | -8.53 | .24 | .26 |
| | ( 4.70) | (4.76) | (1.00) | ( .98) |
| DLHH | .54 | .54 | .06 | .06 |
| | (3.17) | (3.19) | (2.56) | (2.25) |
| DLHSZ | 1.73 | 1.53 | .30 | .24 |
| | (2.02) | (2.07) | (2.20) | (2.23) |
| SINGLE | .31 | | .08 | |
| | (.49) | | ( .89) | |
| CROWD | 30.7 | 29.3 | 10.0 | 9.67 |
| | (2.27) | (2.26) | (5.13) | (5.08) |
| DEMOL | 1.40 | 1.38 | .002 | .01 |
| | (5.76) | (5.88) | ( .06) | ( .25) |
| $R^2$ | .76 | .76 | .78 | .77 |
| F | 13.0 | 16.0 | 14.5 | 17.4 |
| Mean Value Dependent Variable | 57.6 | 57.6 | 9.60 | 9.60 |

Note: Variable definitions are in Table 3.

## Implications

The results just reviewed indicate that individual property owners — almost universally owner-occupants — in urban Korea are responding to market signals in deciding whether to upgrade their housing. Moreover, the aggregate extent of this upgrading has indeed been formidable. It seems clear, therefore, that upgrading the existing stock should be formally incorporated into any national housing strategy. In particular, the government should take steps at least to facilitate the investment of private resources into unit upgrading. Such steps could include making loan funds available in those markets with the greatest crowding, as measured both by dwelling unit shortages and by the floor space available per household.

Further government action could be taken, however, to channel upgrading in particular directions. For example, loans might be made to owners who upgraded the rental portion of their property or an additional room and/or kitchen would be added. Given the "L" or "U" shaped structure and external raised walkways of the traditional Korean home, this is definitely feasible. Such improvements might be more efficiently encouraged through property tax relief, rather than through small principal loans with their heavy origination and servicing costs. The effective residential property tax rate is estimated

*1981*

to be about 1 percent of value, and for modest improvements full relief for three or four years on the typical home would yield a subsidy of about 20-25 percent of the cost of the improvements.[8]

The cost of improvements is certainly low compared to building new units. The Korea Housing Corporation (KHC) estimates the cost of an addition of a three-pyeong room to cost 1.3 million won (600 won/dollar in 1979 prices) or the addition of a one-pyeong bathroom at 1.0 million won.[9] This compares with about 7.5 million won for a ten pyeong unit in a five-story walkup built by KHC. Hence, six to seven units could be upgraded at the cost of this new unit; stated alternatively, three rooms and three bathrooms containing 12 pyeong of space could be added through upgrading compared to the ten-pyeong in the newly-constructed unit.

Finally, the willingness of the Korean homeowner to upgrade his property should be imbedded in new construction policies. This certainly points towards a greater emphasis on core housing. It also suggest construction of "expandable" but higher initial quality units, i.e., detached or semi-detached units, that allow for future expansion. For example, a nine-pyeong core unit on a 27-pyeong site has been estimated to cost 5.1 million won (in 1979), or about 70 percent of the cost of the ten-pyeong KHC unit.[10] This core service option is effectively precluded in the four largest cities (over 1,000,000 population in 1979) by the extremely high land prices; but in the smaller cities, it should be vigorously pursued through zoning regulations and building codes.

The possibilities of using upgrading of existing units as an element in the national housing strategies in developing countries have gone largely unrecognized. The Korean experience shows the possibilities to be both real and of substantial magnitude.

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[8]Tax rates are from J. Riew, *Property Tax and Economic Development: With Focus on Korea* (Seoul: Korea Development Institute, 1978).

[9]Unpublished estimates cited in R. Struyk, *op. cit.*

[10]World Bank calculations reported in Struyk, *op. cit.* The estimate for the KHC unit assumes a 14 pyeong land requirement.