

# Enhancing the Affordability of Rental Housing in the U.S. : Demand-Side Subsidy or Supply-Side Subsidy?

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## Abstract

The purpose of this paper is to assist policy makers in their decisions as regards housing assistance by examining which alternative (demand-side such as rent certificate and housing vouchers, supply-side subsidy such as public housing, or rent control) is more effective in enhancing rental housing affordability. The arguments on the price effects of three alternatives are empirically examined using data on 39 metropolitan areas from *American Housing Survey*. Multiple regression analysis is the principal means of analysis. The results of the empirical tests show that the supply-side subsidy is most important to enhance housing affordability of rental housing through decreasing the overall rent level, while demand-side subsidy does not have a significant relationship with rent level and rent control turns out not working for decreasing rent level. These findings imply that as far as affordability problem is concerned, the governments preference on the demand-side subsidy as the scheme of public housing assistance since Nixon Administration should be reexamined, and the supply-side subsidy should be reemphasized.

## **I. Introduction**

Decent, safe, affordable housing has been considered important to the stability of families and communities by many countries - advanced or developing, capitalist or socialist. Thus, they have intervened to expand and distribute housing resources, even if different administrations have coped with them in different ways.

The nature of America's housing problems, as well as the general perception of them, has changed over time. A notable feature of the evolution of the nation's housing policies is that large public interventions have come in spasmodic waves. That is, each policy was a particular response to particular circumstances, and each policy has built upon or restructured what came before (Ford Foundation, 1989).

The concerns of scholars has also changed over time. During the 1950s, the agenda which preoccupied researchers concentrated on the shortage of housing supply and the poor quality of the existing stock. When the problem of housing supply was ameliorated in the 1960s, the major concern shifted to improving the quality of available housing. During the 1960s and 1970s, the focus changed again as neighborhood decay and racial segregation and discrimination became major research topics. The issue of discrimination was broadened in the 1980s to include such protected classes as persons with disabilities, families with children and the elderly. Over the last decade, however, housing affordability became a dominant issue. The title of the most recent US national housing act - the National Affordable Housing Act of 1990 - reflects the public policy concern over the housing affordability (Linneman and Megbolugbe, 1992).

Even if there has been consensus on the importance of the housing affordability problem, approaches to solve the affordability problem have been debated by housing policy analysts. The issues are numerous, but over the years the policy discussion has focused on whether it is more effective to intervene on the supply-side with subsidized housing production or on the demand-side through provision of a voucher or rental certificate that enables a low-income household to secure decent housing in the private market (Apgar, 1990).

Amid continuing debate, both approaches have been employed as government policies. New construction was the sole policy for low-income renters until the mid-1960s with the widely shared perception of an acute need for a supply of good housing for lower income families. However, the Nixon Administration changed the previous direction of government's housing assistance. As a result, the use of the existing private housing stock has been growing since the rent certificate program was established by the Section 8 in 1974. The preference for the existing private housing stock rather than new construction was continued in the 1980s under the Reagan and

Bush Administrations. The rent certificate program was succeeded by the housing voucher program of the Housing Act of 1983 on an experimental basis, after conducting the Experimental Housing Allowance Program (EHAP), though some new construction programs continued (Weicher, 1990a). The Republicans attempted to sell off public housing through a privatization policy such as the Public Housing Homeownership Demonstration announced by HUD in 1984 (Walker, 1986). In recent years, additional subsidy commitments have been made primarily in Section 8 Certificates and the voucher demonstration. New construction accounted for less than 20 percent of the additional units authorized in 1985 and 1986 (Weicher, 1990a).<sup>1)</sup> That is, there has been a fundamental policy shift from the traditional supply approach to the demand approach during the 1980s.

What about the 1990s? Since the change in the political orientation of the Presidential Administration from Republican to Democrat, the new Democratic Government has focused on plugging the affordability gap between what households can afford and what they have to pay as housing cost through greater funding for rental assistance to tenants living in existing housing and for rehabilitation and construction to expand the supply of affordable housing available for renters and owner-occupants (Clinton, 1992). Clinton also supported retaining public housing rather than privatizing it because the majority of public housing occupants do not have the level or stability of income to sustain an ongoing financial commitment to home ownership, even with substantial government subsidies.<sup>2)</sup>

In addition to government subsidies to the rental housing market, rent control has been conducted by some local governments to prevent rent inflation. It was initially imposed as a result of emergency housing shortage during World War I and II (Lett, 1976), and it is still being implemented as one of the important policy tools to prevent hyperinflation of housing cost in some large metropolitan areas.<sup>3)</sup> Therefore, although rent control is a government regulation rather than a physical subsidy scheme, it cannot be omitted in the analysis of the methods to enhance rental housing affordability.

The purpose of this paper is to assist policy makers in their decisions as regards housing assistance by examining which alternative (demand-side, supply-side subsidy, or rent control) is more effective in enhancing housing affordability. Through the results of evaluation of both subsidy schemes and rent control methods, this paper presents a policy recommendation.

## **II. Housing Affordability Problem**

The original goal of federal housing policy was to provide "a decent home and a

suitable living environment for every American family".<sup>4)</sup> However, current trends in housing conditions and affordability show somewhat negative results.

According to <Table 1>, the overall quality of rental housing has been getting better over time in the 1980s. First, in terms of severe and moderate physical problems, overall metropolitan conditions have improved both in the central cities and the suburbs though the percentage of the households with physical problems in the inner cities was almost twice as high as that of the suburbs. The physical conditions of rental housing of households below poverty level, black households, and elderly households also have been getting better over time. However, the condition of rental housing occupied by households in poverty and black households was still bad in 1987. Overcrowded housing, defined as housing with more than one person per room, is a minor problem. Also, the overcrowding of rental housing occupied by black and elderly households has improved. In the case of the households in poverty, overcrowded rental housing has been slightly increased in late 1980s, and it was

<Table 1> Quality of Rental Housing

unit : % of total occupied rental housing units in each category

	1980	1983	1985	1987
<b>Metropolitan Areas</b>				
In Central Cities				
Physical Problems	N/A	N/A	15.2	13.0
Overcrowding	6.7	6.5	5.5	5.6
In Suburbs				
Physical Problems	N/A	N/A	9.0	7.6
Overcrowding	5.4	4.6	4.2	3.7
<b>Households in Poverty</b>				
Physical Problems	N/A	N/A	21.9	18.9
Overcrowding	N/A	N/A	9.0	9.2
<b>Black Households</b>				
Physical Problems	N/A	N/A	25.1	21.4
Overcrowding	10.0	9.0	7.4	6.2
<b>Elderly Households</b>				
Physical Problems	N/A	N/A	11.4	9.3
Overcrowding	N/A	N/A	0.7	0.6

Note : N/A data not available.

Sources: U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, *Annual Housing Survey, Part A, Current Housing Reports, Series H-150, 1980 & 1983*, and U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, *American Housing Survey, Current Housing Reports, Series H-150, 1985 & 1987*.

somewhat in high percentage of total rental housing occupied by poverty households in 1987.

<Table 2> shows the affordability problem of rental housing. This table measures housing affordability using conventional method developed by HUD, that is, the percentage of household income spent on rental housing.<sup>5)</sup> In metropolitan areas, the

<Table 2> Percent of Household Income Spent on Rental Housing  
unit : % of total occupied rental housing units in each category

	1980	1983	1985	1987
<b>Metropolitan Areas</b>				
In Central Cities				
Over(25%) <sup>1</sup> 30%	(53.2)N/A	(59.5)N/A	(58.6)47.0	(62.3)50.0
Over 50%	20.6	25.2	25.5	24.6
Median Ratio <sup>2</sup>	28	31	29	30
In Suburbs				
Over(25%) <sup>1</sup> 30%	(47.6)N/A	(52.1)N/A	(50.9)38.2	(55.9)43.7
Over 50%	17.0	18.9	17.2	19.5
Median Ratio <sup>2</sup>	26	28	26	29
<b>Households in Poverty</b>				
Over(25%) <sup>1</sup> 30%	N/A	N/A	79.1	78.8
Over 50%	N/A	N/A	60.9	61.1
Median Ratio <sup>2</sup>	N/A	N/A	65	66
<b>Black Households</b>				
Over(25%) <sup>1</sup> 30%	(53.2)N/A	(60.6)N/A	(62.3)50.4	(63.6)51.8
Over 50%	21.8	26.5	29.1	29.5
Median Ratio <sup>2</sup>	29	32	31	32
<b>Elderly Households</b>				
Over 30%	N/A	N/A	56.0	58.5
Over 50%	N/A	N/A	27.6	28.0
Median Ratio <sup>2</sup>	N/A	N/A	35	36

Notes : 1. Numbers in parentheses are based on over 25% criteria. The 5% guideline was changed to 30% since the 1984 publication.

2. Median rent/income ratio. N/A data not available.

Sources: U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, *Annual Housing Survey*, Part A, Current Housing Reports, Series H-150, 1977, and U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, *American Housing Survey*, Current Housing Reports, Series H-150, 1985 & 1987.

affordability problem has been getting worse in both central cities and suburbs in the 1980s, and the central cities have consistently had a more serious affordability problem for rental housing than suburbs. This is caused by relatively high increase of rental housing cost and relatively low increase of household income in the central cities compared to the suburbs.<sup>6)</sup> Overall trends of rental housing affordability for the black and elderly households and the households below poverty level also show the seriousness of the affordability problem. The median cost/income ratio has consistently increased in the 1980s. The median spending on rental housing of households below poverty level reached 66% of their household incomes. If rental housing of which housing cost does not exceed 30% of household's income is considered as affordable housing according to the definition of HUD, about 80% of the poverty households, about 60% of the elderly households, and about 50% of the black households living in rental housing faced a housing affordability problem in the late 1980s. More than 60% of the households in poverty occupying rental housing spent more than 50% of their income on housing in 1985 and 1987.

The above facts clearly show the problem of current rental housing. While overcrowding and inadequate physical conditions are minor problems for rental housing, the affordability problem is serious and worsening especially for the poor and black households.

### **III. Policy Alternatives**

Past government programs intervening in housing market implies that there are three possible policy alternatives for enhancing housing affordability: supply-side subsidy, demand-side subsidy, and rent control. While the first two alternatives use physical subsidy schemes, the last alternative uses government regulation. Below descriptions on the alternatives focus on the arguments of their market effects, that is, the influence on housing cost (rent).

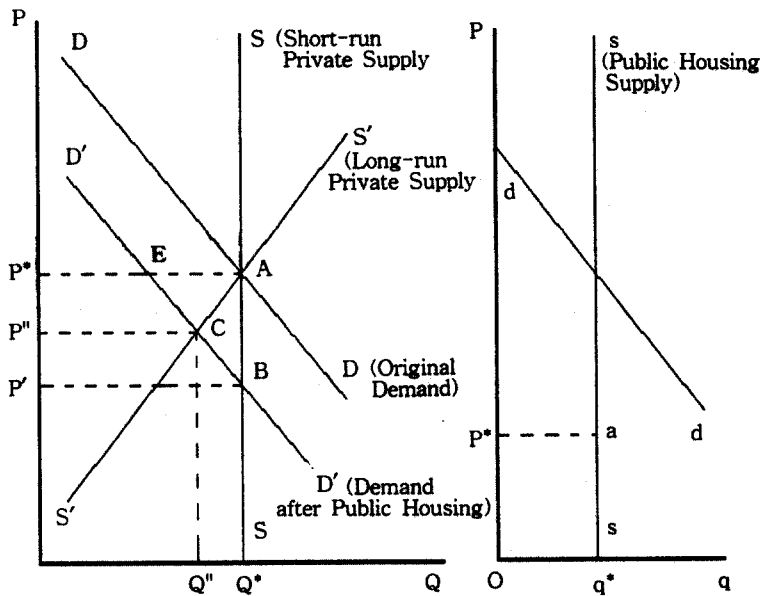
#### **1. Supply-Side Subsidy - Public Housing**

The typical case of supply-side subsidy conducted by government is public housing. In all new construction programs, the subsidy is tied to the unit. A decision is made to subsidize a particular project, not a particular household. The households receives the benefit of the subsidy while it lives in the unit.

Public rental housing program began from the National Housing Act of 1937, which authorized annual federal contributions to amortize the capital costs of publicly owned housing built by local agencies (Taggart, 1970). This general contribution allowed rents

to be reduced so that families otherwise unable to afford adequate shelter could be properly housed. The Brooke Amendment of 1969 was a formal, comprehensive, subsidy program, which restricted public housing rents to no more than 25 percent of tenant income (Sternlieb, 1986).<sup>7</sup> Instead, to complement the Public Housing Authority (PHA)'s shortfall in revenues caused by the limitation on rents, the federal government provided operating subsidies.

<Fig. 1> shows the market effects of public housing. Before public housing is provided, the rental housing market has an equilibrium point of A. If public housing is provided as many as  $Qq^*$ , the demand for private rental housing will decrease as many as  $AE$ .<sup>8</sup> Then, the new equilibrium point will move to B because the supply of rental housing from the private sector is perfectly inelastic in the short run. Thus, the equilibrium price will go down from  $P^*$  to  $P'$  in the short run. That is, in the short



<Fig. 1> Market Effects of Public Housing

Notes : Q = Number of private rental housing; P = Price of private rental housing  
 q = Number of public rental housing; p = Price of public rental housing

run, all low-income households gain from the public housing program: some households occupy subsidized public housing, and others pay lower prices for private low-income housing. However, the influence of the supply of public housing on the price become weakened because the decrease in the price of housing caused by public housing decreases the profitability of private rental housing, so fewer private rental housing will be supplied. Thus, the new equilibrium point will be C instead of B over time, and the equilibrium price will go up from  $P'$  to  $P''$  and the new equilibrium quantity of private rental housing will be reduced to  $Q''$  from  $Q^*$  over time. Therefore, supply-side subsidy like public housing has a positive effect to decrease the rent of overall rental housing and enhance the affordability of rental housing if income level is not changed.<sup>9)</sup>

Apgar (1990) supports the above explanation of public housing's market effects. According to him, by expanding the supply of rental housing, subsidized new construction programs may limit future rent increases, benefiting not only recipients, but also others in the form of reduced rent payments. However, the critics of subsidized housing construction programs contend that the effect of new subsidized production programs on rent levels depends on whether the programs increase the stock of low-income housing (Weicher and Thibodeau, 1988; Weicher, 1990b). If these programs simply displace private nonsubsidized production, they do not add to the aggregate residential rental construction supply of housing. That is, if aggregate residential rental construction activity is limited by a scarce factor of production, subsidized production may simply bid these scarce resources away from nonsubsidized construction. Thus, the rent reduction effect of public housing will be diminished.

## **2. Demand-Side Subsidy - Rent Certificate and Housing Voucher**

The typical cases of demand-side subsidy are rent certificate and housing voucher program. In the consumer subsidy programs, subsidies are tied to the household.

The rent certificate program was created by Section 8 of the Housing and Community Development Act of 1974 (HCD). Under Section 8, qualified low-income households<sup>10)</sup> are issued rent certificates that can be used to rent existing private housing. There are two restrictions on the housing choices of recipients. First, the rental dwelling must meet minimum physical standards for size and quality. Second, the household cannot spend more than the fair market rent, defined by HUD as a reasonable rent for a standard low-income dwelling. The eligible household pays 30 percent of their income as rent. The difference between the fair market rent (FMR) and the amount affordable by low-to moderate-income families is subsidized by local housing authorities. The local housing authorities receive federal money to administer the program, including quality determination, contract-letting for construction, and

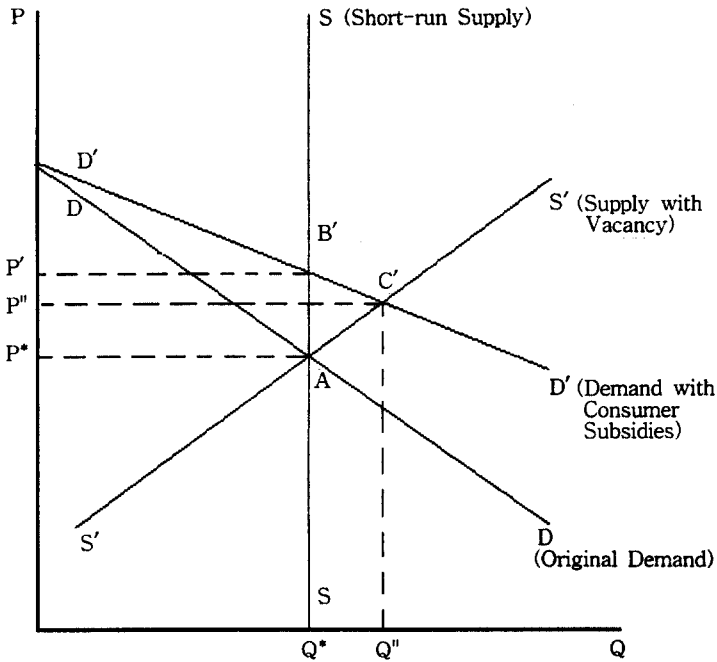


actual rent payment, which goes directly to landlords (Mitchell, 1985b).<sup>11)</sup> In 1980s, the rent certificate program was succeeded by the housing voucher program through the Housing Act of 1983 on an experimental basis, after conducting Experimental Housing Allowance Program (EHAP).<sup>12)</sup> The eligibility requirements for housing vouchers are similar to those for rent certificates. Most of the vouchers went to the very low-income households whose incomes were less than 50 percent of the area's median household income. To qualify for a voucher, the household must occupy a dwelling that meets the government's minimum quality standards (Mitchell, 1985). A voucher differs from a rent certificate in one important respect: the recipient can use the certificate to rent any dwelling that meets minimum physical standards. In 1988, about 156,000 households received vouchers (Sullivan, 1990).

<Fig. 2> shows the market effects of the consumer subsidies. Before consumer subsidies such as rent certificates and housing vouchers are given to low-income families, the rental housing market has an equilibrium at the point of A. If rent certificates or housing vouchers are provided, the demand for rental housing will increase from DD to D'D', and the new equilibrium point will be B' because the new construction of rental housing is perfectly inelastic in the short run. In this case, the equilibrium price will increase to P' from P\*, while the equilibrium quantity of rental housing supplied is still fixed at Q\*. This case assumes that there is no vacant units in rental housing market.

However, if there is any vacant units, the supply curve of rental housing will be changed even in short term. That is, supply curve will be changed from SS to S'S'. In this case, the equilibrium point will move to C' instead of B', the equilibrium price will be P" lower than P', and the equilibrium quantity will be Q". In the long run, the supply curve of rental housing will be changed like S'S', and the equilibrium price and quantity will be P" and Q" regardless of the existence of vacancy, because new construction of or conversion to rental housing will eventually happen. Therefore, demand-side subsidy such as rent certificates and housing vouchers decreases the overall level of rent. However, the existence of vacant housing units in rental housing market may reduce this market effect of demand-side subsidies.

Apgar (1990) criticize demand-side subsidy scheme on the same line as above explanation on the market effects of consumer subsidies that demand-side subsidy entail a rightward shift in housing demand equations and a resulting increase in prices and quantities of housing consumed. However, many studies on the results of the Experimental Housing Allowance Program (EHAP) shows that existing housing subsidies have not resulted in rent inflation (Lowry, 1983). Although the Supply Experiments should have generated the biggest price increases because they were entitlement programs, rent increases in both Green Bay and South Bend were



<Fig. 2> Market Effects of Consumer Subsidies (Rent Certificates and Housing Vouchers)

Note: Q = Number of private rental housing; P = Price of private rental housing

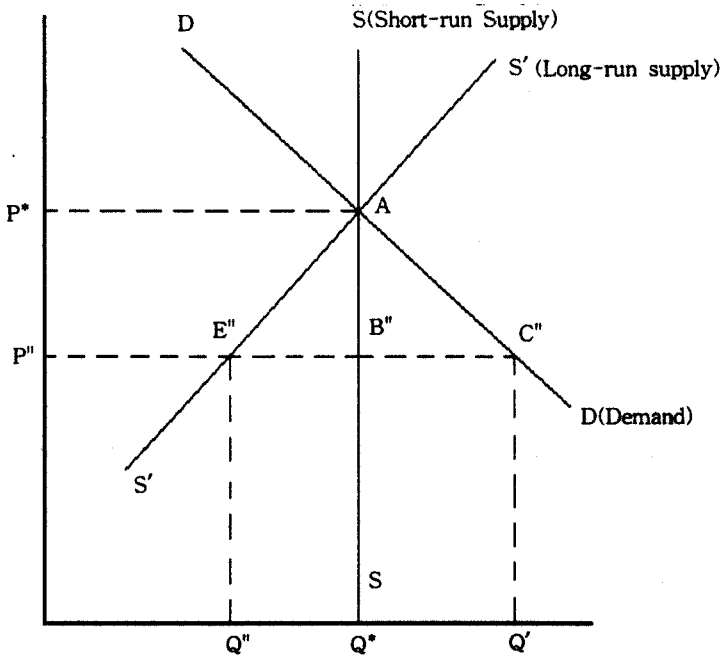
negligible. The Demand Experiments showed a similar pattern, with the exception of one program variant in which the housing standard was established simply at a high minimum rent (Weicher, 1990a). Mills and Sullivan (1981) and Struyk (1990) seek the reason of no significant increase of rent from the existence of vacancy in market. That is, if there is slack in housing market, increased housing demand may have a small effect on rents.

### 3. Rent Control

Rent control is one of the government regulations on rental housing market. It does not use the fiscal or physical intervention of government. That is, it is a kind of price control.

<Fig. 3> shows the market effects of rent control. Before rent control is set up, the rental housing market has a equilibrium point of A. If local government set up a maximum level of rent, market rent will be fixed at  $P''$  lower than equilibrium rent  $P^*$ ,

and the demand for rental housing will increase to  $Q'$  from  $Q^*$  in the short run. However, because in the short run the supply of rental housing is fixed, so market supply of rental housing is not changed at  $Q^*$ . Thus, there happens an excess demand of  $(Q'-Q^*)$ . The opponents on rent control derives the rationale of their critiques from the long-run effect of rent control. In the long run, the supply of rental housing depends on its price. As rent decreases, some landlords may convert their property to more lucrative uses, for instance condominiums or commercial land uses if the conversion is allowed. However, even if there is a government restriction on the conversion of rental housing, rent control does nothing to bring additional housing into the rental supply, but it can induce new demand for rental housing within affluent demand sectors in which the tenure choice is sensitive to price (Niebanck, 1985; Tucker, 1991). Therefore, there may happen a larger shortage of rental housing  $(Q'-Q'')$ . The extent of housing shortage depends on the long-run elasticity of rental housing supply. In the face of supply limitations, these new demands must be satisfied in part through the preemption of relatively high quality of existing units. Thus, even



(Fig. 3) Market Effects of Rent Control

Note: Q = Number of private rental housing; P = Price of private rental housing

if rent control limits the increase of price, the decrease of the supply of low-cost rental housing drives many low-income households who can not find rent-controlled housing into the uncontrolled rental housing submarket. These new demands in the uncontrolled submarket results in an upward shift in overall rent level. Gyourko (1990) supports the above criticism, insisting that rent controls have not had favorable distributional consequences, and that they have not solved the affordability problem in any country's private rental market. Gyourko (1990) further noted that the existence of rent controls leads to economically wasteful interventions to regenerate the depressed private rental sector. Contrary, Levine et.al. (1990) shows that rent control was effective to protect renters, particularly the poor, minorities, young families and elderlies in the case of Santa Monica, CA.

#### **IV. Evaluation of Policy Alternatives**

In this part, the arguments on the price effects of above explained three alternatives are empirically examined using data on 39 metropolitan areas. Although both physical subsidy schemes have the indirect impact on income, this income impact is assumed to be same in this paper because the main purpose of the subsidy is to reduce the housing cost. Therefore, the *price effects* are the criteria for evaluating the influence of each policy alternative on rental housing affordability. That is, how much housing cost (rent) can be reduced by the proposed alternatives is the criterion for the evaluation. The result of the empirical test will show which argument on the price effects of three policy alternatives is more relevant to actual situation, and it will be a rationale for a policy recommendation.

##### **1. Model for Evaluation**

Two major factors affecting housing affordability are household's income and housing cost (rent) according to the definition of housing affordability. Housing affordability will decrease if housing cost is inflated despite no change of real income. On the contrary, housing affordability can be exacerbated when real income of household decreases even if housing cost remains the same. Therefore, if household's income is assumed as constant, then rental housing affordability will be the function of housing cost (rent).

Housing costs (rents) are basically determined by market forces such as demand for and supply of rental housing. However, the vacancy condition of rental housing market, the change of rental housing quality, and government's subsidy or regulation to rental housing can influence the demand and supply of rental housing market, and

consequently change the rent.

The demand for rental housing is related to the issue of tenure choice. Many studies shows that there is a difference of mean income between renters and house-owners, and that there is a strong association between household's income and tenure choice (i.e. either owning or renting house) (Carliner, 1974; Follain *et.al.*, 1980; Follain and Jimenez, 1985; Börsch-Supan, 1990). That is, income has a positive and significant influence on the probability of owning a home.

The supply of rental housing is fixed in the short run, so the increase in the demand for rental housing will increase the equilibrium price. However, the existence of vacant housing can affect the fixed supply of rental housing. That is, when there is an ample vacancy of rental housing, rental housing market is soft rather than tight. Therefore, to some extent, a soft market can absorb the change in the demand for rental housing without the significant change of price (Sullivan, 1990; Struyk, 1990).

Government's various interventions in rental housing market have had a purpose of changing the price and quantity of rental housing. That is, enhancing the affordability has been a key policy goal. However, there has been a debate about which program is more effective to enhance the affordability. Over the years, this discussion has focused on whether it is more effective to intervene on the supply side (via subsidized housing production) or on the demand side (via the provision of vouchers or rental certificates) (Mills and Sullivan, 1981; Apgar, 1990; Struyk, 1990; Weicher, 1990a, 1990b). In addition to government subsidies to the rental housing market, government regulation like rent control has been imposed for private rental housing in an attempt to ensure that rents are affordable, particularly in the face of events such as war or hyperinflation (Gyourko, 1990), even if there has been controversy on the effect of rent control among scholars.

Finally, the change in quality of rental housing can increase or decrease the level of rent. That is, housing stock is heterogeneous in the sense that each dwelling offers a different combination of features, that is, a different bundle of housing services. If the overall quality of rental housing increases, then the median rent will also increase under the condition that other things are constant.

Above relations can be described as follows;

$$R_i = f(X_{1i}, X_{2i}, X_{3i}, X_{4i}, X_{5i}, X_{6i}) \tag{4.1}$$

where *i* denotes each metropolitan area examined;

X1 represents the ratio of low- and moderate- income households to rental housing units;

X2 represents the vacancy rate;

X3 represents the supply-side subsidy;

X4 represents the demand-side subsidy;  
 X5 represents the rent control;  
 X6 represents the quality of rental housing; and  
 R represents housing cost (rent).

The variables used for the analytic model are as follows.

The dependent variable is the median housing cost, which is measured by median monthly gross rent (Arnold and Skaburskis, 1989). According to the definition of U.S. Bureau of the Census, gross rent includes the contract rent plus the estimated average cost of utilities (electricity, gas and water), fuels (oil, coal, kerosene, wood, etc.), property insurance, and garbage and trash collection if these items are paid for by the renter in addition to rental payments.<sup>13)</sup>

The independent variables are the ratio of low- and moderate-income households to rental housing units, which is measured by the ratio of the number of households whose income is below 110% of area median income divided by the total rental housing units<sup>14)</sup>, the vacancy rate of rental housing market, which is measured by the percentage of vacant rental housing units among total rental housing units, the supply-side subsidy, which is measured by the units of public housing<sup>15)</sup>, the demand-side subsidy, which is measured by the units of housing of which rent is subsidized by a Federal, State, or local government program<sup>16)</sup>, the rent control, which is classified as 1 if rent control is conducted in the metropolitan area and 0 if rent control is not conducted<sup>17)</sup>, the quality of rental housing, which is measured by the percentage of the units with physical problems among total renter-occupied units.<sup>18)</sup> These variables are hypothetically assumed to have the following impacts on housing cost (rent).

<Table 3> Hypothetical Impacts of Explanatory Variables on Housing Cost

Explanatory Variables	Median Housing Cost
Ratio of Low-and Moderate-Income Households to Rental Housing Units(LMINC)	+
Vacancy Rate of Rental Housing Market(VACAN)	-
Supply-Side Subsidy(SUSUB)	-
Demand-Side Subsidy(DESUB)	+/-
Rent Control(RCTRL)	-
Quality of Rental Housing(QLITY)	-

Note: + denotes positive impacts; - denotes negative impacts.

For these variables, secondary data from *American Housing Survey*, Current Housing Reports, Series H-170 were utilized. The U.S. Bureau of the Census and the U.S. Department of Housing and Urban Development jointly report the tenure and vacancy status, structural and neighborhood quality, and financial characteristics of metropolitan housing through *American Housing Survey* every year. However, there are some problems in using data in *American Housing Survey*. The bureau does not survey every metropolitan area every year. Usually 11 metropolitan areas are surveyed each year, and same metropolitan areas are surveyed every four year. Another problem is the change of area classifications. From 1974 to 1983, *Annual Housing Survey* (the former title of *American Housing Survey*) has reported the results of the housing survey based on Standard Metropolitan Statistical Areas (SMSA).<sup>19</sup> However, since 1984 the survey has been conducted based on Metropolitan Statistical Areas (MSA), Primary Metropolitan Statistical Areas (PMSA), and Consolidated Metropolitan Statistical Areas (CMSA). Though some metropolitan areas keep the same geographical boundaries, many of them are changed. The unit of analysis is the metropolitan area. This study uses 9 metropolitan areas from the 1986 survey, 9 from the 1987 survey, 10 from the 1988 survey, and 11 from the 1989 survey. To eliminate the effect of different years, median monthly housing cost of each metropolitan areas is standardized as a 1982-84 constant value using consumer price index (CPI) of each metropolitan area (1982-84=100).<sup>20</sup> Therefore, this study conducts the analysis similar to cross-sectional analysis.

## 2. Analysis

The statistical method used for this study is the Ordinary Least Square (OLS) Multiple Regression. The model for evaluation described above is analyzed under the assumption that the model has the style of log-linear equation. That is,

$$\ln Y_i = a_i + b_{1,i} \ln X_{1,i} + b_{2,i} \ln X_{2,i} + \dots + b_{n,i} \ln X_{n,i} + \epsilon_i \quad (4.2)$$

where  $i$  denotes the respective metropolitan areas for which the model is estimated;

$a$  represents the intercept;

$b_1 \dots b_n$  represent the coefficients of the respective independent variables

$X_1 \dots X_n$ ;

$Y$  represents the dependent variable (median housing cost);

$\ln$  represents the natural logarithm of the variable; and

$\epsilon$  represents the unexplained error disturbance.

The correlation matrix and the result of OLS regression using the Equation (4.2) are summarized as <Table 4> and <Table 5>.

The correlation matrix shows that there is no serious multicollinearity problem among the independent variables. The result of log-linear multiple regression shows that supply-side subsidy and the existence of rent control are statistically significant at

<Table 4> Correlation Matrix Among Independent Variables

	<i>lnLMINC</i>	<i>lnVACAN</i>	<i>lnSUSUB</i>	<i>lnDESUB</i>	RCTRL*	<i>lnQLITY</i>
<i>lnLMINC</i>	1.000					
<i>lnVACAN</i>	.139 (.99)	1.000				
<i>lnSUSUB</i>	-.204 (.107)	-.201 (.109)	1.000			
<i>lnDESUB</i>	-.297 (.033)	-.458 (.002)	.309 (.028)	1.000		
RCTRL*	.255 (.059)	-.321 (.023)	-.025 (.440)	-.112 (.249)	1.000	
<i>lnQLITY</i>	.386 (.008)	.308 (.028)	.318 (.024)	-.145 (.189)	.143 (.193)	1.000

Notes: Numbers in parentheses are t-significant values.

\* The variable of rent control is a binary variable using 0 and 1. Therefore the log value of rent control is meaningless.

Legend: See <Table 3>.

<Table 5> Result of OLS Regression

Variable	<i>b</i>	Beta	Correlation	<i>t</i> -ratio
<i>lnLMINC</i>	.059	.083	.180	.570ns
<i>lnVACAN</i>	-.104	-.232	-.425	-1.543*
<i>lnSUSUB</i>	-.118	-.399	-.466	-2.379**
<i>lnDESUB</i>	.029	.076	-.090	.468ns
RCTRL	.059	.364	.469	2.636**
<i>lnQLITY</i>	-.081	-.199	-.339	-1.252ns
(constant)	2.773			27.999***

$R^2=.531$ , Adj.  $R^2=.443$ ,  $F(1.38)=6.034***$

Notes: ns = not significant; \* = significant at 15% significance level;

\*\* = significant at 5% significance level; \*\*\* = significant at 1% significance level



a 5% significance level among the independent variables. The vacancy rate of rental housing market, ratio of low- and moderate-income households to total rental housing, demand-side subsidy, and quality of rental housing are not statistically significant. However, if the permitted significance level is extended to 15%, the vacancy rate of rental housing market can be statistically significant. The resulted relationships of independent variables to housing cost are same as the hypothetical relationships presented in Table 3 except the case of rent control. The hypothetical relationship of rent control to housing cost is negative, however the regression result shows positive relationship. The hypothetical effect of demand-side subsidy on housing cost is ambiguous. In this equation, the relationship resulted in positive although it is not statistically significant. Since significant F is .0003, the overall regression equation is significant at 1% significance level. The R<sup>2</sup> is .531, and the adjusted R<sup>2</sup> is .443.

The result of log-linear multiple regression implies several facts. First, the supply-side subsidy has the highest absolute value of Beta, which implies the relative importance of variables because it is the coefficient of the independent variable when all variables are expressed in standardized form. In addition, the supply-side subsidy has the negative effect on housing cost. Therefore, among three alternatives presented in this paper, the supply-side subsidy is most important to enhance housing affordability of rental housing through decreasing the overall rent level in the case of income level being constant. This result also supports Apgar (1990)'s analysis that the supply-side subsidy contributes to limit rent increases by expanding the overall supply of rental housing. Instead, the opinion that the supply-side subsidy simply displace private nonsubsidized production (Weicher and Thibodeau 1988; Weicher, 1990b) seems to have weak explanatory power. Apgar seeks the reason of rare possibility of displacement effect of subsidized production from the market segmentation. That is, the subsidized production of three- or four-bedroom rental apartments targeted for occupancy by low-income families with children may have little displacement effect. Because there is little private new construction of this type of unit, the subsidized construction program will most certainly expand supply in this submarket. Moreover, the additional supply may persist, especially if there is excess demand for low-cost three- or four-bedroom apartment units (Apgar, 1990).

Second, the demand-side subsidy is not significant, and the relationship to housing cost is positive. This result seems to be related to the extent of rental housing vacancy. The result shows that the vacancy rate of rental housing is significant at 15% significance level, and it has a negative relationship to housing cost. Actually the average rental vacancy rate of 39 metropolitan areas examined in this paper is as high as 11.2%. In this kind of soft market condition, the increase of demand can be absorbed by increasing occupancy of existing housing even if there is no sufficient

new construction of rental housing. That is, as Mills and Sullivan (1981) and Struyk (1990) mentioned, the significance and the effect of the demand-side subsidy on housing cost and further rental housing affordability relies upon the vacancy condition of rental housing market.

Third, the existence of rent control has the second most important influence on housing because it has the second highest value of Beta in the results of regression analysis. However, the relationship between rent control and housing cost is positive. This result reflects Niebanck (1985)'s explanation that the supply limitation causes the rent increase. According to him, rent control discourages moderately priced new construction and encourages withdrawals from the lower priced rental inventory. Thus, even if rent control limits the increase of price, the decrease of the supply of low-cost rental housing drives many low-income households who can not find rent-controlled housing into the uncontrolled rental housing submarket. Actually the average percentage of rent-controlled housing among total rental housing is 4.1% in 39 metropolitan areas examined in this paper. These new demands in the uncontrolled submarket results in an upward shift in overall rent level. Published rents for individual units might well be stabilized, but simultaneously the structure of rents could actually rise. That is, a diminution of housing opportunity following the enactment of rent control ordinances could result in effective increases in rents at all levels of occupant income and housing quality.

## V. Conclusion

Affordable housing is becoming a larger concern to more persons over time. The national goal of decent, safe housing for every American family, which was proclaimed by the Housing Act of 1949 according to President Johnson's Great Society spirit, seems to be achieved since 1980s, so that the quality of rental housing can be considered to be no more a serious problem. However, while the quality of housing stock was ameliorated, the affordability problem is worsening over time.

This study tried to evaluate which policy or program is more effective in terms of enhancing rental housing affordability. To solve the affordability problem, the federal government has tried various methods such as public housing, rent certificate, housing voucher, experimental housing allowance program, and rent control especially for rental housing. There also have been debates about various policies' or programs' effectiveness in terms of not only affordability but also cost. Each policy or program has pros and cons. However, the result of this study shows that as far as the affordability is concerned, the supply-side subsidy through public housing construction is a more effective alternative to enhance the affordability of rental housing than other

methods like the demand-side subsidy through rent certificate or housing voucher and government regulation through rent control.

Since Nixon Administration, the government's preference on the scheme of public housing assistance has gradually changed from the supply-side subsidy to demand-side subsidy in various reasons. However, if affordability problem is considered most serious among other problems of rental housing, the supply-side subsidy through public housing construction should be reemphasized.

## Notes

- 1) During 1980 to 1987, in all metropolitan areas, the number of households living in public rental housing has increased only 22.0%, while the number of households living in rental housing subsidized by Section 8 Certificates or housing vouchers has increased 161.4%. (Source: U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, Annual Housing Survey and American Housing Survey.)
- 2) The Philadelphia Inquirer, November 15, 1992, and The Washington Post, November 7, 1992.
- 3) Rent controls are now practiced in more than 200 American municipalities. Almost 100 of them are small urban communities in northern New Jersey. The others are large and small cities on the East and West coasts. On the East Coast, Boston, Hartford, Newark, New York, Washington, and most of the population centers on Long Island and in Westchester County now have rent control. On the West Coast, San Francisco, Oakland, San Jose, and Los Angeles, plus smaller cities, such as Berkely, Santa Monica, North Hollywood, and Palm Springs, also have rent control (Tucker, 1991:19-20).
- 4) This national housing goal was stated in the Housing Act of 1949 by Johnson Administration (Salins, 1987).
- 5) There is no unique definition of housing affordability. According to Arnold and Skaburski (1989), housing affordability can be defined in terms of the money households spend to buy reasonable housing services, it can be defined with reference to the nature and quality of the housing delivered at the price households are able to pay, or it can be defined by considering the differences in the relative effort different households make to buy housing services. The conventional public policy indicator of housing affordability in the United States is the percentage of income spent on housing. According to the standard of the U.S. Department of Housing and Urban Development, housing expenditures which exceed 30 percent of household income have been viewed as an indicator of a housing affordability problem (Ford Foundation, 1989:12-13).
- 6) During 1980 to 1987, the median rental housing cost in central cities has increased 67.1% compared to 64.3% in suburbs. Contrary, the median household income occupying rental housing has increased 68.0%, while that of suburbs has increased 72.3% during the same periods. (Source: U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, Annual Housing Survey and American Housing Survey)
- 7) The 25 percent guideline established by the national low-income housing legislation in 1969 was increased to 30 percent in 1981 (Sternlieb, 1986).

- 8) Here, it is assumed that  $Oq^*$  in public rental housing is equivalent to AE in private rental housing.
- 9) In the private rental housing market, rent will be at the level of  $P''$  lower than the original rent level of  $P^*$ , and the rent of public rental housing is usually decided at the level of  $p^*$  lower than the private rent level of  $P''$ . Thus, the overall rent level will decrease.
- 10) To qualify for assistance, household income must be less than 80 percent of the area's median family income. Under legislation passed in 1981, the bulk of funds are allocated to households with very low income (less than half the median area income). In 1988, about 780,000 households received rent certificates (Sullivan, 1990:389).
- 11) Section 23 leased housing program of the 1965 Housing Act is the root of Section 8 program. Under this program, local housing authorities leased existing private housing units and in effect sublet them to low-income families eligible for regular public housing. Again, the tenants paid a portion of their income for rent and the government paid the difference (Mitchell, 1985b).
- 12) There are many studies of the Experimental Housing Allowance Program (EHAP). Under EHAP, the federal government conducted a number of experiments with housing allowances. The demand experiments offered housing allowances to a small sample of poor renter households in two cities (Phoenix and Pittsburgh). The purpose of these experiments was to examine the effects of the allowance program on eligible households. The supply experiments offered allowances to all poor households in two counties (Brown County, WI and St. Joseph County, IN). The purpose of the supply experiments was to examine the effects of housing allowances on the market price of housing (Sullivan, 1990). (For detail, refer to Bradbury and Downs eds., 1981; Mitchell ed., 1985; DiPasquale and Keyes eds., 1990)
- 13) Refer to U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, American Housing Survey, Current Housing Reports, Series H-170, Appendix A.
- 14) Total rental housing units include both occupied and vacant units.
- 15) A housing unit is classified as being in a public housing project if the structure in which the unit is located is owned by any local or state government agency, such as a housing and redevelopment authority or a housing development agency, and operated as public housing.
- 16) These program includes the rental assistance program where part of the rent for low-income families occupying the rental housing units is paid by the Department of Housing and Urban Development (HUD), and the rent supplement program where part of the rent for low-income families occupying certain types of HUD-assisted rental housing projects is paid by the Federal Housing Administration (FHA).
- 17) It is a dummy variable. Among 39 metropolitan areas examined in this paper, 24 metropolitan areas had rent control.
- 18) Units with physical problems include both severe and moderate problems, About the definitions of severe and moderate problems, refer to U.S. Bureau of the Census and U.S. Department of Housing and Urban Development, American Housing Survey, Current Housing Reports, Series H-170, Appendix A.
- 19) Before 1983, Annual Housing Survey surveyed 20 metropolitan areas per year and same metropolitan areas are surveyed every 3 years.
- 20) Consumer Price Index of each metropolitan area is obtained from U.S. Bureau of Labor

Statistics, CPI Detailed Reports, January issues. Not every metropolitan area is reported in CPI Detailed Reports. The CPI of metropolitan areas not reported in CPI Detailed Reports are estimated using proximity.

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