UC Berkeley
Fisher Center Working Papers

Title
The "Used House Market"

Permalink
https://escholarship.org/uc/item/4nq522th

Authors
Rosen, Kenneth T.
Smith, Lawrence B.

Publication Date
1982-05-01

Peer reviewed

CENTER FOR REAL ESTATE AND URBAN ECONOMICS
WORKING PAPER SERIES

WORKING PAPER 82-46

THE "USED HOUSE MARKET"

BY

KENNETH T. ROSEN

AND

LAWRENCE B. SMITH

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

The "Used House Market"

by

Kenneth T. Rosen and Lawrence B. Smith

May 1982

Working Paper 82-46

Center for Real Estate and Urban Economics

Institute of Business and Economic Research
University of California at Berkeley
156 Barrows Hall, Berkeley CA 94720

THE "USED HOUSE MARKET"

by

Kenneth T. Rosen and Lawrence B. Smith*

I. Introduction

In recent years considerable attention has been devoted
to the determinants of housing starts and expenditures for
new residential construction.[1] On the other hand, very little
attention has been given to an analysis of the existing house
market.[2] This neglect has occurred although the value of the
existing stock is many times greater than the value of
annual expenditures for new residential construction,
expenditures for alterations and additions to the existing
stock are approximately 25 percent of the value of expendi-
tures for all new construction, and changes in the value
of the existing housing stock influence a wide range of
consumption and investment decisions.[3] This paper makes
a beginning at overcoming the neglect of the used house
market by describing and analyzing the structure and
operation of the existing home resale market.

The paper begins in Section II with a description of the
basic structure of the market, focusing primarily on the
pattern of single-family house resale activity, the value of
expenditures for alterations and additions, and the recent
behavior of existing home prices. In Section III, a model
is developed to explain resale activity, the value of upgrad-

ing expenditures and the determination of single-family house prices. The empirical results of the estimated model are presented in Section IV, and these results are summarized and their implications discussed in Section V.

II. Characteristics of the Used House Market

A. Recent Historical Trends

A home purchase is the largest single consumer transaction that the vast majority of Americans make, and it is the largest portion of nonhuman wealth for most of these households. A recent estimate indicated that the existing housing stock accounted for 27 percent of household wealth in 1979,[4] as the relative importance of housing in household wealth grew rapidly during the last decade with the large rise in nominal and real housing prices (shown in Table I).

In 1980, 65 percent of American households owned their own homes and 40 percent of these homes were unencumbered by mortgage debt. At this time there were 56 million single-family dwelling units of which 42.8 million were owner-occupied, 11.2 million were occupied by tenants, and 2.0 million were vacant. During 1980, approximately 2.9 million of these homes were resold while new construction was commenced on only 853,000 single-family units. In 1980 expenditures for additions and alterations were $9.5 billion compared to $38.6 billion for new residential construction on single-family homes.

An indication of market activity in the existing and new single-family housing sectors during the last decade and of the pattern of housing prices over this period is presented in Table I.

TABLE I

INDICATORS OF NEW AND USED HOUSING MARKET ACTIVITY AND PRICES, 1970-80

	SINGLE FAMILY HOUSING			EXPENDITURES FOR SINGLE FAMILY HOUSING			PERCENTAGE CHANGE IN HOUSE PRICES	
Year	Starts (000)	Resales (000)	Ratio of Resales to Starts	Alterations and Additions (Billions of 1972 dollars)	New Residential Construction (Billions of 1972 dollars)	Ratio of Alterations and Additions to New Residential Construction Expenditures	Nominal	Real
70	815	1612	2.0	6.98	33.99	.21	5.3	-0.6
71	1152	2018	1.8	7.20	46.45	.16	7.8	3.5
72	1310	2252	1.7	7.44	56.36	.13	8.3	5.0
73	1133	2334	2.1	6.74	55.53	.12	7.7	1.5
74	889	2272	2.6	6.50	41.68	.16	10.5	-0.5
75	895	2452	2.7	8.25	33.92	.24	10.5	1.4
76	1166	3002	2.6	8.54	42.61	.20	7.9	2.2
77	1452	3547	2.4	8.60	52.03	.17	12.6	6.1
78	1435	3863	2.7	8.72	53.66	.16	13.5	5.9
79	1196	3701	3.1	8.87	50.29	.18	14.4	3.1
80	853	2881	3.4	9.51	38.64	.25	11.7	-1.9

The most striking difference in the activity in the existing housing and new construction sectors centers on their cyclical volatility. New housing construction shows a high cyclical volatility, while activity in the resale housing market has shown a relatively stable upward trend until the dramatic decline in 1981. Expenditures on alterations and additions appear to be the most stable over time with a minor counter-cyclical pattern, possibly because the substantial non-monitized (and non-imputed) owner labor component in the alterations and additions process rises during periods of economic slack as unemployed households have more time to contribute implicit labor services.

In addition to the greater stability of the existing home resale market, Table I indicates that the volume of housing resales not only substantially exceeds the volume of new construction but that the ratio of housing resales to starts has increased during the decade from 2.0 to 3.4. Expenditures for alterations and additions have also risen relative to new construction as the ratio of these expenditures has increased from approximately .16 percent during the first half of the 1970s to .25 percent in 1980. These trends are significant not only for the homebuilding and real estate brokerage industries, but also for the mortgage market since an increasing proportion of mortgage credit is going to finance resale and upgrading activity rather than new construction.

B. Market Characteristics

Despite the large volume of transactions, the existing house market is characterized by market imperfections, disequilibrium, and large transactions costs which are normally associated with "thin" markets. These imperfections in the existing single family housing market result from the spatially fixed and location-specific nature of the housing unit, the heterogeneity of these units, and an allocative mechanism that physically distributes housing units between users by the movement of the users rather than the movement of houses.

The spatial fixity of the stock ensures the heterogeneity of the commodity and prevents a relatively inexpensive dissemination of market information. Consequently, market participants, both potential buyers and potential sellers, are forced to devote considerable time (and expense) to acquire information as to the value of the specific bundle of housing attributes (including location) associated with each individual house.[5] As a result, there are considerable implicit and explicit search costs connected with a house sale. Implicit costs include the time and the opportunity cost associated with the market search in obtaining the relevant pricing information and in selecting a house from among a heterogeneous stock. Explicit costs include the brokerage and agent fees generally incurred to reduce the implicit search costs.[6]

In addition to the search costs and fees, there are substantial transactions costs associated with trades in real property.[7] Two of the most substantial costs are the legal and recording fees connected with such transactions, and the financing costs associated with the nontransferability of existing low-interest rate mortgages. The nonassumability of existing financing means that existing financing must be repaid upon a sale and hence the cost of financing associated with any house increases according to the difference between the current and existing mortgage rate on the outstanding mortgage loan balance. The importance of this cost has increased greatly in recent years with the sharp rise in interest rates. However, the non-enforceability of the "due on sale" clause in a number of states has partially offset this increase.[8]

Finally, the immobility of the stock also necessitates that used housing be physically allocated between users by the movement of the users rather than the movement of the house.[9] Since such movements entail very large discrete adjustments by the household, additional large transactions costs are built into the allocative process in the form of packing and moving costs, furnishings that become inappropriate, and psychological costs of breaking neighborhood attachments.

The existence of very large transactions costs associated with a housing move means households are likely to be in disequilibrium with respect to their optimal housing

consumption.[10] On the other hand, a housing disequilibrium also
can be partially or completely reduced by undertaking a hous-
ing alteration or addition. Generally, alterations and
additions are used to remedy smaller disequilibrium imbal-
ances, although they may be used to rectify any degree of
imbalance. Adjustment or transactions costs also arise with
alteration and addition expenditures. These adjustment costs
stem primarily from the substantial diseconomies of scale
associated with small scale construction, since typically these
increase per square foot costs relative to new construction.
Moreover, alterations and additions involve substantial
household disruption and disproportionately high planning
and design costs.

Since a household will maintain its disequilibrium posi-
tion until the present value of the expected benefits from
reducing the disequilibrium exceed the transactions costs
associated with a housing adjustment, households are likely
to tolerate a considerable disequilibrium. This disequilibrium
can thus be considered to be stable, or the household can be
considered to be in a bounded equilibrium, in the sense that
the household has no incentive to remedy the disequilibrium.
The process of household adjustment from disequilibrium provides
the focus of our model of the used house market.

III. A Model of the Used House Market

Since the primary household decisions in the existing
housing market are associated with altering housing consump-
tion and investment by moving or by undertaking alterations

and additions,[11] the model focuses upon the bounded equilibrium (or stable disequilibrium) nature of the household's housing choice.

Building on traditional micro and macro models of housing demand,[12] we assume that a household demands an owner-occupied house so as to obtain a desired bundle of consumption and investment housing attributes,[13] H_j^*, where H_j^* is a vector of the desired housing attributes. Since the desired bundle of attributes is based upon the household's consumption and investment demand, it is assumed to depend upon the household's permanent income, Y, the household's demographic characteristics (life cycle, size, etc.), Z, the user cost of homeownership, (represented by the nominal price of homeownership, PH, the cost of mortgage credit, RM, the difference between the current and expected future price of housing, and the household's marginal tax bracket),[14] the price of other consumer goods, PC, the price of renting housing services, R, the expected future price of housing, PH^e, and the yield on alternative investments.[15,16]

$$H_j^* = h(Y, Z, PH, RM, PC, R, PH^e). \qquad (1)$$

Assuming H_j represents the vector of housing attributes owned by the household at the beginning of the period, then D is the household's disequilibrium in terms of housing attributes where

$$D = H_j^* - H_j. \qquad (2)$$

Because the transactions costs associated with reducing

disequilibrium either by moving or by altering the bundle of
housing attributes through renovation are substantial, a
household will remain within its bounded equilibrium until
the present value of the expected benefits from reducing the
housing disequilibrium exceed the transactions costs associ-
ated with a housing adjustment. A household's disequilibrium
in housing attributes can thus be considered to be stable
within the bounded range in which the present value of the
costs of maintaining a disequilibrium are less than the trans-
actions costs of remedying the disequilibrium.[17]

We assume that a household enters the period with-
in its bounded equilibrium and maintains its position unless
either the degree, and hence the cost, of disequilibrium
increases, or the transactions costs of moving or the adjust-
ment costs of alterations and additions decline. The probability
of a housing adjustment, Pr, occurring in period t thus varies
directly with changes in the degree of disequilibrium, and in-
versely with changes in the transactions costs of moving, MC, and
costs of upgrading via alterations or additions, AC. Equation
(3) shows the probability of a housing adjustment as a function
of ΔD, ΔMC, ΔAC,

$$Pr_t = p(\Delta D_t, \Delta MC_t, \Delta AC_t). \tag{3}$$

Since the change in the degree of disequilibrium
is equal to the difference between the current and lagged gap
between the desired and actual bundle of housing attributes,
we get equation (4),

$$\Delta D_t = (H_j^* - Hj_t) - (H_{jt-1}^* - H_{jt-1}). \tag{4}$$

Assuming that a household's actual bundle of housing attributes in the absence of a housing adjustment is fixed[18] (equation (5))

$$H_{jt} = H_{jt-1},\qquad(5)$$

the change in the housing disequilibrium is equal to the change in the desired housing attributes (equation (6)).

$$\Delta D_t = H_j^*{}_t - H_j^*{}_{t-1} = \Delta H_j^*{}_t.\qquad(6)$$

In addition to changes in a household's desired housing attributes, changes in the transactions costs of moving or in the costs of alterations and additions can move a household out of its bounded equilibrium. Most models of household mobility and quality adjustments have assumed transactions costs to be constant.[19] However, these costs clearly have variable elements. With respect to moving, search costs are a function of market tightness with search time falling as the availability of newly completed homes and vacancies increases. Information costs, which may be measured by the cost of brokerage,[20] and legal fees increase with the size of the transaction.[21] Financing costs arising from the nonassumability of existing mortgage finance increase with the mortgage interest rate. Consequently, transactions costs associated with moving may be summarized as a function of housing availabilty as proxied by housing completions (HC), housing prices, and the mortgage interest rate. The change in the transactions

costs of moving is a function of the change in these variables.

$$\Delta MC = m(\Delta HC, \Delta PH, \Delta RM) \tag{7}$$

In an analogous fashion, the adjustment costs associated with alterations and additions are variable. Alteration and addition costs increase with the construction costs of renovating a housing unit; and the fees, design costs and disruption costs can be considered to vary directly with the extent of the renovation. Alteration and addition costs can thus be summarized as a function of construction costs (CC) and housing prices (assuming the extent of a renovation varies directly with the average price of the house), and the change in alteration and addition costs is a function of the change in these variables.

$$\Delta AC = a(\Delta CC, \Delta PH) \tag{8}$$

The probability of moving, Pm, and the probability of undertaking expenditures for alterations and additions, Pa, can be obtained by substituting equations (8), (7), (6) and (1) into (3) and recognizing that the probabilities of moving and undertaking upgrading expenditures are respectively inversely affected by changes in alteration and addition costs on the one hand, and moving and other transactions costs on the other hand. [22]

$$Pm = (\Delta Y, \Delta Z, \Delta RM, \Delta PH, \Delta HC, \Delta PH^e, \Delta R, \Delta CC) \tag{9}$$

$$Pa = (\Delta Y, \Delta Z, \Delta RM, \Delta PH, \Delta CC, \Delta PH^e, \Delta R, \Delta HC) \tag{10}$$

Although individual household behavior can be represented
by the threshold model specified in equations (9) and (10), a
macro model aggregating over all homeowners gives a continous
specification in which the number of moves is a function of the
explanatory variables in equation (9) scaled by total single
family households, and expenditures for alterations and addi-
tions (A) is a function of the explanatory variables in equa-
tion (10) scaled by the stock of single-family housing (SH).

Some modifications are required in the specification of
the moving equation to translate it into a sales of existing
homes (S) equation since in its present form the equation repre-
sents only turnover transactions of existing homeowners,[23] and
ignores first-time buyers who account for approximately 40 per-
cent of all sales.[24]   First-time homebuyers are influenced
by basically the same variables that affect turnovers,
although the transactions costs associated with shifting
from renting to owning are somewhat lower because of the
greater ease of moving from rental accommodation.   Two
changes, however, are necessary to reflect the influence of
first-time homebuyers. First, to include the effect of first-
time homebuyers we aggregate over all households (HH) rather
than simply households already occupying single-family housing.
Second, the effect of the rental price variable becomes am-
biguous in the household move equation since an increase in the
relative price of alternative rental accommodation increases
the demand for homeownership, and hence moves, for first-time

homebuyers. On the other hand, such an increase reduces the desire of existing owners to move to rental accommodation. Consequently, the sign on the rental variable is indeterminant in the aggregate sales equation.

Similarly, the sign on the rental variable in the alterations and additions equation is ambiguous since an increase in rent discourages existing homeowners from adjusting their housing by shifting to rental accommodation. Since such shifts usually arise in response to a desire for reduced housing consumption, higher rents should be accompanied by a reduction in the normal maintenance expenditures on ownership homes. On the other hand, higher rents may also imply increased expenditures as some owner-occupiers are induced to partition their homes into smaller rental units and some non-occupier investors respond by upgrading their housing investment.

Finally, it is possible that a household might not remedy its disequilibrium simply by one mode of adjustment but might combine moving with alterations or additions to the newly purchased home.[25] To allow for this possibility, the sales variable was introduced in lagged form (to represent the delay in upgrading expenditures after acquisition) into the alterations and additions equation.

Redefining the model to include these modifications but ignoring the lag structure generates the following linearized estimating equations.[26]

$$S = b_0 + b_1 \Delta Y \cdot HH + b_2 \Delta Z \cdot HH - b_3 \Delta PH \cdot HH - b_4 \Delta RM \cdot HH +$$
$$b_5 \Delta HC + b_6 \Delta CC \cdot HH + b_7 \Delta PH^e \cdot HH \pm b_8 \Delta R \cdot HH + \varepsilon \qquad (11)$$

$$A = a_0 + a_1 \Delta Y \cdot SH \mp a_2 \Delta Z \cdot SH + a_3 \Delta PH \cdot SH + a_4 \Delta RM \cdot SH -$$
$$a_5 \Delta HC - a_6 \Delta CC \cdot SH + a_7 \Delta PH^e \cdot SH \pm a_8 \Delta R \cdot SH + a_9 S + \varepsilon^1 \quad (12)$$

The nature of the adjustment choice decision is clearly indicated in equations (11) and (12) by the anticipated opposite signs of the PH, RM, HC and CC variables since these indicate that when the transactions costs primarily associated with moving (PH, RM, and HC) fall, housing disequilibrium is more likely to be remedied by moving than by expenditures for alterations and additions. When the costs primarily associated with alterations and additions (CC) decrease, housing disequilibrium is more likely to be reduced by these expenditures and the number of moves will decline. Although the expected impact of Y and PH^e on both moving and expenditures for alterations and additions is indicated to be positive, if the elasticity is significantly greater for disequilibrium adjustment via one mode compared to the other, the substitution effect might dominate the expected price or income effect and a negative sign might be appropriate with respect to the inferior alternative.

In addition to sales and expenditures for alterations and additions, the used house market is characterized by the behavior of housing prices. Although the single-family house market is a market characterized by heterogeneous commodities, the close substitutability of housing units and high degree of competitiveness in the market suggests prices are determined by the interaction of the stock demand for homeownership housing services, H_j^*, with the stock supply of these services. Thus we directly solve for the price of the existing housing units by a minor modification of equation (1). Assuming the stock demand for homeownership housing services is proportionate to the stock demand for housing units, and that the stock supply of these services is proportional to the stock supply of single housing units, SH, the linearized price determination model for single-family housing based on equation (1) may be specified as

$$PH = b_0 + b_1 Y + b_2 Z - b_3 RM + b_4 PC +$$
$$b_5 R + b_6 PH^e - b_7 SH + \varepsilon \qquad (13)$$

IV. The Empirical Results

The basic theoretical model described in the previous section was estimated with quarterly data over the period

from 1969 to 1980 using OLS estimation. The empirical estimates
of the sales and alterations and additions equations are pre-
sented in Table II. Because of co-linearity between the change
in population and lagged sales variables in the alterations and
additions equation, three alternative specifications of this
equation are shown in Table II. These variations consist of
entering the change in population and lagged sales variables
separately and together in the alterations and additions equa-
tions. The inclusion of both variables (column 4) generates
the highest $\bar{R}^2$ and lowest SER (%), which suggests there may
be some jointness in the adjustment process even though both
of the co-linear explanatory variables appear insignificant.
This interpretation is supported by the significance of the
sales variable when the change in population variable is omitted
(column 3). However, our preferred specification is that which
includes the change in population variable without the sales
variable (column 2), and the discussion which follows of the
empirical results pertains to this specification.

The empirical estimates of the price equation are shown in
equation (14). A description of the modifications necessary
to empirically estimate the model is included with the discussion
of the empirical results presented in this section. A detailed
discussion of the variables and the data sources is presented
in Appendix A.

TABLE II

Regression Results, 1969:2 - 1980:4 *

Independent Variables	(1) Sales of Existing Homes	(2) Alterations and Additions (real expenditures)	(3) Alterations and Additions (real expenditures)	(4) Alterations and Additions (real expenditures)
Expected Change in House Prices	.017E-03 (3.8)	-4.7E-08 (2.1)	-2.6E-08 (1.2)	-3.7E-08 (1.6)
Change in Mortgage Rate	-.036 (6.0)	2.96E-06 (1.8)	2.79E-06 (1.4)	2.46E-06 (1.5)
Divorce	.254 (2.5)	---	---	---
Population Aged 35-44	1.41 (6.4)	.0081 (7.7)	---	.0062 (2.2)
Change in (Income/ Construction Costs)	---	2.30E-07 (2.2)	3.63E-08 (4.7)	3.12E-08 (3.8)
Change in (House Prices/Income)	-.118 (2.9)	---	---	---
Change in (House Prices/ Construction Costs)	---	-.162 (3.0)	-.153 (3.3)	-.138 (3.1)
Sales	---	---	3.9E-03 (8.0)	9.36E-04 (0.7)
Housing Completions	.472 (3.7)	---	---	---
Q3	193.8 (5.6)	---	---	---
Constant	77.8 (0.8)	7.24 (57.5)	5.11 (16.2)	6.73 (9.3)
$\bar{R}^2$	.941	.706	.721	.735
F	73.87	16.79	14.22	16.91
Ser (%)	7.48	7.61	7.41	7.23

* bracketed numbers are t statistics

$$PH = 27,576 + .0999Y_{t-1} - 1160.9RM + .450POP - 42,598 \left[\frac{SH}{HH}\right]_{t-1}$$
$$(1.72) \quad (1.51) \quad\quad (2.81) \quad\quad (1.80) \quad\quad (1.59)$$

$$+ .725PH_{t-1,t-4} + 608.0(RM - RM_{t-8}) + 320.7Q1$$
$$(2.52) \quad\quad\quad (2.50) \quad\quad\quad\quad (1.04)$$

$$+ 954.6Q2 + 1225.6Q3 \quad\quad\quad\quad\quad\quad\quad\quad\quad (14)$$
$$(2.57) \quad\quad (4.80)$$

$\bar{R}^2 = .999$, $F = 3602.2$

$DW = 1.47$, 1969:2-1980:4

where: POP is population aged 35-44, and

$PH_{t-1,t-4}$ is a four quarter distributed lag on PH.

A. Demographic Variables

Equation (1) hypothesizes that the desired housing characteristics vary with demographic changes closely associated with life cycle and family size. A number of demographic variables were empirically considered to represent these changes including births, divorces, and population over various age categories associated with homeownership. The empirical results indicate that demographic variables in the form of divorces and change in the population age 35-44 exert a significant influence in the used house market, while births do not.[27]

The significance of the divorce variable on the demand for housing services is quite obvious since divorce changes the economic and demographic characteristics of the household and in fact usually creates two households. As a result a divorce often triggers a home sale as part of the adjustment to the new size and financial circumstances of the smaller housing unit. Moreover, the financial settlement often requires the sale of the house. The coefficient of .254 suggests that one out of four divorces triggers an immediate home sale. This estimate seems reasonable given the number of previous renters and tendency to postpone the housing adjustment until a convenient time with respect to the education of children.

The change in the population aged 35-44 is extremely significant in explaining both the volume of housing sales and expenditures for alterations and additions. This suggests that household disequilibrium reaches the threshold level after approximately ten years of homeownership.[28] Consequently households make the housing adjustment either by trading-up their house or undertaking upgrading expenditures at this stage in their life cycle. The coefficient of 1.41 in the sales regression suggests that a net change in the population size in this age category stimulates more than one home sale through the chain of sales that a trading decision encourages (i.e., the purchase of a new home or a previously occupied unit and sale of the presently occupied home, etc.).[29]

The population variable also was significant in the
price determination equation indicating that population
growth in this age bracket exerts upward pressure on
housing demand and housing prices. In addition, a supply/
demand imbalance variable measured by the ratio of the
lagged stock of single-family houses to total households
exerts the expected downward pressure on the price of houses.

B.   Income, Price and Price Expectations

The basic economic variables affecting the demand for
homeownership -- income, the price of housing, and the mort-
gage interest rate -- also needed to be more precisely defined
before implementing our empirical specification. The income
variable is defined as per capita permanent personal income
in current dollars. The house price variable is derived from
the National Association of Realtors existing home sales
series and represents the median sales price of existing
homes. Our empirical specification entered the income
variable in both the sales and alterations and additions
equations relative to the cost of housing and the cost of
renovations respectively. Thus, permanent income entered
the equations in real terms. The ratio of the price of
houses to permanent income was used in the sales equation to
represent the cash flow affordability of housing while the
ratio of permanent income to construction costs was used in the
alterations and additions regression to represent the cash
flow affordability of these expenditures. These variables
are significant in their respective regressions indicating

affordability has a significant influence on activity in both segments of the existing home market, and that rising real incomes encourage both trading up and upgrading renovation expenditures. In our price determination equation the un-deflated permanent income variable was also significant, (at the 10 percent level). This positive coefficient implies that higher nominal incomes are directly related to higher house prices.

Because current housing consumption and investment decisions depend upon expectations of future house prices as well as current affordability,[30] an expected house price appreciation variable was constructed and entered into each equation. The price expectation term was derived using a polynomial distributed lag on the median house price series.[31] Since theory provides little guidance on the appropriate degree of the polynomial or the length of the lag distribution, various lag structures were attempted and the statistically best (i.e., most significant) were used in the estimated regressions. A ten-quarter lag was used in the sales re-gression and four-quarter lag in the alterations and additions and price determination regressions.

The price expectation variable is significant in all three regressions. It has a highly significant positive sign in the home sales equation, implying that higher expected house price appreciation encourages more home purchases. The variable has a statistically significant negative sign in the alterations and additions regression. This is consistent

with the hypothesis that alterations and additions generally remedy smaller disequilibria, and that large disequilibria generated by rising price expectations cause households to undertake major adjustments by moving rather than by renovating. The negative substitution effect thus appears to dominate the positive price expectation effect in the case of renovations. The positive sign of the price expectations variable in the price equation indicates that expectations about future house prices are consistent with short-run extrapolative expectational models. The rental price variable was insignificant in all regressions which is consistent with the previous theoretical discussion that suggested that the sign of the coefficient was indeterminant.

C. The Mortgage Rate

A key variable in all three regressions is the conventional mortgage interest rate. This variable is specified in both level and difference form. In its level form the variable proxies the affordability of housing. In its difference form the variable represents transactions costs associated with the non-assumability of mortgages and changes in housing affordability.

In the sales equation the change in the mortgage rate is taken as a three-quarter distributed lag. The negative sign indicates that rising mortgage costs discourage housing sales both by reducing the affordability of new housing acquisitions and by causing the transacting parties to lose the low interest

rate on existing mortgages when these mortgages are non-transferable.[32] In the alterations and additions regression the change in the mortgage rate is taken as the difference between the current and eight-quarter lagged rated. The positive sign indicates that as the transactions costs of moving associated with losing favorable mortgage financing on non-assumable mortgages increase, expenditures on alterations and additions rise. Thus an increase in mortgage costs shifts the adjustment mode from housing turnovers to increased expenditures for housing renovations.

The level of the mortgage rate on new financing also affects the overall demand for housing both for consumption and investment purposes, and hence the level of the mortgage rate is significant with a negative sign in the house price equation. However, not all mortgages are non-assumable. As a result the benefits of existing low rate mortgages are often acquired jointly with the house, and are normally capitalized in the price of the house. This capitalization effect is reflected in the significant positive coefficient on the difference between the current and eight-quarter lagged mortgage rate in the price determination regression.

D. Construction Costs and Market Tightness

The empirical results also indicate two other factors are significant in the choice of mode used to increase housing consumption. The first of these is construction costs which exert a significant downward impact on alteration

and addition expenditures. Construction costs were insig-
nificant in the sales regression suggesting the effect was
greater on renovation expenditures directly than on shifting
the mode of adjustment from renovation to moving.

The second influence is the degree of housing market
tightness as reflected in the volume of new housing com-
pletions.[33] Higher new completions significantly increase
housing sales by increasing the choice of housing alterna-
tives and reducing the search costs associated with a
household move. On the other hand, new completions are in-
significant in explaining alteration and addition expen-
ditures, which suggests that the degree of market tightness
affects the volume of housing turnovers directly but that
it has little effect on shifting the upgrade mode between
moving and renovating. The variable may also be interpreted
as reflecting the linkage between new and existing housing
activity since the purchaser of a new home is often an
existing homeowner and the completion of a new home triggers
a chain of sales. The coefficient of .472 in the sales
regression indicates that almost half of new completions
elicit existing house sales as new home purchasers trade
up from their existing homes.

V.   Summary and Conclusions

The preceding discussion indicates that behavior in the
existing single-family house market can be characterized

essentially in terms of households seeking to adjust disequilibrium in their housing consumption and investment by moving, by undertaking expenditures for alterations and additions, or by some combination of these modes. A housing adjustment is made when the present value of the costs of disequilibrium exceed the costs of such an adjustment. The choice of the adjustment mode is significantly influenced by the transactions costs of moving and the adjustment costs of renovating.

The volume of housing sales was shown to depend significantly upon the nominal price of housing relative to permanent income, the mortgage rate, the expected future price of houses, the size of the population aged 35-44, the number of divorces and the volume of single-family housing completions. The real value of expenditures for alterations and additions was shown to depend significantly upon the cost of construction relative to the price of housing, the expected future price of housing, the difference between the current and lagged mortgage rate, real permanent income and the size of the population aged 35-44. The mortgage rate and price expectations were significant in affecting the mode of adjustment. Housing sales varied directly and alteration and addition expenditures varied inversely with rising price expectations. Sales varied inversely and alteration and addition expenditures varied directly with rising mortgage rates.

The analysis also indicated that prices in the existing house market are determined by the interaction of the stock

demand for homeownership and the stock supply of houses.

Housing prices were shown to depend significantly upon per-
manent income, the expected future price of housing, the
current level of the mortgage rate, the difference between
the current and lagged mortgage rate, the size of the popu-
lation aged 35-44 and the ratio of the stock of housing
relative to the number of households.

Our results also have a number of implications for the
future relative importance of activity in the existing and
new housing sectors. The sensitivity of moving and renovating
activity to the population aged 35-44 suggests these activi-
ties will continue to show considerable strength after new
construction weakens in the late 1980's due to a decline
in population in the new household formation age bracket.
The relative insensitivity but positive relationship of
alteration and addition expenditures with the rate of in-
terest on new mortgages suggests alteration and addition
expenditures will have a tendency to fluctuate inversely
with new residential construction expenditures which are
highly sensitive and negatively correlated with the mortgage
rate. Finally, the paper clearly shows the close linkages
between the used housing market and demographic and economic
conditions. It thus contributes to our understanding of the
dynamics of the housing market.

FOOTNOTES

1. See for example Fair and Jaffee, 1972; Jaffee and Rosen, 1979;
Grebler and Maisel, 1961; Huang, 1966; Kearl, 1979; Maisel,
1963 and 1965; Rosen, 1979; Smith, 1969; and Sparks, 1967.

2. Some attention has been given to selected aspects of
this market. For example, Chinloy, 1980 and 1981;
Mendelsohn, 1977; Muth, 1974; and Margolis, 1981.

3. For example, in many models of new residential construction
changes in the value of the existing housing stock affect
the profitability of new construction and hence the level
of this construction.

4. Seiders, 1980.

5. For a discussion of this search procedure and the proba-
bility of a successful house sale see Chinloy, 1980.

6. This assumes economies of scale in the information
process that give rise to brokers who can provide part
of the information at a lower cost than the principals
would incur directly.

7. For an analysis of the theoretical impacts of transactions
costs see Muth, 1974.

8. In about seventeen states the courts have disallowed
the enforcement of a due-on-sale clause in the mortgage
contract, thereby allowing the assumption of a low
interest rate mortgage.

9. This point is raised in the literature on housing turnovers.
See, for example, Hanushek and Quigley, 1978; Weinberg,
Friedman and Mayo, 1981; and Speare, 1974.

10. For a discussion of the disequilibrium in micro models see
Hanushek and Quigley, 1978; and Weinberg, Friedman and
Mayo, 1981.

11. This ignores the disinvestment decision of undermaintenance although such an option would be viable if the present value of the deferred maintenance exceeds the present value of the reduced capital values and altered transactions costs.

12. For a review of many of these models see de Leeuw, 1971 and Polinsky, 1977.

13. We abstract from tenure choice considerations and assume that sales activity would only marginally be affected by variables that independently affect tenure choice. Most variables, like inflationary expectations, that affect tenure choice also affect turnover and are included as explanatory variables. For a discussion of models bearing on tenure choice, see Rosen and Rosen, 1980 and Weiss, 1978.

14. The user costs of housing are delineated in detail in Rosen and Rosen, 1980. In the following model we abstract from changes in the average marginal tax bracket and hence this variable is omitted in equation (1).

15. Although the government treasury bond yield over the anticipated holding period would be a more appropriate alternative yield, we use the RM variable to represent alternative yields since it is already an included variable and is highly correlated with the medium term bond yield.

16. The appropriate specification of the relative investment return is based on the expected after-tax gains from owning a larger house minus the additional expenditures corrected for consumption benefits, relative to the yield on alternative investments. (The current net rental yield R/PH is not included since the house is owner-occupied.) Because of the interaction of the tax structure and inflation, the return to homeownership from accelerating inflation increases nonlinearly. For a discussion of these forces, see Rosen and Rosen, 1980; Hendershott and Hu, 1981; Diamond, 1980; and Kearl, 1979.

17. See Weinberg, Friedman, and Mayo, 1981, for a discussion of some of these issues.

18. This assumes depreciation and normal maintenance do not alter the actual housing attributes.

19. For example, Hanushek and Quigley, 1978; Weinberg, Friedman, and Mayo, 1981; Muth, 1974; Mendelsohn, 1977; and Chinloy, 1980.

20. This assumes a relative efficiency of obtaining information via brokers or agents and assumes their fees represent the cost of information.

21. Straszheim, 1975, p. 83 makes this observation but does not utilize it in his empirical work.

22. Equations (9) and (10) have been simplified by deleting PC, which is highly co-linear with other included variables.

23. Investor sales, which are also omitted, may be incorporated into the model by assuming that gross transactions are some constant multiple of the net change in investor holdings, and that net investor holdings adjust according to changes in the expected yield on single-family housing relative to the yield on alternative investments. Assuming the relative yield depends upon the net cash flow return (which is based on the implicit rent, R, and the nominal price of homes, PH) and expected capital appreciation, PH^e, relative to alternative investment yields represented by the current mortgage rate, RM, the net change in investor demand may be incorporated into the previous equations by reinterpreting the estimating coefficients.

24. National Association of Realtors, 1981, p 6.

25. Our specification also ignores the case of speculative renovations by third parties attempting to make an arbitraging profit since this activity was relatively rare during the estimation period.

26. In this specificaiton, ΔZ is defined as a rate. Rather than scale this variable, the actual population numbers are used in the estimating equations, which thus approximate the rates scaled by HH or SH. Similarly, for HC no scaling is shown since HC is essentially in the same unit of measure as S and A.

27. The insignificance of the birth variable may be due to an inappropriate leading or expectational specification. Since births are often planned, an incorrect lead structure may have been tested. Alternatively, the effect of births could be randomly or widely distributed over time.

28. The median age for first-time homebuyers was 28 over the estimation period.

29. The large size of the coefficient may also indicate that the appropriate age bracket should be larger and that the population size of the enlarged bracket is highly correlated with the included variable. However, since data is available only in ten-year intervals, we were precluded from a more precise age bracket specification. The 35-44 age bracket is substantially better than any other multiple of ten according to the usual statistical tests.

30. For a discussion of the impact of price expectations see Grebler and Mittelbach, 1979; Henderson and Hu, 1981; and Rosen and Rosen, 1980.

31. This procedure should approximate a rational expectations model. See Feldstein and Flemming, 1971, for an elaboration of this approach.

32. The benefits of the loss of the low rate financing go to the lending institution and are lost to both the buying and selling party when there is non-assumability.

33. Vacancies would not be an appropriate measure of market tightness in the homeownership market because they do not reflect excess demand at the prevailing marginal reservation price. This would more closely be reflected in a sales to real estate listing ratio or listing to housing stock ratio. However, measures of these ratios do not exist nationally.

Appendix A: Data Sources

The key data series which made implementation of this
model possible were estimates of the sales volume of exist-
ing homes published in the Federal Reserve Bulletin.   These
data on sales volume of existing homes are collected by the
National Association of Realtors.   The Realtors aggregate
the sales volume of their local boards and then construct a
national total using data from the Annual Housing Survey
Tapes to expand their survey to the universe of all home
sales. This technique assures consistency among the two es-
timates of home sales volume.

The two demographic variables, divorces and population
aged 35-44, were derived from official government data sources.
The divorce data are collected by the National Center for
Health Statistics.   The population data are from the Bureau
of the Census estimates of resident population.   In addition,
a number of the economic series were scaled by total house-
holds, also derived from the Bureau of the Census.

In terms of economic series, three variables were used:
income, house price, and the mortgage interest rate.   The income
series is per capita personal income in current dollars.   The
house price series was derived from the National Association of
Realtors' existing home sales series and represents the median
sales price of existing homes.   The mortgage interest rate series
is the conventional mortgage interest rate for all lenders as com-
piled by the Federal Home Loan Bank Board.   The completions of
housing data are from the Census Bureau's monthly survey.

BIBLIOGRAPHY

Chinloy, Peter T., "An Empirical Model of the Market for Resale Homes," *Journal of Urban Economics*, 7, (May, 1980), pp. 279-92.

Chinloy, Peter T., "The Effect of Maintenance Expenditures on the Measurement of Depreciation in Housing," *Journal of Urban Economics*, 8, (July, 1981), pp. 86-107.

de Leeuw, Frank, "The Demand for Housing: A Review of Cross Section Evidence," *Review of Economics and Statistics*, 53, (February, 1971), pp. 1-10.

Diamond, Douglas B., "Taxes, Inflation, Speculation, and the Cost of Homeownership," *American Real Estate and Urban Economics Association Journal*, 8, (Fall, 1980), pp. 281-98.

Fair, Ray C. and Jaffee, Dwight, "Methods of Estimation for Markets in Disequilibrium," *Econometrica*, 40, (May, 1972), pp. 487-514.

Feldstein, Martin S. and Flemming, J.S., "Tax Policy, Corporate Saving and Investment Behavior in Britain," *Review of Economic Studies*, 38, (October, 1971), pp. 415-34.

Grebler, Leo and Maisel, Sherman J., "Determinants of Residential Construction: A Review of Present Knowledge," in *Impacts of Monetary Policy*, Commission on Money and Credit, (Englewood Cliffs, NJ: Prentice Hall, 1963), pp 475-620.

Grebler, Leo and Mittelbach, Frank, *The Inflation of House Prices* (Lexington, MA: Lexington Books, 1979).

Guttentag, Jack M., "The Short Cycle in Residential Construction, 1946-59," *American Economic Review*, 51. (March, 1961), pp. 275-98.

Hanushek, E. and Quigley, John M., "An Explicit Model of Intra-Metropolitan Mobility," *Land Economics*, 54, (November, 1978), pp. 411-29.

Hendershott, Patric and Hu, S.C., "Inflation and Extraordinary Returns to Owner-Occupied Housing," *Journal of Macroeconomics*, forthcoming 1981

Huang, David S., "The Short Run Flows of Non-Farm Residential Mortgage Credit," *Econometrica*, 34, (April, 1966), pp. 433-59.

Jaffee, Dwight M., "An Econometric Model of the Mortgage Market," in *Savings Deposits, Mortgages and Housing*, Gramlich, E. and Jaffee, D., editors, (Lexington MA: D.C. Health Co., 1972), Ch. 5.

Jaffee, Dwight M. and Rosen, Kenneth T., "Mortgage Credit Availability and Residential Construction," *Brookings Papers on Economic Activity,* 2, 1979.

Kearl, James R., "Inflation, Mortgages and Housing," *Journal of Political Economy,* 87, (October, 1979), pp. 1115-38.

Maisel, Sherman J., "A Theory of Fluctuations in Residential Construction Starts," *American Economic Review,* 53, (June, 1963), pp. 359-83.

Maisel, Sherman J., "Non-Business Construction," in *The Brookings Quarterly Econometric Model of the United States,* J.S. Duesenberry et. al. editors (Chicago: Rand McNally and Co., 1965).

Margolis, Stephen, "Depreciation and Maintenance of Houses," *Land Economics,* 57, (February, 1981), pp. 91-105.

Mendelsohn, R., "Empirical Evidence on Home Improvements," *Journal of Urban Economics,* 4, (October, 1977), pp. 459-68.

Muth, Richard F., "Moving Costs and Moving Expenditures," *Journal of Urban Economics,* 1, (January, 1974), pp.108-25.

National Association of Realtors, *National Homebuying Survey,* (Washington, D.C.: National Association of Realtors, 1981), p.6.

Polinsky, A. Mitchell, "The Demand for Housing: A Study in Specification and Grouping," *Econometrica,* 45, (March, 1977), pp.447-61.

Rosen, Harvey S. and Rosen, Kenneth T., "Federal Taxes and Homeownership: Evidence from Time Series," *Journal of Political Economy,* 88, (February, 1980) pp. 59-75.

Rosen, Kenneth T., *Seasonal Cycles in the Housing Market: Patterns, Costs and Policies* (Cambridge, MA: M.I.T. Press, 1979).

Seiders, David, "Major Developments in Residential, Mortgage and Housing Markets Since the Hunt Commission," *Journal of the American Real Estate and Urban Economics Association,* 8, (Spring, 1980), pp. 4-32.

Smith, Lawrence B., "A Model of the Canadian Housing and Morgage Markets," *Journal of Political Economy,* 77, (October, 1969), pp. 795-816.

Sparks, Gordon R., "An Econometric Analysis of the Role of
    Financial Intermediaries in Postwar Residential
    Building Cycles" in *Determinants of Investment Behavior*,
    R. Ferber, editor (New York: National Bureau of Economic
    Research, 1967).

Speare, A. Jr., "Residential Satisfaction as an Intervening
    Variable in Residential Mobility," *Demography*,
    (May, 1974), pp. 173-88.

Straszheim, Mahlon H., *An Econometric Analysis of the Urban
    Housing Market* (New York, National Bureau of Economic
    Research, 1975).

Weinberg, D.H., Friedman, J. and Mayo, S.K., "Intraurban
    Residential Mobility: The Role of Transactions Costs,
    Market Imperfections and Household Disequilibrium,"
    Journal of Urban Economics, 8, (February, 1981),
    pp. 62-75

Weiss, Yoram, "Capital Gains, Discriminatory Taxes and the
    Choice Between Renting and Owning a House, " *Journal
    of Public Economics*, 10, (February, 1978), pp.45-56.

CENTER FOR REAL ESTATE AND URBAN ECONOMICS
WORKING PAPER SERIES PUBLICATION LIST

Institute of Business and Economic Research
156 Barrows Hall, University of California
Berkeley CA 94720

The following working papers in this series are
available at a charge of $5.00, which partially covers
the cost of reproduction and postage. Papers may be
ordered from the address listed above. Checks should
be made payable to the Regents of the University of
California.

———*———*———*———*———*———*———*———*———*———*———*———*———*———*———

79-1   Kenneth T. Rosen and David E. Bloom. "A Microeconomic
          Model of Federal Home Loan Mortgage Corporation Activ-
          ity." April 1979.

80-2   Kenneth T. Rosen and Mitchel Resnick. "The Size Distri-
          bution of Cities: An Examination of the Pareto Law and
          Primacy." July 1979.

80-3   Jennifer R. Wolch. "Residential Location of the
          Service-Dependent Poor." August 1979.

80-4   Stuart Gabriel, Lawrence Katz, and Jennifer Wolch.
          "Local Land-Use Regulation and Proposition 13: Some
          Findings from a Recent Survey." September 1979.

80-5   David Dale-Johnson. "Hedonic Prices and Price Indexes
          in Housing Markets: The Existing Empirical Evidence and
          Proposed Extensions." January 1980.

80-6   Susan Giles Levy. "Consumer Response to High Housing
          Prices: The Case of Palo Alto, California." January
          1980.

80-7   Dwight Jaffee and Kenneth T. Rosen. "The Changing
          Liability Structure of Savings and Loan Associations."
          February 1980.

80-8   Dwight Jaffee and Kenneth T. Rosen. "The Use of Mort-
          gage Passthrough Securities." February 1980.

80-9   Stuart A. Gabriel. "Local Government Land-Use
          Allocation in the Wake of a Property Tax Limitation."
          May 1980.

80-10   Kenneth T. Rosen. "The Affordability of Housing in 1980 and Beyond." June 1980.

80-11   Kenneth T. Rosen. "The Impact of Proposition 13 on House Prices in Northern California: A Test of the Interjurisdictional Capitalization Hypothesis." June 1980.

80-12   Kenneth T. Rosen. "The Federal National Mortgage Association, Residential Construction, and Mortgage Lending." August 1980.

80-13   Lawrence Katz and Kenneth T. Rosen. "The Effects of Land Use Controls on Housing Prices." August 1980.

80-14   Kenneth T. Rosen. "The Demand for Housing Units in the 1980s." September 1980.

80-15   Konrad Stahl. "A Note on the Microeconomics of Migration." October 1980.

80-16   John T. Rowntree and Earl R. Rolph. "Efficient Community Management." August 1980.

80-17   John M. Quigley. "Non-linear Budget Constraints and Consumer Demand: An Application to Public Porgrams for Residential Housing." September 1980.

80-18   Stuart A. Gabriel and Jennifer R. Wolch. "Local Land-Use Regulation and Urban Housing Values." November 1980.

80-19   F. E. Balderston. "The Structural Option for the Savings and Loan Industry." November 1980.

80-20   Kristin Nelson. "San Francisco Office Space Inventory." November 1980.

80-21   Konrad Stahl. "Oligopolistic Location under Imperfect Consumer Information." December 1980.

80-22   Konrad Stahl. "Externalities and Housing Unit Maintenance." December 1980.

81-23   Dwight M. Jaffee and Kenneth T. Rosen. "The Demand for Housing and Mortgage Credit: The Mortgage Credit Gap Problem." March 1981.

81-24   David E. Dowall and John Landis. "Land-Use Controls and Housing Costs: An Examination of San Francisco Bay Area Communities." March 1981.

81-25   Jean C. Hurley and Constance B. Moore. "A Study of Rate
         of Return on Mortgage Pass Through Securities."   March
         1981.

81-26   Kenneth T. Rosen. "The Role of Pension Funds in Housing
         Finance." April 1981.

81-27   John M. Quigley. "Residential Construction and Public
         Policy: A Progress Report." April 1981.

81-28   Kenneth T. Rosen. "The Role of the Federal and 'Quasi-
         Federal' Agencies in the Restructured Housing Finance
         System." June 1981.

81-29   Diane   Dehaan   Haber   and   Joy   Hashiba   Sekimura.
         "Innovations in Residential Financing: An Analysis of
         the Shared Appreciation Mortgage and a Comparison of
         Existing Alterntive Mortgage Instruments." June 1981.

81-30   Diane Dehaan Haber and Joy Hashiba Sekimura. "Alterna-
         tive Mortgages Consumer Information Pamphlet." June
         1981.

81-31   Jean C. Hurley.   "A Model for Pricing Pass-Through
         Securities Backed by Alternative Mortgage Instru-
         ments." June 1981.

81-32   Kenneth T. Rosen.   "The Affordability of Housing in
         California. September 1981.

81-33   Kenneth T. Rosen and Lawrence Katz.   "Money Market
         Mutual Funds: An Experiment in Ad Hoc Deregulation."
         September 1981.

81-34   Kenneth T. Rosen.   "New Mortgage Instruments: A
         Solution to the Borrower's and Lender's Problem."
         September 1981.

81-35   Konrad Stahl. "Toward a Rehabilitation of Industrial,
         and Retail Location Theory." September 1981.

81-36   Frederick E. Balderston.   "S&L Mortgage Portfolios:
         Estimating the Discount from Book Value." October 1981.

81-37   Kenneth T. Rosen. A Comparison of European Housing Fi-
         nance Systems." October 1981.

81-38   Frederick E. Balderston. "Regression Tests of the Rela-
         tionship between Book Net Worth and Revised Net Worth of
         S&Ls." October 1981.

81-39   Lawrence B. Smith and Peter Tomlinson.   "Rent Controls in Ontario: Roofs or Ceilings?" November 1981.

81-40   Alan R. Cerf.   "Investment in Commercial Real Estate Including Rehabilitation: Impact of the Tax Recovery Act of 1981." November 1981.

81-41   Frederick E. Balderston. "The Savings and Loan Mortgage Portfolio Discount and the Effective Maturity on Mortgage Loans." November 1981.

82-42   John M. Quigley. "Estimates of a More General Model of Consumer Choice in the Housing Market." January 1982.

82-43   Martin Gellen. "A House in Every Garage: The Economics of Secondary Units." March 1982.

82-44   John D. Landis. "California Housing Profiles: 1980." March 1982.

82-45   Paul F. Wendt.   "Perspectives on Real Estate Investment." February 1982.

82-46   Kenneth T. Rosen and Lawrence B. Smith. "The 'Used House Market.'" May 1982.

82-47   Kenneth T. Rosen. "Deposit Deregulation and Risk Management in an Era of Transition." May 1982.

82-48   Steven W. Kohlhagen. "The Benefits of Offshore Borrowings for the S&L Industry." May 1982.

82-49   Lawrence B. Smith. "The Crisis in Rental Housing: A Canadian Perspective." June 1982.

82-50   Anil Markandya. "Headship Rates and the Household Formation Process in Great Britain." June 1982.

82-51   Anil Markandya. "Rents, Prices and Expectations in the Land Market." June 1982.

82-52   Kenneth T. Rosen. "Creative Financing and House Prices: A Study of Capitalization Effects." July 1982.

82-53   Kenneth T. Rosen and Lawrence B. Smith. "The Price Adjustment Process for Rental Housing and the Natural Vacancy Rate." September 1982.

82-54   Frederick E. Balderston. "Analysis of the Viability of S&L Firms." September 1982.

82-55   Lawrence B. Smith, Kenneth T. Rosen, Anil Markandya and
         Pierre-Antoine Ullmo. "The Demand for Housing, Household
         Headship Rates, and Household Formation: An International
         Analysis." October 1982.

82-56   Sherman Maisel and Kenneth Rosen. "The Macroeconomics of
         Money Market Mutual Funds." December 1982.

82-57   Frederick E. Balderston. "The Time-Path Viability of S&L
         Firms -- Part One: Firms Characterized by Accounting Data
         Only, With and Without Savings Growth." December 1982.

83-58   Alan R. Cerf. "Homeownership: Tax Incentives and National
         Policy." March 1983.