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THE ECONOMICS OF TENURE CHOICE, 1955-79

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ABSTRACT

The aggregate homeownership rate in the United States has continued to rise throughout the 1970s despite rising inflation and the rapid growth of young and primary individual households with relatively low homeownership rates. This appears to be a result of a decline in the cost of homeownership relative to renting. The post 1965 decline in the real after-tax interest rate has acted to reduce the costs of both types of housing. However, inflation and legislation induced increases in taxation of rental housing have largely offset the decline in the net real financing rate. Depreciation is based on historic cost and nominal capital gains are taxed. Moreover, this taxation was increased in 1969 and 1976 with the introduction and expansion of the minimum tax, the increased recapture of accelerated depreciation, and the amortization, rather than expensing, of construction period interest and property taxes.

The decline in the cost of owner-occupied housing relative to rental housing is estimated to have sharply increased homeownership. In the absence of this decline $4\frac{1}{2}$ to 5 million fewer households would have been homeowners at the end of 1978. That is, the homeownership rate would have been 60 percent, rather than 65 percent.

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The Economics of Tenure Choice, 1955-79

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Substantial concern arose in the 1970s regarding the "affordability" of owner-occupied housing.[1] House price increases generally exceeded increases in other prices, and a rising inflation premium was incorporated into mortgage interest rates. As a result, the ratio of the monthly mortgage payment on a constant quality house to average household income rose sharply.[2] In spite of this increase, the homeownership rate in the United States climbed throughout the 1970s. The climb was especially remarkable because the rapid growth in both young and primary individual households tended to reduce the homeownership rate [Jaffee and Rosen (1979)].

The explanation of the continued rise in the homeownership rate is, surprisingly, the same increase in inflation that purportedly has made ownership unaffordable.[3] The true real cost of homeownership fell sharply between the middle 1960s and late 1970s because the real after-tax financing rate

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1/ See, for example, Friedan and Solomon (1977), the Congressional Budget Office (1977) and Downs (1978).

2/ Modigliani and Lessard (1975) discuss the problems of the standard fixed payment mortgage and the merits of alternative mortgage instruments at some length. For a briefer presentation, see Hendershott and Villani (1977, pp. 17-24).

3/ Villani (1978) appears to have been the first to emphasize this point.

declined. That is, the mortgage rate, after allowing for its deductibility in computing one's taxable income, has risen by less than the expected rate of appreciation in the purchased house. While the real after-tax financing rate for rental housing has declined by even more because landlords tend to be in higher tax brackets than homeowners, the taxation of rental housing is less favorable than that of owner-occupied housing in inflationary periods. More specifically, nominal capital gains are taxed at the point of sale at both the capital gains and minimum (after 1969) tax rates, and tax depreciation is based on historic, rather than replacement, cost. Because of these factors, real rents have been roughly constant over the last quarter century. Thus homeownership has become relatively more attractive.

The present paper is structured in the following manner. In Section I, a framework is constructed for computing the real user cost of capital for owner-occupied housing, and data are employed to calculate this user cost quarterly over the 1955 to 1979 period. Section II does the same for rental housing. Differences and changes in tax treatment are highlighted. The relationship between the homeownership rate, adjusted for demographic changes, and the cost of owner-occupied housing relative to rental housing is demonstrated in Section III. A summary concludes the paper and an appendix lists the real user costs and the data underlying their calculation.

I. Owner-Occupied Housing

A. The General Framework

As is well-known, the decision to invest depends on whether the present value of the expected future cash flows generated by the investment exceeds the value of the initial equity investment and in equilibrium the two will be equal. For partially debt-financed owner-occupied housing, the gross revenues (positive cash flows) consist of an implicit flow of net rental services over time and a lump sum at the selling date (asset price net of selling costs and the outstanding mortgage on that date). The costs (negative cash flows) include mortgage and property tax payments, after allowance for their income tax deductibility.[4] Assume that

(i) inflation is expected to generate increases in net revenues at the quarterly rate p and housing prices at rate q,

(ii) the house, and thus the implicit rent, deteriorate at the quarterly rate d,

(iii) the fraction, α, of the purchase price is financed with a mortgage at rate i.

(iv) the house is expected to be sold after N periods, at which point a percentage realtor's fee, β, will be paid.

The equilibrium condition is then

$$(1-\alpha)P_k = \sum_{t=1}^{N} \frac{(1+p-\gamma_s d)^{t-1} R}{(1+e)^t} - \sum_{t=1}^{N} \frac{(1-\tau_y)\tau_p (1+q-\gamma_s d)^{t-1} P_k}{(1+e)^t} - \sum_{t=1}^{N} \frac{PAY_t}{(1+e)^t}$$

$$+ \sum_{t=1}^{N} \frac{\tau_y i L_{t-1}}{(1+e)^t} + \frac{(1-\beta)(1+q-\gamma_s d)^N P_k - L_N}{(1+e)^N}, \qquad (1.1)$$

[4] Inclusion of property tax payments in the cost of housing needs explanation. One may rightfully argue that property taxes are but payments for better community services (e.g., a better public school system), and for this reason should not be included as a cost of housing. This would be a valid criticism if our primary concern were with the choice of location of housing. Indeed, in areas where property taxes are higher, community services are better, other things being equal. On the other hand, our main concern is the cost of one more square foot of space when a house is being built (or remodeled). The additional property tax paid on this square foot is unlikely to render additional community services and thus is appropriately viewed as a cost of housing.

where

P_k is the purchase price of the house, including land,

γ_s is the ratio of the price of the structure to the total value of the investment,

R is the implicit rent during the first quarter,

τ_p and τ_y are the property tax rate and the marginal income tax rate of the purchaser,

PAY_t is the mortgage payment made, and

L_t is the loan outstanding at the end of period t.

The left-hand side equals the equity investment. The first sum on the right is the present value of the stream of implicit rents, the second sum the present value (negative) of property tax payments(allowing for their tax deductibility), the third the present value of mortgage payments, the fourth the present value of the tax saving from the interest deductions, and the last term the present value of the large sum remaining after the house is sold and the then outstanding mortgage is repaid. When the mortgage is a standard fixed-rate, fixed-payment mortgage or when the variable-rate is expected to remain at the constant value i through period N

$$PAY_t = PAY = \frac{(1+i)^M i \alpha P_k}{(1+i)^M - 1} \quad \text{and} \quad L_t = \frac{(1+i)^M - (1+i)^t}{(1+i)^M - 1} \alpha P_k, \tag{1.2}$$

where M equals the original term-to-maturity (in quarters) of the mortgage.

The real user cost of capital is a simple concept in theory; the user cost is the real rental rate that an economic unit would pay to rent a unit of real capital. In a world without taxes and inflation and with perfect capital markets, the user cost would equal "the" rate of interest plus the

depreciation rate. For owner-occupied housing the real user cost is obtained by substituting (1.2) into (1.1), employing the general finite sum rule that $\sum_{t=1}^{N} \frac{(1+p-\gamma_s d)^{t-1}}{(1+e)^t} = \frac{1 - (1+p-\gamma_s d)^N (1+e)^{-N}}{e-p+\gamma_s d}$, solving for R and dividing by the general price level P. The result is

$$R/P = \left(\frac{e-p+\gamma_s d}{\delta_p}\right) \frac{P_k}{P} \left[1 - \alpha + \frac{(1-\tau_y)\tau_p \delta_q}{e-q+\gamma_s d} + (1-\tau_y) \frac{(1+i)^M \alpha i}{(1+i)^M - 1}\left(\frac{1 - (1+e)^{-N}}{e}\right) + \right.$$

$$\frac{\tau_y \alpha i}{(1+i)^M - 1}\left(\frac{1 - (1+i)^N (1+e)^{-N}}{e-i}\right) + \frac{\alpha (1+i)^M (1+e)^{-N}}{(1+i)^M - 1} -$$

$$\left. \frac{\alpha (1+i)^N (1+e)^{-N}}{(1+i)^M - 1} - (1-\beta)(1-\delta_q) \right] \qquad (1.3)$$

where $\delta_p = 1 - \frac{(1+p-\gamma_s d)^N}{(1+e)^N}$ and $\delta_q = 1 - \frac{(1+q-\gamma_s d)^N}{(1+e)^N}$.

The rather complicated expression on the right-hand side of equation (1.3) is the hurdle rate that the real imputed rent from additional housing investment must exceed in order for the investment to be undertaken. The equilibrium real imputed rent or user cost, then, can be computed from the depreciation and expected inflation rates (d, p, and q), the structure-value ratio (γ_s), the terms of the mortgage (α, i, and M), the property tax rate and realtor's fees (τ_p and β), and the homeowner's expected holding period (N), income tax rate (τ_y), and required rate of return (e).

The finite holding period, in conjunction with β and the multiple expected inflation and financing rates, makes (1.3) a complicated expression. A series of

assumptions can transform (1.3) into a more familiar relationship that better illustrates the primary determinants of R/P. If the required after-tax rate of return equals the after-tax mortgage rate itself, i.e., $e = (1-\tau_y)i$, the expected housing inflation rates are equal ($p = q$) and there are no selling costs ($\beta = 0$), then one obtains[5/]

$$R/P = [(1-\tau_y)i - q + \gamma_s d + (1-\tau_y)\tau_p]P_K/P. \qquad (1.4)$$

The right side of (1.4) is a simple real user cost of capital expression that reflects the current tax treatment of housing (no taxation of implicit rents but deduction of property taxes and mortgage interest and no deductibility of depreciation expense) and of interest income (taxation at rate τ_y). As can be seen, the higher the tax rate, the lower is the cost of capital. Further, insofar as the mortgage rate does not rise by a multiple of increases in expected inflation, the reduction in the cost of capital owing to taxation is greater the higher is the expected inflation rate.

B. The Data

There are two housing prices series in the model: the price of implicit rents (the rent component of the consumer price index) and the price of houses (the NIA deflator for residential structures before 1963 and the Bureau of Census constant 1974 quality price thereafter). The price of other goods is represented by the consumer price index net of shelter. These price series are listed in the appendix. All indices are set equal to unity in the fourth quarter of 1964; thus the real imputed rent equals the gross marginal product (R/P_k) in that period.

5/ It is also assumed that $q - \gamma_s d < e$.

The calculation of the expected inflation rates is explained in detail in Hendershott and Hu (1980) and the expected rates are listed in the data appendix. The general expected inflation rate is a 16 quarter distributed lag on current and past rates of change in the deflator for nonfood business product net of energy and the impact of the 1971-75 price controls. The lagged weights were obtained from a regression explaining an eight-year U.S. government bond rate. The expected inflation rates in rents and house price are averages of the general expected inflation rate and a distributed lag on own past inflation rates where the lag weights are the same as those employed in computing the general inflation rate. The general and house price expected inflation rates are plotted in Figure 1. The rental expected inflation rate is similar to the general rate.

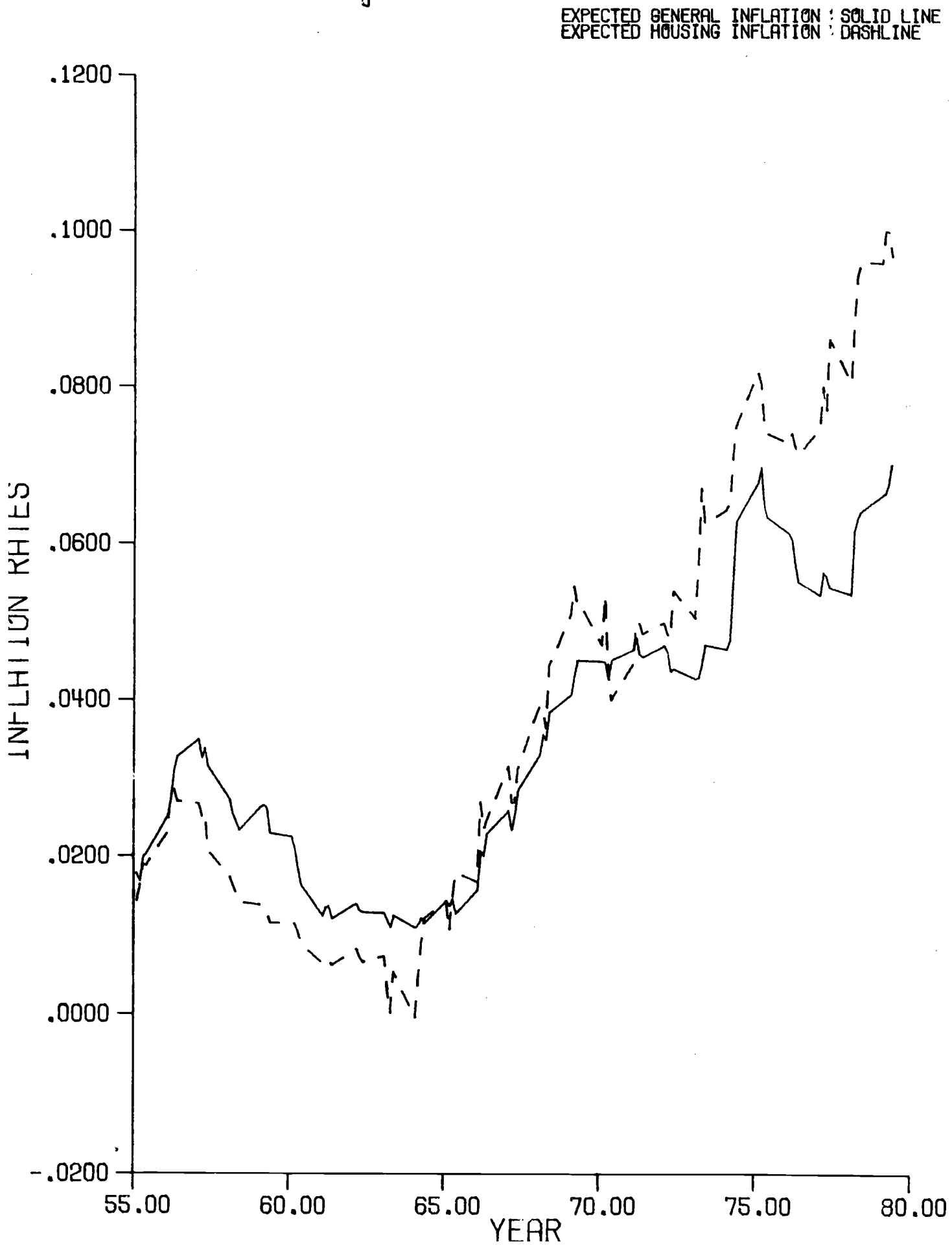
The required after-tax return on equity, e, for taxpayers in low to medium marginal tax brackets is taken to be the after-tax mortgage rate because taxable bonds and mortgages are reasonable investment alternatives. For taxpayers in higher tax brackets, tax-exempt securities offer a superior return. Because the long-term exempt rate has generally equalled 70 percent of the yield on comparable taxable bonds, it is assumed that

$$e = 0.7i \text{ for } \tau_y > 0.3$$

$$e = (1-\tau_y)i \text{ for } \tau_y \leq 0.3.$$

For $\tau_y \leq 0.3$, the costs of debt and own financing are the same and thus the cost of capital is independent of the method of financing. The house purchase is assumed to be 75 percent financed with a 25 year, fixed-rate mortgage. The mortgage yield series utilized is the FHA-HUD series for 1955-64, FHLB's effective rate series for the 1965-72 period and the FHLB's effective rate on 75%-25 year new home commitments for the 1973-79 period (FHLBB Journal, June 1978).

Figure 1: Expected Inflation Rates



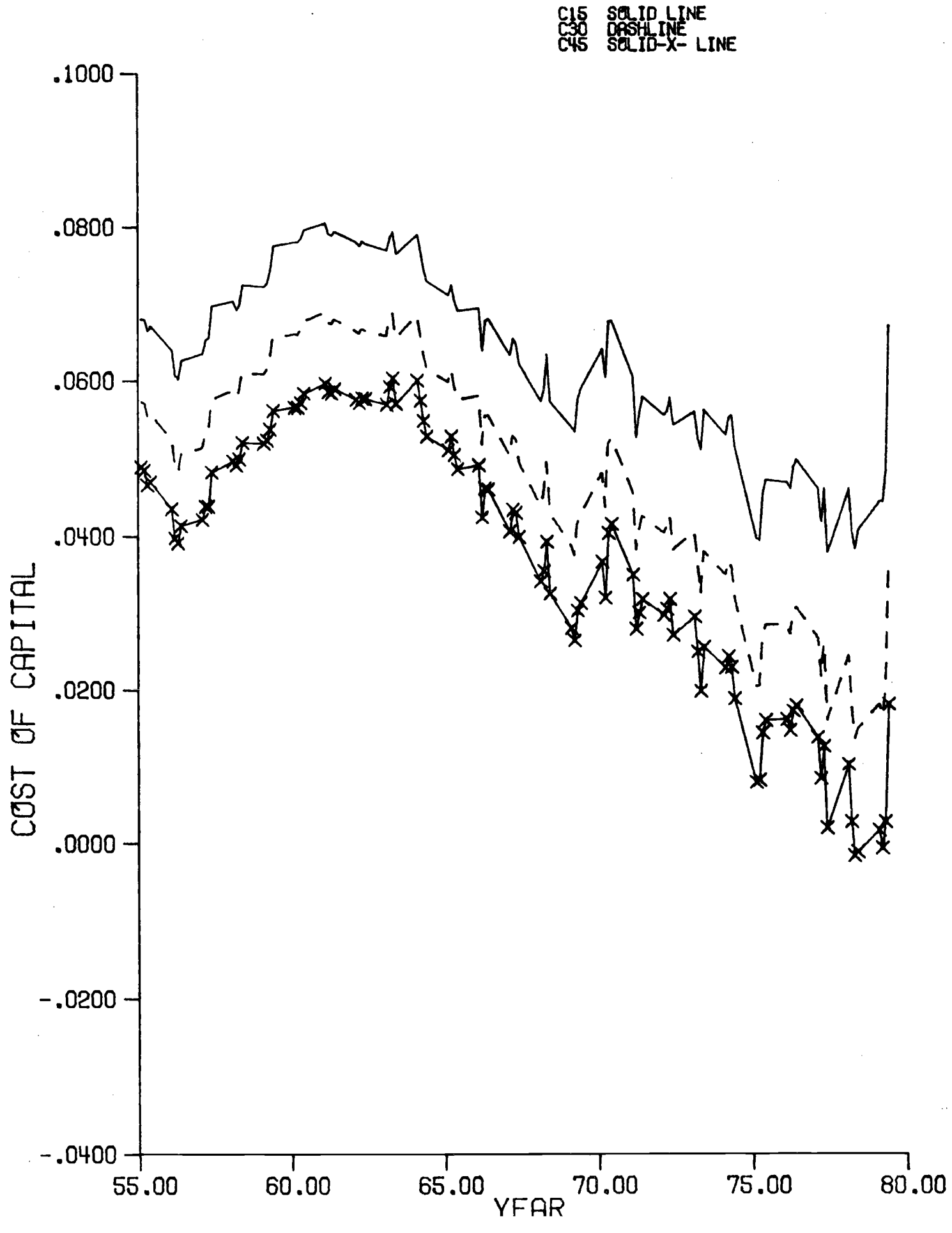
Lastly, annual depreciation and property tax rates are assumed to be 0.017 and 0.018, respectively, the structure-to-value ratio is set at 0.83, realtor's fees (β) at 6 percent of the value of the house, and the expected holding period is 8 years. Calculations are made for households in the 0.15, 0.3 and 0.45 tax brackets.

Figure 2 plots the real user costs for households in the three tax brackets (the series are also listed in Table B in the appendix). The user costs all rise in the second half of the 1950s, plateau in the early 1960s, and then trend downward into early 1979. The user costs are lower in 1964 for those in higher tax brackets, owing to the greater tax savings on their property taxes and interest payments, and the decline since then is greater because their tax saving on interest payments is larger. The real user cost for those in high tax brackets was, in fact, roughly zero in late 1978 and early 1979, implying that optimal behavior of these households consisted of owning marginal unused rooms.[6]

6/ For a public-policy oriented discussion of this phenomenon, see Hendershott and Hu (1980).

FIGURE 2

REAL USER COSTS OF CAPITAL FOR OWNER-OCCUPIED HOUSING



II. Rental Housing

The user cost of capital for rental housing differs from the user cost of capital expression for owner-occupied housing in many respects. Rents received from rental housing are subject to tax whereas the imputed rents from owner-occupied housing are not, and depreciation is tax deductible for rental housing while it is not tax deductible for owner-occupied housing. In addition, the calculation of the user cost is complicated by the longer construction period and the changing tax treatment of construction period interest and property taxes, tax preference items and capital gains induced by tax legislation in 1969, 1976, and 1978.[7] All of these factors are accounted for and discussed below.

A. General Framework

With the symbolism employed in the discussion of owner-occupied housing, the equilibrium condition for investment in rental housing is

$$(1-\alpha)P_k = -\left(\sum_{t=1}^{4}(1+e)^{-t} - \tau_y \frac{4}{C}\sum_{t=1}^{C}(1+e)^{-t}\right)CIPT + \sum_{t=5}^{N+4}(1+e)^{-t}\Big\{(1-\tau_y)(1+p-d)^{t-5}R$$

$$+ \tau_y \gamma_s dx_{t-4}P_k - (1-\tau_y)\tau_p(1+q-\gamma_s d)^{t-5}P_k - PAY_t + \tau_y iL_{t-5}$$

$$- \tau_m Z_1 ACC_{t-4}\Big\} + (1+e)^{-(N+4)}\Big[(1-\beta)(1+q-\gamma_s d)^N P_k - L_N$$

$$- \tau_y RECAP - (\tau_c + Z_2\tau_m/2)CGAIN\Big]. \qquad (2.1)$$

7/ de Leeuw and Ozanne (1979) provide an illuminating discussion of this tax legislation and how it has affected the returns on investment in rental housing. The study of Brueggeman (1977) and various issues of the Standard Federal Tax Reporter were also useful in measuring the rental user cost.

where

CIPT is the interest and property taxes incurred during the construction period,

C is the minimum number of quarters over which CIPT can be amortized for tax purposes,

dx_{t-4} is the tax depreciation rate the t th period the investment is in place,

τ_m and τ_c are the mimimum and capital gains tax rates of the investor,

ACC_{t-4} is tax depreciation in excess of straight line depreciation at historic cost in the t th period the investment is in place,

RECAP is the cummulative value of accelerated depreciation (ACC) upon which recapture provisions apply,

CGAIN is the amount of taxable capital gain realized at time of sale,

Z_1 and Z_2 are zero-one dummy variables to be defined below.

Equation (2.1) takes into account construction period outlays on interest and property taxes (CIPT) and their tax deductibility, a four quarter delay in getting the investment on line (thus the summation of the basic flows begins in period t=5), the deductibility of tax depreciation (the dx_i's), and the treatment of mimimum taxes on accelerated depreciation (ACC), recapture provisions (RCAP), and taxable capital gains (CGAIN). These factors and variables are discussed in some detail below.

The real user cost is obtained by solving (2.1) for R and dividing by P. The parameters that differ from those employed in the calculation of the user cost for owner-occupied housing are: d = 0.014, N = 13 years (52 quarters),[8] α = 0.8 (rental housing is slightly more debt financed), i = the home mortgage

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[8] de Leeuw and Ozanne (1979) obtained the profit-maximizing holding period by calculating the present value of assumed cash flows associated with a typical investment in real estate for many different holding periods and choosing the one with the highest demand price (they assume a value for R/P_h and calculate P_h, rather than R/P_h). They found that the optimum holding period was equal to 13 years and varied only slightly as conditions changed. In future research we propose to expand on this problem of determining an optimum holding by explicitly taking into account returns on alternative investments to rental real estate. Detailed attention will be given to the taxation of rental housing and its effects on the optimum holding period and on the calculation of rental user costs of capital.

rate plus 0.005, $\tau_y = 0.5$ and $e = 0.7i + 0.03$. The latter implies that the after-tax opportunity cost of equity financing for high tax-bracket investors is the tax-exempt rate plus 3 percentage points. Thus rental housing is assumed to be a more risky investment than owner-occupied housing. Finally the weights given general inflation and housing-specific inflation in calculating the expected housing inflation rate are 2/3 and 1/3, respectively. The general inflation rate is given a larger weight than for owner-occupied housing because the expected holding period, 13 years, is longer. The longer the holding period, the more likely are all inflation rates to converge to a common value.

B. Special Tax Considerations for Rental Housing

Tax Depreciation

Since 1954 tax depreciation of new rental housing may be based on application of the double-declining balance method to the initial cost of the structure. According to this method, investors are allowed initially to deduct the fraction 2/n of the undepreciated balance of the structure, where n is the allowable annual tax life, and to switch to the straight line method whenever doing so would give higher depreciation charges on the undepreciated balance over the remaining tax life. The straight-line method in this case is simply the remaining undepreciated balance divided by the remaining tax

life. The optimal switch over point with n = 35 is the 18th year.[9] Given the assumed holding period of 13 years, the property is sold before the switch would occur and thus

$$dx_{t-4} = \frac{2}{140}\left(1 - \frac{1}{70}\right)^{t-5}.$$

While the permitted use of accelerated methods, including the "short" tax service life, is clearly favorable tax treatment, it is worth noting at this point that the use of the historic, rather than replacement, cost base constitutes unfavorable treatment during inflationary periods.

Recapture

Recapture provisions relate to accelerated depreciation or the difference between depreciation based on the double-declining balance and straight line methods. Thus accelerated depreciation (ACC) in period t is

$$ACC_{t-4} = \left(dx_{t-4} - \frac{1}{140}\right)\gamma_s P_k,$$

given a 140 quarter tax life. Accelerated depreciation is initially positive and then becomes negative (in the 13th year) when the undepreciated base becomes

9/ In any period t no greater than the switch-over year n', tax depreciation is

$$\frac{2}{n}\left(1 - \frac{2}{n}\right)^{t-1} \gamma_s P_k,$$

while in any period $t > n'$, tax depreciation is

$$\frac{1}{n-n'}\left(1 - \frac{2}{n}\right)^{n'} \gamma_s P_k.$$

Clearly, the optimal time to switch occurs when

$$\frac{2}{n}\left(1 - \frac{2}{n}\right)^{n'-1} < \frac{1}{n-n'}\left(1 - \frac{2}{n}\right)^{n'}$$

or when $n' > \frac{n}{2} - 1$. Given an n of 35 years and the requirement that the switch occurs at year end,

$$dx_t = \begin{cases} \frac{2}{35}\left(1 - \frac{2}{35}\right)^{t-1} & t \leq 18 \\ \frac{1}{17}\left(1 - \frac{2}{35}\right)^{17} & t > 18. \end{cases}$$

With quarterly data and the provision that depreciation begins a year after the initial equity investment,

$$dx_{t-4} = \begin{cases} \frac{2}{140}\left(1 - \frac{1}{70}\right)^{t-5} & t < 76 \\ \frac{1}{68}\left(1 - \frac{1}{70}\right)^{68} & t \geq 76. \end{cases}$$

sufficiently small. If the structure were held for the full tax life, then accumulated accelerated depreciation would, of course, be zero.

Recapture provisions relate to the percentage (PER) of accumulated accelerated depreciation that is taxed at the income tax rate at time of sale. Thus

$$RECAP = PER \sum_{t=5}^{N+4} ACC_{t-4}.$$

Before 1963, no recapture provisions existed, i.e., PER = 0. The Tax Reform Act of 1962 required that for new rental property held less than 20 months all accumulated acceleration depreciation or the amount of the capital gain at point of sale, whichever was less, had to be treated as ordinary income.[10/] For each month in excess of 20 months the property was held, the percentage of excess depreciation treated as ordinary income declined by one percent. So, if property were held for 10 years, then none of the gain was ordinary income. Beginning in 1970, the number of months property had to be held before complete recapture occurred was increased from 20 to 100. If the property were held for a full 200 months (16 2/3 years), then no recapture occurred. The Tax Reform Act of 1976 mandated full recapture regardless of the holding period.

Table 1 summarizes the impact of the changes legislation on PER. With our assumption of a 13 year or 156 month holding period -- just the time when ACC turns negative -- we have

$$PER = \begin{cases} 0.0 & \text{prior to 1970} \\ 0.44 & \text{1970 to 1975} \\ 1.0 & \text{after 1975.} \end{cases}$$

10/ We assume that the expected capital gain at the anticipated time of sale exceeds ΣACC.

Table 1

Percent of Accelerated Depreciation (PER) that Is Subject to Recapture as a Function of the Holding Period (N) in Months

Prior to 1963	1963 to 1969	1970 to 1975	After 1975
0.0 for all N	0.0 for $N \geq 120$	0.0 for $N \geq 200$	
	$(120-N)/100$ for $20 < N < 120$	$(200-N)/100$ for $100 < N < 200$	
	1.0 for $N \leq 20$	1.0 for $N \leq 100$	1.0 for all N

Taxation at the Capital Gains Rate

The capital gains tax rate equalled one-half the rate of taxation of ordinary income, up to a maximum of 25 percent, for many decades prior to late 1978. The 1978 Tax Reform Act lowered the fraction of the income tax rate to 40 percent. Thus

$$\tau_c = \begin{cases} 0.4\tau_y & \text{after September 1978} \\ 0.5\tau_y & \text{prior to October 1978.} \end{cases}$$

The capital gains tax rate on rental property applies to the net (of sales commissions) sale price less the undepreciated purchase price and the accelerated depreciation subject to recapture provisions. Thus

$$\text{CGAIN} = (1-\beta)(1+q-\gamma_s d)^N P_k - (1 - \sum_{t=5}^{N+4} \gamma_s dx_{t-4})P_k - \text{RECAP.}$$

It is worth noting that this tax applies to nominal, rather than real, capital gains.

Minimum Tax

The tax treatment of accelerated depreciation and capital gains was increased in the 1970s through the application of a new "minimum" tax rate to certain tax preference items. Starting in 1970, tax preference items were taxed provided that they exceeded the sum of $30,000, regular income tax less credits, and tax carryovers. The tax preference items that relate specifically to investment in rental housing are (1) one-half of the excess of net long-term capital gains over net short-term capital gains and (2) accelerated depreciation in excess of straight line depreciation taken each year.

The Tax Reform Act of 1976 increased the minimum tax rate from 10 percent to 15 percent. Also, in place of the existing exemption of $30,000 plus the regular income taxes for the year, individuals were allowed an exemption equal to the greater of $10,000 or one-half the regular income taxes for the year. But, changes occurring in 1978 loosened these revisions to some degree. The 1978 Tax Reform Act removed the untaxed portion of capital gains from the calculation of the "regular" minimum tax. Instead, the capital gains deduction is subject to a complex alternative minimum tax beginning in 1979. Because this alternative applies to only a handful of taxpayers, it is ignored below.

For an investor in rental housing faced with substantial tax preference items, the minimum tax rate is

$$\tau_m = \begin{cases} 0.0 & \text{before 1970} \\ 0.1 & \text{1970-75} \\ 0.15 & \text{after 1975.} \end{cases}$$

The Z_1 and Z_2 dummy variables in equation (2.1), which indicate when this tax rate applies to the flow of accelerated depreciation (Z_1) and the capital gain at sale (Z_2), are

$$Z_1 = \begin{cases} 1 & \text{after 1969} \\ 0 & \text{otherwise} \end{cases} \qquad Z_2 = \begin{cases} 1 & \text{1970-78} \\ 0 & \text{otherwise.} \end{cases}$$

Construction Period Interest and Property Taxes

Property taxes and interest are assumed to be paid on one-half of the total investment during the period of construction. Thus

$$CIPT = (\tau_p + i_c)0.5P_k,$$

where i_c is the construction loan rate and is approximated by the prime commercial paper rate plus one and a half percentage points.

Traditionally, construction period interest and property taxes were deductible during the construction period by investors in rental housing.[11/] With the passage of the Tax Reform Act of 1976, construction period interest and taxes are required to be capitalized into the asset price in the beginning of 1978. The minimum allowable amortization period was 4 years in 1978 and increases by one year each succeeding year thereafter until the minimum amortization period becomes 10 years in 1984. Thus the amortization variable C is, in quarters,

$$C = \begin{cases} 4 & \text{prior to 1978} \\ 16 & 1978 \\ 20 & 1979 \\ \vdots & \\ 40 & \text{after 1983.} \end{cases}$$

C. Rental User Costs

The real user cost of capital for rental housing is the solid schedule plotted in Figure 3 (and is listed in Table B in the appendix). As can be seen, the user cost has no discernable trend over the past 25 years, although there is a slight bulge in the early 1960s. The failure of the user cost to decline sharply between 1964 and late 1978 in the face of a 5 percentage point fall in the real after-tax mortgage rate, $(1-\tau_y)i-q$, follows from two factors: the tax reform legislation of 1969 and 1976 and the acceleration of actual, and thus expected, inflation. The reform legislation created a minimum tax, increased the proportion of

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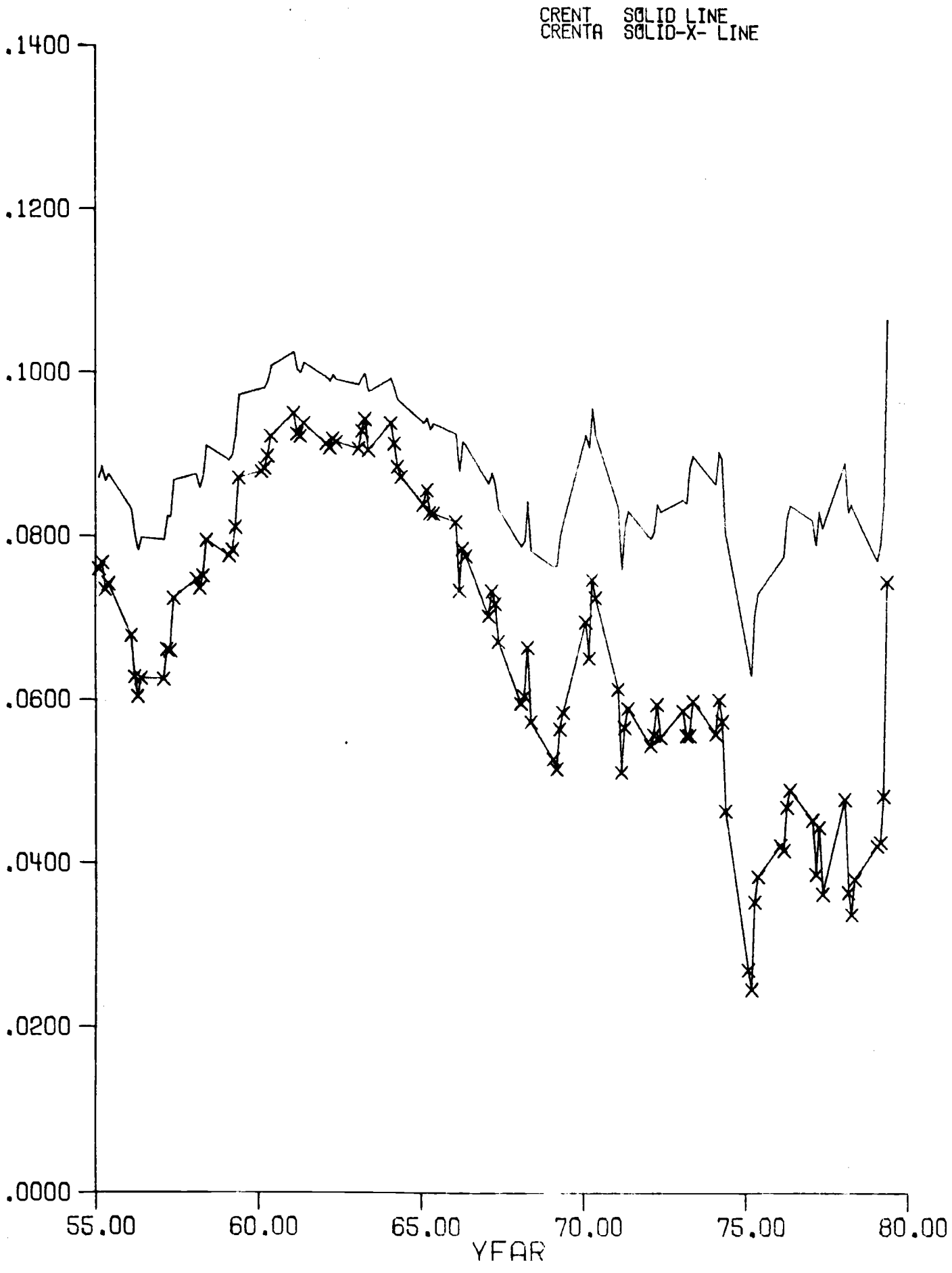
11/ This is analogous to the treatment of owner-occupied housing and non-residential structures.

FIGURE 3
ACTUAL AND INFLATION ADJUSTED REAL USER COSTS OF CAPITAL
FOR RENTAL HOUSING



accelerated depreciation subject to recapture, and lengthened the minimum interval over which construction period interest and property taxes can be amortized. In order to obtain a rough estimate of the impact of this legislation, we recomputed the rental user cost with $\tau_m = 0.0$, PER = 0.0, and C = 4 throughout. The difference between the user cost in Figure 3 and the recalculated user cost was 65 basis points in 1969, rose gradually to 80 basis points in 1975, jumped to 125 basis points in 1976 and 1977, and on to 175 basis points in late 1978 when the minimum amortization period for construction property taxes and interest was lengthened. This difference fell in 1979 when the taxation of capital gains was reduced.

An increase in expected inflation affects the rental user cost adversely relative to the owner-occupied user cost in two ways.[12/] First, an increase in expected inflation creates expected capital gains that will be subject to taxation. Second, the increase intensifies the expected understatement of true economic depreciation owing to the use of historic cost accounting. A rental user cost that eliminates these effects is obtained by adjusting equation (2.1) in the following ways: (1) setting the coefficient on CGAIN equal to zero, (2) redefining tax depreciation as

$$dx_{t-4} = \frac{2}{140}\left(1 - \frac{1}{70}\right)^{t-5}(1+q-\nu_s d)^{t-5},$$

and (3) recomputing accelerated depreciation as

$$ACC_{t-4} = \left[dx_{t-4} - \frac{1}{140}(1+q-\nu_s d)^{t-5}\right]\nu_s P_k.$$

[12/] The user costs for investments by other businesses are also adversely affected.

The "inflation-adjusted" rental user cost is the hatched series in Figure 3.

Comparison of the actual and "inflation-adjusted" rental user costs reveals that the adjusted cost was less than 1 percentage point lower throughout the 1960-65 period when expected housing inflation was less than $1\frac{1}{2}$ percent. As expected housing inflation changes over time so does this difference. The acceleration of expected inflation and reform legislation in the second half of the 1970's continually decreased the "inflation-adjusted" user cost relative to the actual user cost through 1978. By mid 1978, when expected housing inflation equalled 8 percent, the difference between actual and adjusted was about 5 percentage points. In late 1978 and 1979 the difference falls back to $3\frac{1}{2}$ percentage points even though expected inflation rises slightly because taxation of capital gains had decreased (the capital gains tax rate was cut in 784 and the minimum tax was no longer applied to capital gains beginning in 791) and thus the impact of inflation was less.

III. The Homeownership Rate

As Jaffee and Rosen (1979) have emphasized, households with different demographic characteristics have sharply different homeownership rates. For example, in 1970 only one-quarter of families with a head under age 25 owned, while over half with a head in the 25 to 34 age group and three-quarters of those with even older heads did. Also, primary individual households, especially younger ones, had far lower ownership rates than family households with heads in the same age span. Demographic specific ownership rates will vary over time with the economic attractiveness of ownership relative to renting. However, the aggregate economy-wide homeownership rate will vary with changes in the demographics of the population, as well as with changes in the economic variables. While demographics undoubtedly respond to economic variables, the response is likely to be limited, at least in the short run. Thus it would appear to be useful to isolate the impact of demographic variables prior to attempting to identify the effect of economic variables. This is the purpose of the Jaffee-Rosen calculation of the adjusted homeownership rate.

The adjusted (for demographic changes) level of homeowners in period t is defined as

$$HADJ_t = HH_t \sum_{i=1}^{8} o_i h_{it},$$

where HH_t is the total number of households in period t, h_{it} is the proportion of total households in class i in period t and o_i is the homeownership rate for class i in a given base period (1970 for Jaffee and Rosen). The variation over time in the ratio $HADJ_t/HH_t$ depends solely on changes in the portion of households in the different demographic classes. The homeownership rate can be defined as

$$\frac{HOWN}{HH} = \frac{HOWN}{HADJ} \frac{HADJ}{HH} .$$

If we take HADJ/HH as predetermined by demographic factors, then the determination of the adjusted homeownership rate, HOWN/HADJ, provides a complete explanation of the homeownership rate.

The adjusted homeownership rate should depend largely on the attractiveness of homeownership relative to renting. The measurement of this attractiveness is complicated by the determination of expected inflation, transaction costs, estimates of a probable holding period, and the effects of existing and potential federal tax policy. At least for homeownership, it appears reasonable to assume that the user cost of owning is the appropriate price to be considered in determining the overall attractiveness of owning. However, even this measurement is not totally satisfactory because of the time horizon for which the decision to own is being made. The primary tax advantage of owner-occupied housing -- zero taxation of capital gains as long as the gain is rolled over into another house until at least age 55 -- means that the individual household is faced with significant transaction costs if it decides to switch back to renting. So, once households decide to own in actuality they are making the decision to remain homeowners for a considerably longer time than is reflected in the assumed value for the holding period in calculating the user cost. Nonetheless, because expectations of interest rates, inflation, etcetera beyond the assumed 8 year holding period are likely not dissimilar to those over the 8 years, the calculated user cost is probably a quite adequate measure of the relevant expected cost of owning.

For the cost of renting, investigators [e.g., Rosen and Rosen (1980)] generally employ an observed rental index such as the CPI rent component. The above discussion suggests that the relevant rental cost is that expected

to prevail over a generally lengthy time horizon. Thus it appears to us that the above calculated rental user cost, the value to which actual rents will adjust over time, is a better measure. In fact, a possible criticism is that the measure fails to take into account anticipated changes in the tax law (implicitly no changes are anticipated).

The ratio of the above-calculated user costs for owner-occupied and rental housing is employed as the measure of the attractiveness of homeownership relative to renting. An increase in the ratio of user costs should lead to a reduction in the adjusted rate, with an uncertain lag, while a fall in the ratio should lead to an increase in the adjusted rate. We test the user costs for households in both the 15 and 30 tax brackets, denoting the ratio of the former to the rental user cost by C015CR and the ratio of the latter to the rental by C030CR. The other variable tested is "permanent" real disposable income per household where permanent is approximated by an average of current and observed income during the previous 11 quarters. This variable, denoted by YDA/HH, could capture increases in either taste for or "affordability" of homeownership as real income rises. Tastes could, of course, move in the opposite direction.

The adjusted homeownership rate rose almost monotonically from 0.945 in the second quarter of 1960 to 1.077 at the end of 1978.[13] Our user cost ratios trend downward from 0.8 in 1959 to 0.5 in 1978 for the 15 percent bracket, and 0.7 to 0.2 for the 30 percent bracket. Thus the general movement in the ratios is broadly consistent with the behavior of the adjusted homeownership rate. The movement in the real income, too, is broadly consistent; real permanent income per household rose from 9 thousand (1972 dollars) in 1960 to 12 thousand in 1978.

13/ The numerator and denominator for this time span were kindly supplied by Dwight Jaffee.

It is reasonable to expect a substantial lag in the adjustment of the homeownership rate to changes in the user cost ratio. An increase in the economic attractiveness of homeownership must be perceived by the household, a decision must be made regarding the explicit form and location of the house, and the house must be constructed (or converted from a rental unit). The first two lags might be short for some households and a small increase in the homeownership ratio could be achieved through a drop in unsold or vacant existing houses, but the full response to a significant decline in the cost of homeownership is undoubtedly not completed for a number of years.

In the estimation the distributed lag weights were assumed to lie along a third degree polynomial (with no end point constraints) and the length of the lag was extended as long as the expected negative relationship held. Because initial estimates over the 1960-2 through 1978-4 period indicated substantial autocorrelation of the residuals, the Cochrane-Orcutt semi-difference transformation was employed. The results of this estimation are:[14]

$$\frac{HOWN}{HADJ} = \underset{(21.2)}{1.320} + \underset{(0.3)}{0.0012}\,\frac{YDA}{HH} - \underset{(11.2)}{0.426}\sum_{i=0}^{21} w_i\, CO15CR_{-i} \qquad (3.1)$$

$$\bar{R}^2 = 0.9993, \quad SEE = 0.00104, \quad DW = 0.61, \quad RHO = 0.96$$

$$\frac{HOWN}{HADJ} = \underset{(30.2)}{1.045} + \underset{(4.3)}{0.0106}\,\frac{YDA}{HH} - \underset{(14.7)}{0.255}\sum_{j=0}^{21} w_j\, CO30CR_{-j} \qquad (3.2)$$

$$\bar{R}^2 = 0.9994, \quad SEE = 0.00099, \quad DW = 0.73, \quad RHO = 0.91$$

14/ These equations still appear to suffer from substantial autocorrelation, but this is deceiving. Examination of the residuals from equations (3.1) and (3.2) reveals a distinct annual clustering, i.e., the residuals for 1960-2 through 1961-1 are similar, a jump occurs in 1961-2, and the pattern is repeated. (This phenomenon follows from the construction of the data. Only annual data are available for both the number of homeowners and the adjusted homeowners; this ratio is calculated for the second quarter of the year and interpolated linearly between second quarters.) We have averaged the residuals for each of the 18 annual clusters and computed Durbin-Watson statistics based upon these. The result is statistics of 2.3 and 2.8.

where the numbers in parentheses are t-statistics and RHO is the semi-difference parameter. The income variable is statistically significant in the second equation only; the user cost variables perform as expected in both equations.

The weights on the lagged user cost ratios in equations (3.1) and (3.2) are summarized by year in Table 2. The average t-ratios for the quarters in the year are also listed. Both the humped weight pattern and the nearly 5 year period for complete adjustment are generally consistent with our expectations. The estimated response to CO15CR is somewhat more rapid with 28 percent occurring within two years rather than the 14 percent response to CO30CR.

The magnitude of the user-cost coefficients in equations (3.1) and (3.2) indicate large and similar effects from observed changes in the user cost ratios. The estimated impact of the observed decline in CO15CR accounts for 66 percent of the observed increase in the adjusted homeownership rate between early 1960 and the end of 1978, while the impact of the decline in CO30CR explains 56 percent of the increase. If the ratio of the user costs had not fallen over this period, then $3\frac{1}{2}$ to 4 million fewer households would have been homeowners at the end of 1978 than the observed 50 million. Put another way, the homeownership rate would have been about 60 percent, rather than the observed 65 percent.

These results are roughly comparable to those of Harvey and Kenneth Rosen (1980). The Rosens related the homeownership rate annually over the 1949-74 period to the ratio of the user costs, per capita real consumption (a proxy for permanent income), a credit availability variable (the real growth rate in thrift deposits), and demographic variables (their dependent

Table 2: Lagged Responses to the User Cost Ratios

	C015CR		C030CR	
Quarters	Weight	t-ratio	Weight	t-ratio
0 to 3	.12	(2.8)	.05	(1.0)
4 to 7	.16	(4.3)	.09	(2.4)
8 to 11	.23	(6.9)	.20	(6.8)
12 to 15	.26	(7.5)	.30	(8.4)
16 to 19	.20	(4.4)	.28	(6.0)
20 to 22	.04	(1.0)	.07	(2.1)

variable is the "observed" homeownership rate, not the adjusted rate). The greatest difference in our results relates to demographic variables. Through construction of the adjusted homeownership ratio, demographic factors are "forced" in our analysis to cause a reduction in the unadjusted ratio from 0.62 in 1960 to 0.58 in 1974. The Rosens, in contrast, find no impact for such factors. They do find income to be a significant determinant [as we did in equation (3.2)] and credit availability to be insignificant (t-ratio of 1.3). Most striking is the similarity in our results regarding the user cost ratio. They, too, find a significant, much delayed response (the peak adjustment occurs in the third year following a change in the user cost ratio). To provide a feel for the magnitude of their estimated response, they compute the long-run value of the homeownership rate in 1974 on the assumption that property taxes and interest were not tax deductible. The calculated value is 0.60 as opposed to the observed value of 0.64. We have attempted to perform the same experiment which consists of recomputing C15 and C30 without the deductions, obtaining the impact of these changes on HOWN/HADJ in equations (3.1) and (3.2) and transforming these changes into impacts on HOWN/HH, the observed ownership rate. The results are 0.59 (tax rate equals 0.15) and 0.575 (tax rate equals 0.3). These calculations suggest roughly the same sensitivity of tenure choice to relative prices as that obtained by Rosen and Rosen.[15/]

[15/] When the ownership equation was estimated in logarithmic form and this experiment was performed, the calculated value of the homeownership rate in 1974 was 0.60 for either cost of capital.

IV. Summary

Our goal has been to explain why the aggregate homeownership rate in the United States has continued to rise throughout the 1970s despite rising inflation and the rapid growth of young and primary individual households with relatively low homeownership rates. In order to do this it was first necessary to compute the real user costs of capital for owner-occupied and rental housing. The decline in the real after-tax interest rate associated with equal increases in nominal interest rates and expected inflation has acted to reduce the user costs for both types of housing. However, inflation and legislation induced increases in taxation of rental housing have largely offset the decline in the net real financing rate. Depreciation is based on historic cost and nominal capital gains are taxed. Moreover, this taxation was increased in 1969 and 1976 with the introduction and expansion of the minimum tax, the increased recapture of accelerated depreciation, and the amortization, rather than expensing, of construction period interest and property taxes.

The decline in the cost of owner-occupied housing relative to rental housing is estimated to have sharply increased homeownership. The empirical results suggest that $4\frac{1}{2}$ to 5 million fewer households would have been homeowners at the end of 1978 in the absence of the estimated decline in the relative cost of homeownership. That is, the homeownership rate would have been 60 percent, rather than 65 percent.

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DATA APPENDIX

The first three variables listed in Table A are the commodity-specific expected inflation rates for the rent, house price, and general price indexes. These expectations were constructed as 16 quarter distributed lags on the current and past rates of inflation of the indexes listed in the next three columns, respectively. The weights, going from the current period to the lagged 15 period, are 0.147, 0.131, 0.117, 0.103, 0.091, 0.079, 0.068, 0.058, 0.049, 0.404, 0.033, 0.026, 0.020, 0.014, 0.010, 0.006. [The estimation of these weights is described in Hendershott and Hu (1980).] Column 4 is the rent component of the consumer price index; column 5 is the price of houses (see page 6 in the text); and column 6 is the rate of change in the deflator for nonfood business product, net of energy and the impact of price controls for the 1971-75 period. Column 7 lists the price of other goods, P, and equals the consumer price index net of the shelter component. Finally, the last two columns give the mortgage interest rate variable (RM) and the interest rate on commercial paper (RCP).

The underlying expected housing and rent inflation rates were constructed as weighted averages of the expected general inflation rate [column (3)] and the good-specific expected inflation rates [column (1) or (2)]. The weights employed were .5/.5 for owner-occupied housing and .67/.33 for rental housing.

Table B lists the real user costs of capital for owner-occupied housing and rental housing. The first three columns give the user costs for owner-occupied housing based upon marginal income tax rates of .15, .30, and .45, respectively. Column 4 is the real user cost of capital for rental housing.

TABLE A: DATA EMPLOYED IN COMPUTATION OF USER COST OF CAPITAL

RENT	HOUSE	GENERAL	HOUSE RENT	HOUSE PRICE	GORDON	GENERAL RM PRICE		RCP	QT
.0352	.0500	.0450	80.9	20.1	.0328	.8070	.1050	.0195	511
.0369	.0503	.0412	81.8	20.4	.0041	.8070	.1050	.0219	512
.0375	.0479	.0374	82.6	20.5	.0032	.8070	.1050	.0225	513
.0407	.0465	.0374	83.8	20.7	.0090	.8070	.1050	.0226	514
.0406	.0428	.0301	84.6	20.8	-.0038	.8070	.0539	.0238	521
.0395	.0431	.0280	85.3	21.1	.0039	.8070	.0539	.0232	522
.0377	.0413	.0247	85.9	21.2	.0017	.8070	.0540	.0231	523
.0396	.0331	.0282	87.0	21.1	.0120	.8070	.0541	.0231	524
.0426	.0291	.0288	88.3	21.1	.0079	.8070	.0544	.0233	531
.0431	.0246	.0248	89.3	21.1	.0004	.8090	.0565	.0262	532
.0475	.0252	.0237	90.9	21.3	.0045	.8120	.0587	.0275	533
.0511	.0180	.0156	92.5	21.2	-.0073	.8130	.0592	.0237	534
.0472	.0109	.0231	93.0	21.1	.0177	.8140	.0578	.0204	541
.0424	.0102	.0204	93.3	21.2	.0023	.8120	.0570	.0163	542
.0373	.0134	.0162	93.5	21.4	-.0008	.8090	.0570	.0136	543
.0341	.0109	.0157	93.9	21.4	.0043	.8040	.0565	.0131	544
.0311	.0110	.0177	94.3	21.5	.0085	.8060	.0565	.0161	551
.0285	.0151	.0168	94.7	21.7	.0027	.8040	.0565	.0197	552
.0250	.0180	.0198	94.9	21.9	.0093	.8040	.0567	.0233	553
.0224	.0172	.0203	95.2	22.0	.0074	.8070	.0570	.0283	554
.0209	.0209	.0252	95.6	22.2	.0115	.8060	.0572	.0300	561
.0203	.0281	.0275	96.1	22.6	.0099	.8130	.0578	.0326	562
.0216	.0263	.0310	96.9	22.6	.0121	.8200	.0590	.0335	563
.0203	.0214	.0328	97.3	22.6	.0104	.8270	.0610	.0363	564
.0193	.0186	.0350	97.7	22.6	.0110	.8350	.0625	.0363	571
.0173	.0176	.0326	97.9	22.6	.0038	.8410	.0627	.0368	572
.0180	.0173	.0339	98.5	22.7	.0097	.8490	.0640	.0395	573
.0187	.0099	.0315	99.1	22.5	.0036	.8520	.0650	.0399	574
.0189	.0073	.0274	99.6	22.5	.0011	.8640	.0635	.0282	581
.0186	.0072	.0254	100.0	22.6	.0036	.8700	.0612	.0172	582
.0177	.0063	.0245	100.3	22.6	.0050	.8690	.0608	.0213	583
.0175	.0050	.0234	100.7	22.6	.0048	.8710	.0627	.0321	584
.0172	.0013	.0264	101.1	22.5	.0116	.8720	.0630	.0330	591
.0164	.0004	.0266	101.4	22.5	.0072	.8730	.0633	.0360	592
.0156	-.0003	.0262	101.7	22.5	.0064	.8780	.0652	.0419	593
.0161	.0002	.0230	102.2	22.5	.0014	.8820	.0675	.0476	594
.0154	.0007	.0226	102.5	22.6	.0056	.8830	.0680	.0469	601
.0153	.0019	.0211	102.9	22.6	.0036	.8880	.0678	.0407	602
.0180	.0025	.0186	103.8	22.7	.0014	.8890	.0676	.0337	603
.0154	.0015	.0164	103.8	22.6	.0015	.8950	.0676	.0327	604
.0142	.0005	.0125	104.0	22.6	-.0020	.8970	.0661	.0301	611
.0137	.0004	.0136	104.3	22.6	.0055	.8970	.0649	.0286	612
.0127	.0003	.0137	104.5	22.6	.0041	.9000	.0648	.0290	613
.0129	.0004	.0122	104.9	22.6	.0013	.9010	.0648	.0306	614
.0126	.0020	.0139	105.2	22.7	.0062	.9050	.0648	.0324	621
.0123	.0026	.0140	105.5	22.7	.0040	.9090	.0648	.0320	622
.0121	.0014	.0132	105.8	22.7	.0024	.9100	.0647	.0333	623
.0124	.0004	.0130	106.2	22.6	.0031	.9130	.0643	.0326	624
.0117	.0020	.0129	106.4	22.7	.0034	.9160	.0639	.0331	631
.0110	-.0061	.0120	106.6	22.4	.0018	.9170	.0634	.0332	632
.0104	-.0107	.0111	106.8	22.2	.0017	.9230	.0633	.0370	633
.0109	-.0017	.0126	107.2	22.5	.0052	.9260	.0633	.0391	634
.0104	-.0120	.0111	107.4	22.1	.0007	.9290	.0633	.0395	641
.0104	-.0027	.0116	107.7	22.4	.0036	.9300	.0634	.0393	642
.0098	.0055	.0123	107.9	22.7	.0041	.9320	.0633	.0391	643
.0106	.0129	.0117	108.3	23.0	.0020	.9350	.0633	.0406	644
.0101	.0141	.0145	108.5	23.1	.0076	.9390	.0633	.0430	651
.0102	.0076	.0138	108.8	22.9	.0026	.9450	.0630	.0438	652

TABLE A CONTINUED

RENT	HOUSE	GENERAL	HOUSE RENT	HOUSE PRICE	GORDON	GENERAL PRICE	RM	RCP	QT
.0098	.0145	.0147	109.0	23.2	.0048	.9470	.0630	.0438	653
.0099	.0230	.0129	109.3	23.6	.0005	.9530	.0633	.0447	654
.0111	.0179	.0158	109.8	23.5	.0084	.9620	.0644	.0497	661
.0116	.0334	.0208	110.2	24.2	.0121	.9710	.0663	.0543	662
.0116	.0271	.0202	110.5	24.1	.0037	.9790	.0685	.0579	663
.0136	.0263	.0231	111.2	24.2	.0096	.9860	.0707	.0600	664
.0139	.0374	.0260	111.6	24.8	.0101	.9890	.0703	.0545	671
.0146	.0306	.0235	112.1	24.7	.0015	.9930	.0688	.0472	672
.0152	.0289	.0255	112.6	24.8	.0089	1.0040	.0692	.0497	673
.0162	.0340	.0287	113.2	25.2	.0115	1.0140	.0699	.0530	674
.0176	.0458	.0332	113.9	25.9	.0141	1.0250	.0716	.0558	681
.0188	.0418	.0358	114.6	26.0	.0121	1.0350	.0736	.0608	682
.0204	.0381	.0351	115.4	26.1	.0068	1.0450	.0772	.0596	683
.0227	.0506	.0387	116.4	26.9	.0143	1.0580	.0772	.0596	684
.0237	.0613	.0409	117.2	27.7	.0128	1.0680	.0789	.0666	691
.0250	.0662	.0434	118.1	28.3	.0137	1.0820	.0818	.0754	692
.0276	.0593	.0453	119.3	28.4	.0133	1.0960	.0849	.0849	693
.0298	.0594	.0453	120.5	28.8	.0104	1.1110	.0867	.0862	694
.0321	.0493	.0452	121.8	28.7	.0108	1.1260	.0891	.0855	701
.0335	.0621	.0451	123.0	29.7	.0109	1.1390	.0895	.0817	702
.0347	.0438	.0430	124.2	29.2	.0072	1.1490	.0900	.0784	703
.0375	.0350	.0454	125.8	29.1	.0149	1.1640	.0894	.0629	704
.0403	.0428	.0467	127.5	29.8	.0135	1.1760	.0842	.0459	711
.0418	.0521	.0483	129.0	30.6	.0140	1.1910	.0799	.0504	712
.0410	.0540	.0461	130.1	31.1	.0083	1.2000	.0824	.0574	713
.0398	.0516	.0458	131.1	31.4	.0110	1.2060	.0830	.0507	714
.0400	.0529	.0472	132.4	31.9	.0141	1.2160	.0814	.0406	721
.0386	.0509	.0464	133.4	32.2	.0105	1.2240	.0803	.0458	722
.0373	.0524	.0439	134.4	32.7	.0074	1.2320	.0807	.0494	723
.0365	.0642	.0442	135.5	33.8	.0119	1.2460	.0814	.0533	724
.0397	.0585	.0429	137.5	34.0	.0092	1.2670	.0806	.0628	731
.0402	.0710	.0431	139.0	35.2	.0113	1.2980	.0826	.0747	732
.0402	.0898	.0448	140.4	36.9	.0139	1.3240	.0899	.0987	733
.0409	.0783	.0473	142.0	36.9	.0155	1.3550	.0922	.0898	734
.0423	.0822	.0468	143.8	37.8	.0109	1.4000	.0911	.0831	741
.0423	.0829	.0479	145.3	38.6	.0135	1.4390	.0949	.1046	742
.0434	.0857	.0554	147.1	39.5	.0246	1.4790	.1012	.1153	743
.0458	.0871	.0631	149.3	40.4	.0264	1.5240	.1028	.0905	744
.0483	.0963	.0680	151.6	41.9	.0232	1.5540	.0977	.0656	751
.0480	.0911	.0699	153.3	42.5	.0189	1.5690	.0956	.0592	752
.0478	.0850	.0651	155.0	43.0	.0079	1.6060	.0962	.0667	753
.0486	.0849	.0636	157.0	43.9	.0130	1.6370	.0973	.0612	754
.0513	.0844	.0616	159.6	44.8	.0121	1.6540	.0953	.0529	761
.0514	.0876	.0608	161.6	46.0	.0137	1.6670	.0947	.0557	762
.0517	.0873	.0578	163.7	47.0	.0099	1.6930	.0955	.0553	763
.0521	.0878	.0554	165.9	48.1	.0108	1.7190	.0948	.0499	764
.0547	.0958	.0537	168.8	49.8	.0114	1.7530	.0936	.0481	771
.0549	.1039	.0566	171.1	51.7	.0191	1.7810	.0945	.0524	772
.0538	.0980	.0562	173.1	52.5	.0141	1.8040	.0951	.0581	773
.0572	.1179	.0547	176.4	55.5	.0120	1.8270	.0956	.0659	774
.0592	.1077	.0538	179.5	56.1	.0127	1.8570	.0974	.0680	781
.0612	.1166	.0618	182.7	58.4	.0278	1.8960	.1012	.0720	782
.0611	.1252	.0634	185.4	60.9	.0184	1.9330	.1040	.0808	783
.0612	.1281	.0643	188.2	63.0	.0173	1.9720	.1076	.0990	784
.0620	.1259	.0663	191.3	64.7	.0192	2.0230	.1107	.1010	791
.0629	.1337	.0666	194.5	67.5	.0164	2.0800	.1145	.0985	792
.0680	.1325	.0677	199.2	69.5	.0178	2.1400	.1182	.1060	793
.0733	.1238	.0702	204.3	70.7	.0206	2.1940	.1315	.1310	794

TABLE B: USER COSTS OF CAPITAL

C015	C030	C045	CRENT	YRQT
.0680	.0573	.0489	.0870	1955.1
.0680	.0571	.0485	.0884	.2
.0665	.0553	.0466	.0866	.3
.0671	.0558	.0470	.0874	.4
.0640	.0524	.0436	.0832	1956.1
.0607	.0488	.0398	.0802	.2
.0602	.0483	.0392	.0782	.3
.0627	.0506	.0414	.0798	.4
.0636	.0514	.0422	.0796	1957.1
.0654	.0532	.0439	.0824	.2
.0656	.0533	.0439	.0823	.3
.0698	.0576	.0483	.0867	.4
.0704	.0588	.0497	.0874	1958.1
.0693	.0580	.0492	.0858	.2
.0700	.0587	.0500	.0871	.3
.0725	.0610	.0521	.0909	.4
.0723	.0609	.0520	.0892	1959.1
.0728	.0614	.0524	.0898	.2
.0745	.0629	.0538	.0922	.3
.0776	.0656	.0562	.0972	.4
.0781	.0661	.0566	.0980	1960.1
.0781	.0660	.0566	.0981	.2
.0786	.0666	.0572	.0990	.3
.0797	.0678	.0584	.1008	.4
.0806	.0690	.0597	.1025	1961.1
.0792	.0677	.0586	.1003	.2
.0790	.0675	.0584	.1000	.3
.0795	.0681	.0590	.1012	.4
.0781	.0666	.0576	.0994	1962.1
.0776	.0662	.0572	.0989	.2
.0782	.0668	.0578	.0997	.3
.0779	.0666	.0577	.0991	.4
.0771	.0659	.0570	.0985	1963.1
.0788	.0680	.0593	.0994	.2
.0795	.0689	.0604	.0998	.3
.0766	.0657	.0571	.0976	.4
.0791	.0686	.0601	.0992	1964.1
.0769	.0661	.0575	.0980	.2
.0746	.0636	.0549	.0966	.3
.0730	.0617	.0529	.0962	.4
.0712	.0599	.0511	.0937	1965.1
.0725	.0616	.0529	.0943	.2
.0705	.0593	.0505	.0929	.3
.0692	.0577	.0487	.0936	.4
.0695	.0581	.0492	.0924	1966.1
.0640	.0518	.0425	.0878	.2
.0679	.0555	.0462	.0915	.3
.0681	.0556	.0461	.0909	.4
.0634	.0504	.0407	.0863	1967.1
.0655	.0530	.0435	.0877	.2

TABLE B: CONTINUED

C015	C030	C045	CRENT	YRQT
.0649	.0525	.0431	.0863	.3
.0622	.0495	.0400	.0833	.4
.0574	.0440	.0342	.0788	1968.1
.0590	.0455	.0356	.0794	.2
.0635	.0496	.0394	.0842	.3
.0573	.0430	.0326	.0782	.4
.0541	.0389	.0281	.0763	1969.1
.0535	.0376	.0265	.0765	.2
.0577	.0417	.0304	.0800	.3
.0591	.0428	.0314	.0818	.4
.0642	.0482	.0368	.0924	1970.1
.0605	.0438	.0321	.0908	.2
.0678	.0519	.0405	.0956	.3
.0679	.0527	.0417	.0923	.4
.0605	.0457	.0351	.0835	1971.1
.0528	.0383	.0280	.0760	.2
.0559	.0408	.0301	.0813	.3
.0580	.0427	.0319	.0831	.4
.0556	.0405	.0298	.0797	1972.1
.0562	.0413	.0306	.0806	.2
.0579	.0427	.0319	.0840	.3
.0544	.0384	.0272	.0830	.4
.0561	.0406	.0296	.0844	1973.1
.0527	.0364	.0250	.0840	.2
.0512	.0325	.0199	.0884	.3
.0563	.0381	.0256	.0898	.4
.0531	.0351	.0229	.0863	1974.1
.0554	.0369	.0244	.0903	.2
.0556	.0360	.0230	.0894	.3
.0515	.0319	.0189	.0805	.4
.0399	.0205	.0080	.0656	1975.1
.0395	.0206	.0083	.0631	.2
.0454	.0268	.0145	.0706	.3
.0473	.0285	.0161	.0731	.4
.0470	.0285	.0162	.0770	1976.1
.0462	.0273	.0148	.0776	.2
.0491	.0300	.0173	.0821	.3
.0499	.0308	.0180	.0838	.4
.0462	.0268	.0139	.0820	1977.1
.0420	.0217	.0085	.0790	.2
.0462	.0260	.0127	.0832	.3
.0380	.0161	.0021	.0811	.4
.0462	.0245	.0104	.0890	1978.1
.0407	.0175	.0029	.0830	.2
.0385	.0138	-.0015	.0839	.3
.0409	.0150	-.0010	.0829	.4
.0446	.0182	.0018	.0771	1979.1
.0446	.0166	-.0005	.0792	.2
.0487	.0203	.0029	.0841	.3
.0672	.0373	.0182	.1066	.4