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THE DISTRIBUTION OF THE U.S. CAPITAL STOCK BETWEEN RESIDENTIAL AND INDUSTRIAL USES

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ABSTRACT

Residential real estate currently accounts for nearly one-half of all private fixed capital in the United States. The purpose of the present study is to measure the extent to which an increase in the total capital stock induces an increase in the stock of residential capital, i.e., to measure the marginal propensity of additional capital to be absorbed in residential capital. The paper begins with a simple theoretical model of the division of capital between housing and other industries. For plausible values of the key parameters, the model implies that the marginal share of housing is less than its average share. The paper then uses the historical experience of the United States since 1929 to estimate the relation between the size of the total capital stock and the amount of capital used for residential real estate; this statistical analysis supports the conclusion of the theoretical model that the marginal share of housing in total capital is less than its average share.

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The Distribution of the U.S. Capital Stock Between Residential and Industrial Uses

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I. Introduction

Residential real estate currently accounts for nearly one half of all private fixed capital in the United States.[1] This high ratio of residential capital to total capital has been a feature of the American economy for many decades.[2] The demand for residential capital has grown at the same rate as the supply of total capital because of the concurrent changes in other factors like per capita income, population, and the relative price of housing services. A key determinant of the relative price of housing services is of course the cost of capital and therefore the size of the total capital stock. Because housing is relatively capital intensive, an exogenous increase in the size of the capital stock will cause a fall in the relative price of housing services and therefore an increase in the stock of residential capital. Without further analysis, it is not clear whether such an increase in the total stock of capital will, *ceteris paribus*, cause a greater than proportional or less than proportional increase in the stock of residential capital.

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[1]In 1978, the replacement value of private residential real estate was 1961.6 billion while the corresponding value of all private reproducible fixed capital was 3778.3 billion; see Musgrave, 1979.

[2]The Department of Commerce estimates by John Musgrave indicate that residential capital has accounted for between fifty and sixty percent of the U.S. capital stock in each of the past fifty years. The residential share peaked at the end of the second World War, when it was 59.8 percent. Today, the share is 51.9 percent.

The purpose of the present study is to measure the extent to which an increase in the total capital stock induces an increase in the stock of residential capital, i.e., to measure the marginal propensity of additional capital to be absorbed in residential capital. A knowledge of this propensity is important for evaluating the national return on additional saving and for understanding the impact that an increased capital stock would have on labor productivity and on the composition of national output.[1] The present paper provides both a theoretical and an empirical examination of this question.

The paper begins with a simple theoretical model of the division of capital between housing and other industries. For plausible values of the key parameters, the model implies that the marginal share of housing in the capital stock is less than its average share: increases in the capital stock add disproportionately more to industrial capital.

The model that yields this conclusion describes the capital allocation process as equalizing the rates of return on residential and nonresidential capital. It thus ignores the issue of risk aversion and portfolio preferences that may be particularly important for owner-occupied housing. The model also ignores institutional factors that reduce capital mobility between the housing sector and the rest of the economy. The relevance of the model might therefore be questioned by arguing that a large share of the investment in housing is financed by thrift institutions that are required by law to put all or most of their assets into home mortgages. In response to this, it might be noted that the flow of savings into such thrift institutions responds to differences in

[1]The implications of the findings of this paper are discussed in section 4 below.

rates of return and that the marginal sources of funds for residential real estate come from institutions like commercial banks and insurance companies that invest in mortgages, corporate bonds, and, more recently, bonds issued by mortgage institutions and backed by portfolios of residential mortgages. To the extent that these features circumvent institutional restrictions, the model's assumption of a perfect capital market is more plausible. Thus while the model is undoubtedly oversimplified, its ability to approximate reality adequately is an open question.

The third section of the paper therefore uses the historical experience of the United States since 1929 to estimate the relation between the size of the total capital stock and the amount of capital used for residential real estate. The analysis incorporates population and real income but treats the relative price of housing services as endogenous. This statistical analysis supports the conclusion of the theoretical analysis that the marginal share of housing in total capital is less than its average share.

There is a brief concluding section discussing some implications of these findings and some possible extensions of the analysis.

2. A Two-Sector Model of Housing and Industrial Production

This section uses a simple two-sector general equilibrium model of production and demand to analyze the effect of an exogenous increase in the total capital stock. The economy is divided into a sector that produces residential housing services and a remaining sector that produces "industrial output". The extreme capital intensity of the production of housing services is captured in this model by the condition that the production of housing services uses only capital not labor.[1] This in turn implies that all of the labor in the economy is employed in the industrial sector.

The economy can be represented by five equations. First, the production function for industrial output relates the flow of industrial output (X) to the industrial capital stock (K_x) and the total labor supply ($\bar{L}$):

$$(2.1) \quad X = F(K_x, \bar{L}),$$

For now I assume only that there are constant returns to scale; a Cobb-Douglas example of the industrial production function is examined below.

The assumption that the production of housing service uses capital but no labor and that this production satisfies constant returns to scale implies that the flow of housing services (H) is proportional to the stock of housing capital (K_h):[2]

$$(2.2) \quad H = \lambda K_h$$

[1]The current model is thus a special case of the general two-sector model analyzed by Harberger (1962), Johnson (1956), Jones (1965) and others.

[2]The current analysis also simplifies by ignoring the role of land. Introducing land would complicate the analysis without changing anything essential about the conclusions.

These two uses of capital exhaust an exogenously given capital stock (K):

$$(2.3) \qquad K_x + K_h = \overline{K}.$$

Capital is allocated between the two sectors until the yield is equal in the two uses. If p is the price of housing services, the return per unit of housing capital is $p\lambda$. If the industrial output is selected as numeraire, the return on industrial capital is F_k. Equal rates of return implies:

$$(2.4) \qquad p\lambda = F_k.$$

Finally, the quantity of housing services demanded relative to the demand for industrial output will be written as a function of their relative price:[1]

$$(2.5) \qquad H = D(p) \cdot X, \qquad D'(p) < 0,$$

These five equations determine the five endogenous variables X, K_x, H, K_h and p. The effect of a small exogenous increase in the total capital stock, can be calculated by totally differentiating these equations. This yields:

$$(2.6) \qquad dX = F_k dK_x ,$$

$$(2.7) \qquad dH = \lambda dK_h,$$

[1]This implicitly assumes an income elasticity of one for housing. The empirical evidence indicates that this is likely to be an upper bound; see deLeeuw (1971), Muth (1960), Polinsky (1977) and Reid (1962). A lower income elasticity would imply a smaller value of dK_h/dK than the one derived in this section.

$$(2.8) \quad dK_x + dK_h = d\bar{K} ,$$

$$(2.9) \quad \lambda \, d \, p = F_{kk} dK_x ,$$

and

$$(2.10) \quad dH = XD'd \, p + Ddx.$$

These equations can be solved by substitution into 2.10 of 2.7, 2.9 and 2.6 to obtain:

$$(2.11) \quad \lambda \, d \, K_h = XD' \frac{F_{kk}}{\lambda} + D \, F_k \, dK_x$$

Note from equation 2.4 that $\lambda = p^{-1} F_k$. Thus 2.11 implies:

$$(2.12) \quad \frac{FK}{p} dK_h = XD'p \frac{F_{kk}}{F_k} + DF_k \quad dK_x.$$

The demand equation 2.5 implies that $XD' = \delta H / \delta p$. Writing the price elasticity of demand as $\eta = -(p/H)(\delta H / \delta p)$ implies $p X D' = H \eta$. Substituting this into 2.12 and noting that $D = H/X$ yields:

$$(2.13) \quad \frac{F_K}{p} dK_h = - H \eta \frac{F_{KK}}{F_K} + \frac{H}{X} F_K \quad dX_K .$$

Constant returns to scale implies that $F_{KK} = -F_K^2 / \sigma X$ where σ is the local elasticity of substitution of the production function for industrial output. With this substitution, equation 2.13 simplifies to:

$$(2.14) \quad dK_h = \frac{pH}{X} \frac{\eta}{\sigma} + \frac{pH}{X} \quad dK_x.$$

Using 2.8 to rewrite $dK_x = d\overline{K} - dK_h$, yields:

$$(2.15) \quad \frac{dK_h}{d\overline{K}} = \frac{h \; (1 + \eta / \sigma)}{1 + h \; (1 + \eta / \sigma)}$$

where h = pH/X, the ratio of expenditure of housing to other spending. During the past decade, expenditure on housing services (including the imputed value of the services of owner-occupied houses) has varied between 11.2 and 12.4 percent of national income (Economic Report of the President, 1978). This implies a value of h between 12.6 and 14.2. Using h = 0.14 will tend to overstate the value of $dK_h/d\overline{K}$. Consider first the value implied by a Cobb-Douglas technology in the industrial sector (α=1) and a unitary price elasticity of demand (η =1); with h=0.14, these imply $dK_h/d\overline{K}$ = 0.22, i.e., only 22 percent of additional capital goes into the residential sector. A lower elasticity of substitution in production in the industrial sector increases the value of $dK_h/d\overline{K}$ but even an elasticity as low as σ =0.5 implies only $dK_h/d\overline{K}$ = 0.30. Statistical evidence on the price elasticity of demand[1] suggests that a value of η =1 is likely to be too high and therefore to cause an overestimate of $dK_h/d\overline{K}$. Again however the calculation is not very sensitive to reasonable changes in the parameter values; with η = 0.75 and σ = 1, for example, $dK_h/d\overline{K}$ = 0.20. In short, for a wide range of reasonable parameter estimates, the model implies a value of the marginal $dK_H / d\overline{K}$ that is substantially less than the observed average value of $K_H / \overline{K}$.

[1] See the studies by deLeeuw (1971), Laidler (1969), Polinsky (1977), Rosen (1979a, , 1979b).

Equation 2.15 does not, however, establish that $dK_H / d\overline{K}$ is less than the value of $K_h / \overline{K}$ that is implied by the model itself. Additional parameter restrictions are required to derive $K_h / \overline{K}$ explicitly. The following analysis shows that, with the assumption of a Cobb-Douglas technology in the industrial sector, the model implies a distribution of the total capital stock that agrees quite well with the observed capital stock. With this assumption, equation 2.1 becomes

(2.16) $$X = AK_x^{\alpha} \; \overline{L}^{\,1-\alpha}$$

where A is a constant scale factor. Equation 2.4 is therefore

(2.17) $$p\lambda = \alpha AK_x^{\alpha-1} \; \overline{L}^{\,1-\alpha}$$

Using 2.2 to rewrite λ as $\lambda = HK_h^{-1}$ and dividing 2.16 by 2.17 yields

(2.18) $$\frac{K_h}{K_x} = \frac{h}{\alpha}$$

The value of α may be approximated by the pretax share of capital in the industrial sector. For the decade 1968-77, employee compensation accounted for 85.9 percent of national income exclusive of housing sources; if one-third of unincorporated proprietors' income is reported as "labor" income in this sector, an additional 2.9 percent is added. Thus the capital share corresponding to the industrial sector is between 0.112 and 0.141. This imples a ratio of K_h/K_x between 1 and 1.15 or a ratio of $K_H / \overline{K}$ between 0.50 and 0.53, very close to the average ratio of 0.48 during the decade 1964 to 1974.[1] The Cobb-Douglas case thus provides a reasonable approximation of the observed experience and clearly implies that the marginal share going to residential capital is significantly less than the average share. Note that combining 2.18 with 2.15 for the Cobb-Douglas case (in which $\sigma = 1$) implies that an elasticity may be written:

$$(2.19) \qquad \frac{\bar{K}}{K_h}\,\frac{dK_h}{d\bar{K}} = \frac{(h+\alpha)(1+\eta)}{1+h(1+\eta)}\,.$$

It is immediately clear that this elasticity is less than unity if $\alpha(1+\eta) < 1$, a condition that is consistent with all plausible parameter estimates.

Although the simple theoretical model of this section could be extended in a number of ways to increase its realism, this will not be pursued here. Instead, the next section turns to an analysis of some basic time-series evidence on this question.

[1]The value of 0.48 refers to the gross capital stocks. With the net capital stocks, the ratio is 0.51.

3. Statistical Estimates of The Distribution of Incremental Capital

The fundamental determinants of the total demand for residential capital are population, income, wealth and the relative price of housing services. An increase in the total stock of capital increases the quantity of housing capital demanded by raising personal wealth and income and by lowering the relative cost of capital and therefore the relative price of housing services.

This section treats the relative price of housing services as endogenous and estimates a simple reduced form specification that relates the stock of housing capital directly to the total stock of capital and the level of real income:

$$(2.1) \qquad \frac{K_h}{N} = \beta_1 \frac{K}{N} + \beta_2 \frac{YD}{N} + \beta_3$$

where K_H is the real stock of residential capital, K is the total real capital stock, YD is disposable personal income, and N is the population. The coefficient of the capital stock variable (β_1) thus represents both the wealth and price effects. An increase in the capital stock also raises disposable income; more specifically, the derivative of YD with respect to K is the net-of-tax rate of return on capital. The total effect of an increase in the capital stock is therefore equal to β_1 plus the product of β_2 and the net-of-tax rate of return.

The demand for housing capital is of course also affected by many other things, inclusing the demographic composition of the population, the tax laws, the banking rules, government mortgage subsidies, etc. Although a complete structural model of the mechanism by which an increase in the total capital stock is transmitted into an increase in the stock of residential capital should in principle incorporate all of these variables, they cannot simply be added linearly to the reduced form equation. The current reduced form specification must therefore be regarded as an oversimplication that can provide only an initial estimate of the distribution of incremental capital.

Equation 3.1 has been estimated with time series data for the United States for the years 1930 through 1974, with the years 1941 through 1946 excluded. The analysis is based on recent estimates of the stocks of residential and nonresidential fixed capital prepared by the Department of Commerce.[1] These capital stock figures are estimates of replacement values in constant 19 dollars. Separate estimates are available for the gross capital stock (i.e., the accumulation of gross investment minus scrapping) and for the net capital stock (i.e., accumulation of gross investment minus depreciation). Data on disposable income and on the civilian resident population come from the Economic Report of the President (1978).

Equation 3.2 presents the parameter estimates corresponding to equation 3.1 based on the gross capital stock (K_h^G and K^G):

$$(3.4) \qquad \left(\frac{K_h^G}{N}\right)_t = \underset{(0.02)}{0.32}\left(\frac{K^G}{N}\right)_t + \underset{(0.04)}{0.28}\left(\frac{YD}{N}\right)_t + 1052,$$

$R^2 = 0.99$
N = 39
1930 - 40,
1946 - 74

[1]See Musgrave (1976). The total capital stock used in the study excludes the values of land, inventories and government debt.

The total effect of an increase in the capital stock is thus 0.32 plus the product of 0.28 and the net-of-tax real return on capital. Since this net of tax return is at most 0.08,[1] the total effect of a one dollar increase in the capital stock is to increase the residential capital stock by no more than 34 cents. This is substantially less than the ratio of housing capital to total capital, a ratio that has averaged 0.48 for the most recent decade in the sample.

The estimated value of β_1 in equation 3.2 will be biased if there is measurement error in the capital stock variables. Since housing capital is part of total capital, any error of measurement in K_h^G will cause a corresponding error of measurement of the total K^G. This common error in the two variables would cause an upward bias in the estimate of β_1. This source of bias can be eliminated by estimating β_1 in a slightly less direct way. Rewrite equation 3.1 as:

$$(3.3) \qquad \frac{K_h}{N} = \beta_1 \quad \frac{K_h}{N} + \frac{K_{nh}}{N} + \beta_2 \frac{YD}{N} + \beta_3$$

where K_{nh} is non-housing capital, i.e., $K_{nh} = K - K_h$. This implies:

$$(3.4) \qquad \frac{K_h}{N} = \frac{\beta_1}{1-\beta_1} \frac{K_{nh}}{N} + \frac{\beta_2}{1-\beta_2} \frac{YD}{N} + \frac{\beta_3}{1-\beta_3}$$

Although K_{nh} and K_h may have measurement errors that are either positively or negative correlated, the specification of 3.4 avoids the automatic source of

[1]The pretax return on the capital of nonfinancial corporations is approximately 11 percent (Feldstein and Summers, 1977), while the effective total tax rate on that income exceeds 60 percent. The net-of-tax return on this large part of the capital stock is thus less than 5 percent.

positive correlation that affected equation 3.1.

The resulting parameter estimates,

$$(3.5)\qquad \frac{K_h}{N} = \underset{(0.03)}{0.44}\ \frac{K_{nh}}{N} + \underset{(0.04)}{.44}\ \frac{YD}{N} + 1628\ ,$$

$$\begin{aligned} R^2 &= 0.99 \\ N &= 39 \\ 1930 &- 40, \\ 1946 &- 74 \end{aligned}$$

imply a value of $\beta_1 = 0.31$, almost exactly the same as in equation 3.1. The problem of measurement error does not seem to be serious.

The corresponding estimate of $\beta_2 = 0.25$ is also very similar to the value obtained in equation 2.2. While I know of no previous estimates of an aggregate propensity to own housing capital, the estimated value of β_2 might, on the basis of the implied elasticity, be regarded as low. The implied elasticity of K_H^G with respect to YD, calculated at the values for 1974, is only 0.14. Estimates including lagged values of disposable income and instrumental variable estimates produced very similar results. The equations were also reestimated with a correction for the autocorrelated disturbance; this raised the estimates of β_1 (to 0.37 in the equation analogous to 2.2 and to 0.35 in the equation analogous to 3.5) but actually lowered the estimated values of β_2.

Equation 3.6 presents the parameter estimates based on the net capital stocks:

$$(3.6)\qquad \left(\frac{K_h^N}{N}\right)_t = \underset{(0.02)}{0.44}\ \left(\frac{K^N}{N}\right)_t + \underset{(0.03)}{0.02}\ \left(\frac{YD}{N}\right)_t + 456.$$

$$\begin{aligned} R^2 &= 0.99 \\ N &= 39 \\ 1930 &- 40, \\ 1946 &- 74 \end{aligned}$$

The estimated value of β_1 is about 15 percent below the aggregate rational of K_h^N to K^N which averaged 0.51 for the last decade of the sample. The difference, although smaller than with the gross capital stocks, is obviously statistically significant. Note that the coefficient of the income variable is very small and statistically insignificant. Using the alternative specification of equation 3.4 leaves these conclusions essentially unchanged:

$$(3.7) \qquad \left(\frac{K_h^N}{N}\right)_t = \underset{(0.10)}{0.72} \left(\frac{K_{nh}^N}{N}\right)_t + \underset{(0.05)}{0.10} \left(\frac{YD}{N}\right)_t + 870$$

$R^2 = 0.99$
$N = 39$
1930 - 40,
1946 - 74

imples $\beta_1 = 0.42$ and $\beta_2 = .028$. Reestimating these equations with an autoregressive transformation, with lagged values of the income variables, or by an instrumental variable method did not change either the general estimate of β_1 or the low value of the income coefficient.

In short, the estimates provide at least weak support for the conclusion of the theoretical model of section 2 that the marginal share of additional capital is less than the historically constant aggregate share of approximately 50 percent. This difference can persist because other factors like rising income, special credit programs, and the development of transportation systems have contributed to the growth of housing demand. Since the equations include only income among these variables, the parameter estimates are likely to give too much importance to the capital stock as a determinant of housing capital. It seems likely that a more complete specification would result in a lower estimate of β_1. Indeed, the higher estimate of β_1 with the net capital stock than with the gross capital stock reflects the lower estimated income effect. Explicitly constraining the coefficient of the income variable to a higher value reduces the estimated value of β_1 with either the net or gross capital stocks.

There is a second reason for believing that the estimated value of β_1 may be too low. Both the theoretical analysis of section 2 and the estimated equations of this section have taken the total capital stock to be exogenous. A more general model would recognize that the aggregate amount of capital is endogenous and that some of the factors that simulate the demand for residental capital (e.g., the favorable tax treatment of owner occupied housing) are likely to stimulate aggregate capital accumulation as well. This introduces a spurious positive correlation between total capital and housing capital which, unlike the measurement error problem, cannot be eliminated by the respecification of equation 3.4. Some preliminary analysis suggests that this form of simultaneity may be important and that the current estimates of β_1 may therefore be too low.

4. Some Implications and Caveats

Although the theoretical and empirical findings of this study should be regarded as preliminary and tentative, some potential implications are worth noting. In particular the divisions of incremental capital between residential and nonresidential uses is important for assessing how a higher rate of saving would affect national income and labor productivity. This in turn has implications for national policy toward savings in general and toward residential investment in particular.

In assessing the desirability of increasing the rate of saving in the United States, the key consideration should be the national rate of return on additional capital.[1] This rate of return can be measured for the corporate sector by the ratio of company pretax profits plus interest payments to the capital stock at replacement cost; Feldstein and Summers (1977) report that the cyclically-adjusted average rate of return on nonfinancial corporations was 11.2 percent in the period from 1948 through 1976.[2] Measuring the corresponding pretax rate of return on residential real estate is clearly much more difficult and

[1] Because of the distorting effects of tax rules, social security annuities, government deficits, and direct government capital formation, the outcome of the "market" cannot be presumed to be the correct overall divison between consumption and saving. An increase in the rate of saving is desirable if the pretax national rate of return is high enough to compensate for the postponement in consumption. See Feldstein (1977).

[2] Profits are corrected to eliminate the distorting effects of inflation on inventory profits and depreciation. The capital stock includes land and inventories. Since profits are defined net of state and local taxes, this rate of return understates the true total national return by at least one percentage point.

probably impossible. Nearly 75 percent of residential real estate is owner occupied; there is no adequate way to measure the imputed rental income on this property without assuming in advance the relevant rate of return. Although the favorable income tax treatment of owner-occupied housing suggests a lower pretax rate of return on such investment, this may be more than offset by the capital market imperfections that prevent many individuals from becoming homeowners or from investing as much as they want in this type of asset. Since much of the residential real-estate that is not owner-occupied is held by noncorporate investors, it is difficult to identify their rental income and to correct the reported depreciation for difference between the rules and economic depreciation.

Uncertainty about the rate of return on residential property implies that the rate of return on any increase in the total capital stock is also uncertain. The importance of this uncertainty about the return on residential property depends on the share of additons to the capital stock that are devoted to this use. If only a third or less of incremental capital goes into housing, the uncertainty of the total marginal return to capital is limited and that total return is not likely to be very far from the return on nonfinancial corporate capital.

Much of the popular and government concern with capital formation reflects the link between industrial capital, labor productivity and wage income. In contrast, increases in the stock of housing capital may have little or no impact on wage rates or labor productivity, especially in the case of owner-occupied housing where essentially no market labor is used in the production of housing services. The evidence in this paper on the share of incremental capital used for residential real estate implies that additional saving has a greater positive impact on labor productivity and wages than would be true if savings were divided in the same proportions as the current capital stock.

There is of course no reason to accept as appropriate either the existing mix of residential and nonresidential capital or the current division of additions to the capital stock. It can be argued with some justice that the tax laws, the rules governing financial institutions, and the character of monetary policy have all encouraged a relatively greater investment in housing at the expense of investment in plant and equipment. Alternative policies can raise the cost of housing or increase the return on industrial capital in order to reduce the share of capital that is obsorbed in housing.

The theoretical and empirical analyses of this paper can be extended in several ways. At the level of abstraction of the current theoretical model, the most useful extension would probably be to recognize the portfolio investment character of the demand for owner occupied housing. The next step in the empirical research is to replace the simple reduced form equations of section 3 with a structural model within which it would be possible to examine the other factors that maintain the relative demand for housing capital, to trace the mechanism by which additions to the total stock of capital induce an increase in residential investment, and to evaluate the role of financial institutions in achieving the current allocation of capital.

Bibliography

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

Feldstein, Martin, "Does the U.S. Save Too Little?" American Economic Review, Vol. 67, No. 1, February 1977, 116-21.

Feldstein, Martin and Lawrence Summers, "Is the Rate of Profit Falling?" Brookings Papers on Economic Activity, 1:1977, 211-27.

Harberger, Arnold, "The Incidence of the Corporate Income Tax," Journal of Political Economy, LXX (June 1962), 215-40.

Johnson, Harry G., "A Comment of the General Equilibrium Analysis of Excise Taxes," American Economic Review, XLVI (March 1956), 151-56.

Jones, R.W., "The Structure of Simple General Equilibrium Models," Journal of Political Economy, LXXIII, December 1965.

Laidler, David, "Income Tax Incentives for Owner-Occupied Housing," The Taxation of Income from Capial (Arnold C. Harberger and Martin J. Bailey, eds.), The Brookings Institution, Washington, D.C., 1969.

Musgrave, John C., "Fixed Nonresidential Business and Residential Capital in the United States, 1925-75," Survey of Current Business, U.S. Department of Commerce, April 1976, 46-52.

Musgrave, John C., "Fixed Nonresidential Business and Residential Capital in the United States, 1975-78," Survey of Current Business, U.S. Department of Commerce, April 1976, 46-52.

Muth, Richard F., "The Demand for Non-Farm Housing," in The Demand for Durable Goods, ed. by Arnold C. Harberger. Chicago: University of Chicago Press, 1960.

Polinsky, A. Mitchell, "The Demand for Housing: A Study in Specification and Grouping," Econometrica, Vol. 45, No. 2, March 1977, 447-61.

Reid, Margaret G., Housing and Income. Chicago: University of Chicago Press, 1962.

Rosen, Harvey S., "Owner Occupied Housing and the Federal Income Tax: Estimates and Simulations," Journal of Urban Economics, 6, 247-66 (1979a).

Rosen, Harvey S., "Housing Decisions and the U.S. Income Tax," Journal of Public Economics, 11 (1979b) 1-23.

U.S. Government, Economic Report to the President. Washington, D.C.: U.S. Government Printing Office, 1978.