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## Housing Costs After Tax Reform

Theodore Crone

## Dividing Up The Investment Pie Have We Overinvested In Housing?

Edwin S. Mills



# BUSINESS REVIEW

Federal Reserve Bank of Philadelphia  
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The tax reforms passed in 1986 bring sweeping changes to the way people make their investment decisions. In the housing sector, where many Americans have their biggest investment, the tax structure plays a particularly strong role. This issue of the *Business Review* examines these issues from two perspectives.

In "Housing Costs After Tax Reform," Theodore Crone looks at how the new tax law recasts people's decisions about whether to rent a home or to buy one. Several factors enter into the decision, such as new income tax rates, new capital gains provisions, and the changes in rents and housing prices that are likely to occur.

Edwin S. Mills, in "Dividing Up the Investment Pie: Have We Overinvested in Housing?" assesses the impact of tax provisions and other economic factors on capital allocation between housing and non-housing assets in the U.S. economy. Using statistical tests and a new comprehensive data set, he investigates the difference between the private and social rates of return to investment in housing and non-housing, and how that difference might affect GNP.

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# Housing Costs After Tax Reform

*Theodore Crone\**

In calculating their 1986 taxes, many taxpayers undoubtedly took the opportunity to estimate what their federal income taxes would have been under the new law that began to take effect in January of this year. The good news for most of us is that our total tax bill would have been lower under the new law.

Before we run out to spend this extra money, however, we should consider some more subtle changes that the new law will introduce into our

financial planning. For example, the costs of some of our most important purchases will change. In the area of housing, both rents and the after-tax cost of owner-occupied housing will rise as a result of tax reform. Households will have to factor in these changes in costs in deciding *whether* to rent or buy and *how much* housing to rent or buy. All indications are that owning one's home in the U.S. will become relatively more attractive as a result of the new tax law. However, whether they rent or buy, Americans are likely to settle for less in the way of housing—that is, smaller, less expensive homes.

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## INCREASES IN RENTS

Why should we expect rents to rise in response to the recent changes in the tax law? Simply put, the owners of rental property will be charging higher rents to compensate for several provisions of the new law that would otherwise reduce their after-tax return. The after-tax return to a landlord depends upon the rent plus any capital gain from his property minus all his costs, including maintenance and taxes. Total taxes are determined by the interaction of a number of provisions of the tax code. Landlords are likely to react to any changes in the law that increase their tax payments by raising rents as soon as market conditions allow.

**Three major changes in the law reduce the return to landlords.** These include the lengthening of depreciation schedules, a reduction in marginal income tax rates, and an increase in capital gains taxes. Rental property will now be depreciated over a longer time span: under the old law the period was 19 years, and under the new law it is 27½ years. Furthermore, the yearly depreciation will be constant over the entire period rather than concentrated in the early years of a property's depreciable life. These two changes combine to push some deductions into the later years of a rental investment. The reduction in depreciation allowances for the first year illustrates the effect of these changes. First-year depreciation is now about 3.6 percent of the value of the property rather than the previous 8.8 percent. As a general rule, taxpayers do better to receive a deduction or write-off earlier rather than later, because the tax savings that result from the write-off can be used to earn income in later years. Since landlords now can claim less depreciation in the early years of their investment, their total after-tax return will be lower.

The new tax law also lowers marginal income tax rates for all taxpayers. The 14 tax brackets in the old law will be replaced by two official brackets in the new law when it is fully effective in 1988—a 15 percent bracket and a 28 percent bracket. Above certain income levels, however, the 15 percent bracket and personal exemptions

will be phased out. Thus, the new law really mandates four brackets—15 percent, 28 percent, 33 percent, and 28 percent again after the phase-outs (see Table 1). As long as an investment generates a positive return, lower income tax rates are a plus. But any time an investment generates a negative return *for tax purposes*, lower tax rates reduce the value of that investment as a tax write-off. The value of any tax write-off depends upon the taxpayer's marginal rate, that is, the highest tax bracket in which he pays taxes. For example, for a taxpayer who was in the 42 percent tax bracket under the previous law, every dollar subtracted from his taxable income was worth 42 cents in tax savings. If he is now in the 28 percent tax bracket, every dollar subtracted is only worth 28 cents in tax savings. In the early years of an investment in rental property, the cash flow less depreciation for tax purposes is generally negative. Therefore, in the early years, the investment generates a tax write-off against other income. Since marginal tax rates are reduced under the new tax law, the value of these write-offs is reduced for all landlords.<sup>1</sup>

A third feature of the new tax law that reduces the return to the owners of rental property is the increased tax rate on capital gains. In periods of

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<sup>1</sup>The value of real estate investments as tax write-offs is further reduced by the fact that these write-offs now can be taken only against certain types of income called "passive income." Passive income is defined as income from a trade or business in which the taxpayer does not materially participate, such as a limited partnership, and all rental income. Wages and salaries are clearly not passive income, and neither are interest, dividends, annuities, or royalties. In the case of rental income, small landlords (less than \$100,000 in adjusted gross income) may deduct up to \$25,000 in rental losses from nonpassive income as long as they are active in the management of the property. This provision is gradually phased out for landlords whose adjusted gross income exceeds \$100,000. Other changes in the tax law also will affect certain types of rental property. In the case of new structures, construction period interest and taxes are now depreciated over 27½ years along with other structure costs. This is less advantageous than deducting these costs over 10 years, as in the pre-1987 tax system. And for historically certified buildings, the tax credit for rehabilitation costs has been reduced from 25 percent to 20 percent.

**TABLE 1**  
**Marginal Tax Rates for Non-Itemizers in 1988**

Marginal Tax Rates	Adjusted Gross Income	
	Single person	Family of four
15 percent	\$4,900 - \$22,800	\$12,800 - \$42,600
28 percent	\$22,800 - \$48,100	\$42,600 - \$84,700
33 percent	\$48,100 - \$105,500	\$84,700 - \$205,700
28 percent	over \$105,500	over \$205,700

rising property values, much of the return to rental housing is in the form of capital gains. Prior to the enactment of the new law, only 40 percent of long-term capital gains were included in taxable income. With a top income tax bracket of 50 percent, this resulted in a maximum tax rate on total capital gains of 20 percent. The partial exclusion of capital gains has now been eliminated. Beginning in 1988, capital gains income will be taxed at the same rate as income from any other source. For some taxpayers that will mean a capital gains tax rate of 33 percent.

**Landlords will raise rents to bolster after-tax returns.** It is unlikely that individuals will continue to invest in rental property as long as the after-tax rate of return is considerably below the level that prevailed before tax reform.<sup>2</sup> Investment will decline and vacancy rates will fall until rents can be raised sufficiently to restore the landlords' after-tax rate of return.

The key to estimating how much rents will increase as a result of the new tax law is calculat-

ing the rate of return that landlords could expect under the pre-1987 law. If we specify rents and costs as a proportion of property value, it is relatively simple to calculate the after-tax cash flow from rental property. These income and cost items will vary among different housing markets and, indeed, from property to property. But some estimates are available for average rents, maintenance costs, property taxes, and transaction costs, such as agents' fees and loan origination fees.<sup>3</sup> Using these estimates along with the pre-1987 tax rates and depreciation schedules, we calculated the after-tax rate of

<sup>3</sup>See Theodore M. Crone, "Changing Rates of Return on Rental Property and Condominium Conversions," Federal Reserve Bank of Philadelphia, Working Paper 85-1 (1984). The rent-to-property value ratios for 27 metropolitan areas reported in that working paper were brought up to their 1983 levels using rental and housing value increases estimated from the Annual Housing Survey. 1983 was the latest year available for the survey when these calculations were made. The average rent-to-value ratio for these 27 metropolitan areas was .08. For the calculations here, maintenance costs were set at 2.6 percent of the property's value, property taxes at 2 percent, buying costs at 2.5 percent, and selling costs at 7.5 percent. See Frank DeLeeuw and Larry Ozanne, "Housing" in *How Taxes Affect Economic Behavior*, ed. Henry J. Aaron and Joseph A. Pechman (Washington: Brookings Institution, 1981).

<sup>2</sup>This statement and the analysis to follow are based on the assumption that the new tax law will not affect the *after-tax* rate of return on capital in the long run. It is what economists call a *partial equilibrium* analysis as opposed to a *general equilibrium* analysis.

return for owners of rental property.<sup>4</sup> For property that was held for 19 years and then sold, the annual after-tax rate of return would have been 11 percent. Selling the property before that time or holding it for a longer period would have resulted in a lower after-tax rate of return.

How much would landlords have to raise rents in order to achieve that same 11 percent after-tax rate of return under the new tax law? Using exactly the same scenario—a 19-year holding period and interest rates at the same level—a landlord would have to increase his rent by 27 percent. Though this estimate seems high, it is consistent with other estimates based on similar calculations.<sup>5</sup> However, this comparison does not take into consideration some other possible effects of the change in the tax law.

Rental increases will not need to be as high as 27 percent if landlords adapt to the new law by holding property for a longer period of time. And they will have to hold the property longer in order to claim the same amount of depreciation because a large portion of the deductions now come later in the life of the investment. Delaying the sale of the property also postpones the payment of capital gains taxes which are higher

under the new law. But even if a landlord holds his property for 28 years, that is, until the end of its depreciable life for tax purposes, he would still have to raise rents by 19 percent to maintain an 11 percent after-tax rate of return.

One other possible effect of the new tax law may lower the necessary rent increases. Since lenders are concerned about their after-tax return and borrowers about their after-tax cost of funds, the tax law should have the effect of generally lowering interest rates. For example, if a lender's marginal tax rate drops from 40 percent to 28 percent, he can accept a somewhat lower market rate of interest on his money and still receive the same after-tax return. Many borrowers, on the other hand, are able to deduct interest payments as a cost of doing business. Thus, if a borrower's marginal tax rate drops, he will be willing to borrow only at a somewhat lower market rate because the tax savings from the interest deductions will be less. It is not easy to calculate the net effect of these forces on the market interest rate. Major economic forecasting services, however, have estimated reductions of one-quarter to three-quarters of a percentage point in long-term interest rates due to the new tax law. Let us take the midpoint of these estimates and assume that interest rates will fall by one-half a percentage point as a result of the new law which means a lower borrowing cost for the landlord. With this decline in interest rates, a landlord who extends the holding period for his property from 19 to 28 years would have to increase rents by only 16 percent in order to achieve the same after-tax return as he received prior to 1987.

These estimates of rental increases clearly depend upon what changes in the economy and in people's investment strategies result from the recent tax reforms. Under one scenario the estimate is as high as 27 percent; under another it is only 16 percent. Which is more likely? A major tax reform such as that enacted in 1986 should lead to the kinds of adjustments in financial markets and in the economic behavior of property owners which we have discussed. Therefore, it seems reasonable to assume that

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<sup>4</sup>For the calculations reported here, we used the interest rates that prevailed in January 1986, that is, a mortgage rate of 10.4 percent and a 10-year Treasury-bond rate of 9.19 percent. We assumed a long-term inflation rate of 5 percent which is close to the expected average annual inflation rate over the next 10 years of 5.39 percent as reported in Richard Hoey's *Decision-Makers Poll*, conducted in December, 1985 and published by Drexel Burnham Lambert in January 1986. The 5 percent inflation rate applies to rental property values and all prices.

<sup>5</sup>With no interest rate change, one recent study estimates that rents would have to increase between 19 and 33 percent depending upon one's assumption about the landlord's marginal tax rate. See James R. Follain, Patric H. Hendershott, and David C. Ling, "Real Estate and the Tax Reform Act of 1986," paper prepared for the Brookings National Issues Forum (December 1986). Assuming a 10-year holding period, Douglas B. Diamond estimates that, other things remaining equal, rents on a typical multifamily project would have to increase by 24 percent to provide the same after-tax rate of return under the new law as under the old one. See Douglas B. Diamond, Jr., "Impacts on Rental Housing Development," *Home Building After Tax Reform*, The National Association of Home Builders (November 1986).

interest rates will fall enough and landlords will hold rental properties long enough to keep rental increases closer to the 16 percent estimate than to the 27 percent estimate.<sup>6</sup>

Moreover, these rental increases will not occur overnight. They reflect the *long-term* effects of the new tax law. How soon these increases are put in place will depend upon how quickly the supply of rental housing adjusts to the new tax situation. In order for landlords to impose substantial rent increases, construction of rental units will have to slow and vacancy rates will have to fall in most housing markets. The adjustment will be slower in areas like the southwest where rental vacancy rates are high and faster in the northeast where rental markets are tighter.

### INCREASES IN HOMEOWNER COSTS

Renters can expect their housing costs to increase by as much as 16 percent as a result of the new tax law, but they will not be alone. Homeowners will also face cost increases. Even though the major homeowner tax deductions—mortgage interest and property taxes—are retained in the new tax law, other changes will result in higher after-tax housing costs for homeowners.

**Changes in deductions and lower marginal tax rates will raise homeowner costs.** The new tax law introduced major changes in the standard deduction and in many deductions not related to housing. Since all taxpayers can claim the standard deduction, only the itemized deductions over and above the level of the standard deduction result in a decrease in taxes. Under the new tax law the standard deduction is higher. In 1986 it was \$3,670 for married couples filing jointly, but beginning in 1988 it will be \$5,000.<sup>7</sup> Therefore, it will take more itemized deductions

to reach the level of the standard deduction—itemized deductions for which the taxpayer receives no reduction in total taxes. Since many non-housing deductions have been eliminated, such as state and local sales taxes and interest on consumer debt, more homeowners will have to use some of their housing deductions to bring their itemized deductions up to the level of the standard deduction. For this portion of their housing deductions they will receive no decrease in their total tax bill. For example, suppose a married couple has \$4,000 in deductions not related to housing and \$7,000 in mortgage interest and property tax deductions from their home, for a total of \$11,000. Only \$6,000 of the housing deductions will result in a lowering of their tax bill, because without the housing deductions the couple would not have itemized and would have received a \$5,000 standard deduction.

Lower marginal tax rates also serve to increase homeowner costs by lowering the value of housing deductions. Lower tax rates affect homeowners just as they do landlords, and the value of housing deductions, like all others, has been reduced. If a couple with \$6,000 in housing deductions was in the 38 percent tax bracket under the old law and now is in the 28 percent bracket, the tax savings from their housing deductions has dropped from \$2280 to \$1680.

**How much more will it cost to own a home?** To illustrate how much homeowner costs will increase under the new tax law, we can look at the after-tax costs of an owner-occupied home for a typical family in the first year of their housing investment.<sup>8</sup> These costs, of course, will vary

<sup>8</sup>In calculating increases in homeownership costs, care must be taken to make comparisons for the same tax year. The tax rates established in the tax reform bill will become fully effective only in 1988. The standard deduction, the personal exemption, and all the tax brackets used under the previous tax law would have changed by 1988 because of the provisions for indexing for inflation. Due to the low rate of inflation in 1986 and the relatively low expectations for inflation in 1987, tax brackets, deductions, and exemptions have been adjusted using an average annual rate of inflation of 3 percent for 1986 and 1987.

<sup>6</sup>Taking all of the effects of the tax law changes into consideration, Follain, Hendershott, and Ling predict a 10 to 15 percent increase in residential rents. Diamond estimates that they will increase 15 to 20 percent.

<sup>7</sup>For single taxpayers the standard deduction will rise from \$2,480 to \$3,000.

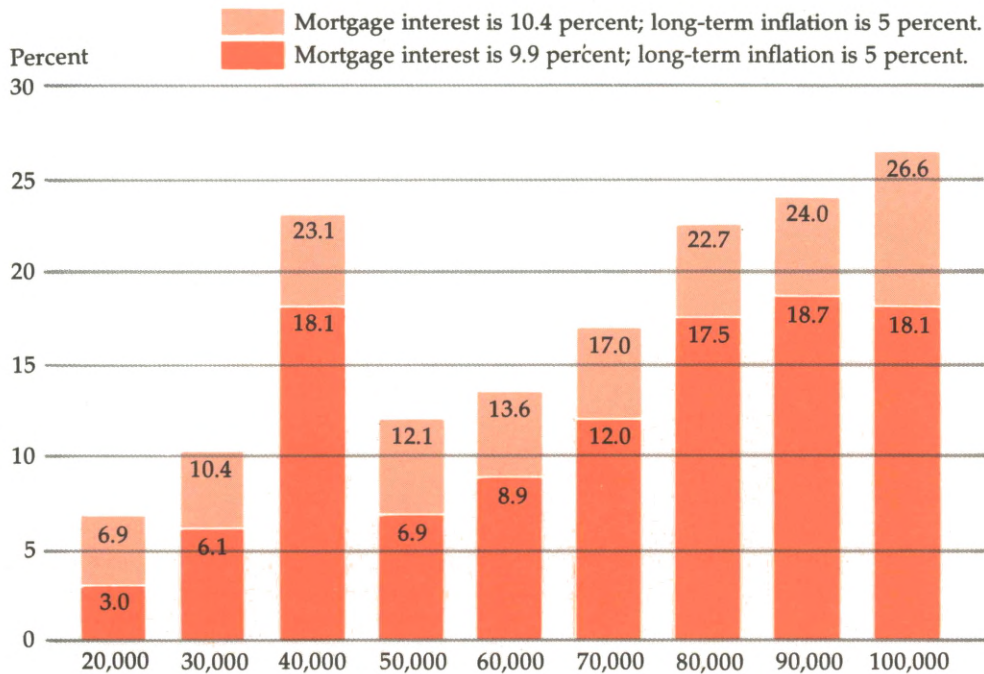
with the value of the house and with the family's marginal tax rate. If we exclude the one-time costs associated with buying a house, the first-year costs will include the mortgage payments, maintenance costs, property taxes, and the foregone interest on the family's equity in the house. From this sum should be subtracted the capital gains accrued over the year and the tax savings derived from deductions related to housing.

The full bars in Figure 1 show the percentage change in first year homeowner costs due to changes in the tax law for a typical family of four who purchases a home valued at twice its annual income. These increases assume no change in interest rates. The first-year costs increase by 6.9

percent for a family earning \$20,000 a year and by 26.6 percent for a family earning \$100,000 a year. In general, the percentage increase in housing costs due to tax changes is greater at the higher levels of income. The one exception is in the \$40,000 income range, where housing cost increases are substantially greater than at some higher income levels. Since the new tax brackets are considerably broader than the old ones, our typical taxpayer in the \$40,000 range will see a sharp decline in his marginal tax rate—from 28 percent to 15 percent—and a corresponding decline in the value of his housing related deductions.

Interest rates are a key determinant of the cost

**FIGURE 1**  
**First-Year Homeowner Costs Increase**



NOTE: To keep this chart consistent with the rest of the discussion in this article, we have adjusted the pre-1987 tax rates, standard deduction, and exemptions to their presumed 1988 levels. The interest rates and inflation rates are the same as those used for the rent examples in the text.



of owner-occupied housing. If the new tax law does lead to a decline in long-term interest rates of one-half a percentage point, as some forecasters suggest, the increase in homeownership costs for a typical family at all income levels will be a good deal less, because a lower interest rate will result in a lower monthly mortgage payment. The darker portions of the bars in Figure 1 show the increase in first-year homeownership costs assuming interest rates decline by one-half a percentage point (the same as in our rent example). Increases still range from about 3 percent to almost 19 percent. These increases are for first-year costs only, and the average yearly cost will depend upon the family's length of stay in the house they buy. Nevertheless, increases in the first-year costs are indicative of increases in the average yearly costs.

#### WILL IT STILL PAY TO BUY A HOME?

Both rents and homeowner costs are going to increase as a result of the new tax bill. The question facing many families will be the same as it was before tax reform: "Given that we intend to remain in our next residence for, say, five years, should we rent or buy?" The answer to this question depends upon the family's after-tax rate of return on owner-occupied housing compared to its next best opportunity. In terms of the after-tax return, we can consider the next best investment opportunity for many homeowners to be tax-exempt municipals or government securities, depending on their tax bracket. By calculating an after-tax return on owner-occupied housing for each income group, a "critical income level" for homeownership can be determined for any expected length of stay in the same house. Any family above that critical income level would do better by investing in owner-occupied housing. Any family below that income level would fare better by renting and investing in long-term Treasury securities or tax-exempt municipals. Figure 2 (p. 10) shows critical income levels for homeownership under the pre-1987 law. At a 5 percent inflation rate, our typical four-person family which earns

\$40,000 or more a year (in 1988 dollars) and intends to remain in the home at least 10 years would fare better by buying the home. A family whose annual income was less or who intended to stay for a shorter period would fare better by renting.

The return to homeownership and therefore the critical income level for homeownership are highly dependent upon the inflation rate. Even though higher rates of inflation translate into higher interest rates, the increase in interest payments by the homeowner is more than offset by the greater appreciation in the value of the house as long as the house appreciates at the rate of inflation. To illustrate, Figure 2 compares the critical income levels for homeownership under two different assumptions about the long-term inflation rate—5 percent and 8 percent. Clearly the higher the inflation rate the higher the return to owner-occupied housing. Regardless of how long people stay in a home, the critical income level for homeownership declines as the inflation rate increases.

If the inflation rate remains unchanged, the effect of the new tax code on the critical income levels for homeownership depends upon how the tax changes will affect rents and interest rates. Figure 3 (p. 11) compares the critical income levels under the old law to two scenarios under the new law: no change in interest rates with rents up 19 percent, and one-half percent lower interest rates with rents up 16 percent. The critical income level is universally lower under the new law than under the old one. Under the old law, our typical family who intends to remain in a home for 10 years would have to have an income of \$40,000 to make homeownership preferable to renting. Under the new tax law with no change in interest rates, homeownership is preferable as long as the family income is \$34,000 or greater. We can also look at the issue starting with income rather than the intended length of stay. A family with an initial income of \$35,000 would have to remain in the home 14 years under the old tax law in order to make homeownership preferable to renting and

buying securities. Under the new law, they would have to remain only 10 years.

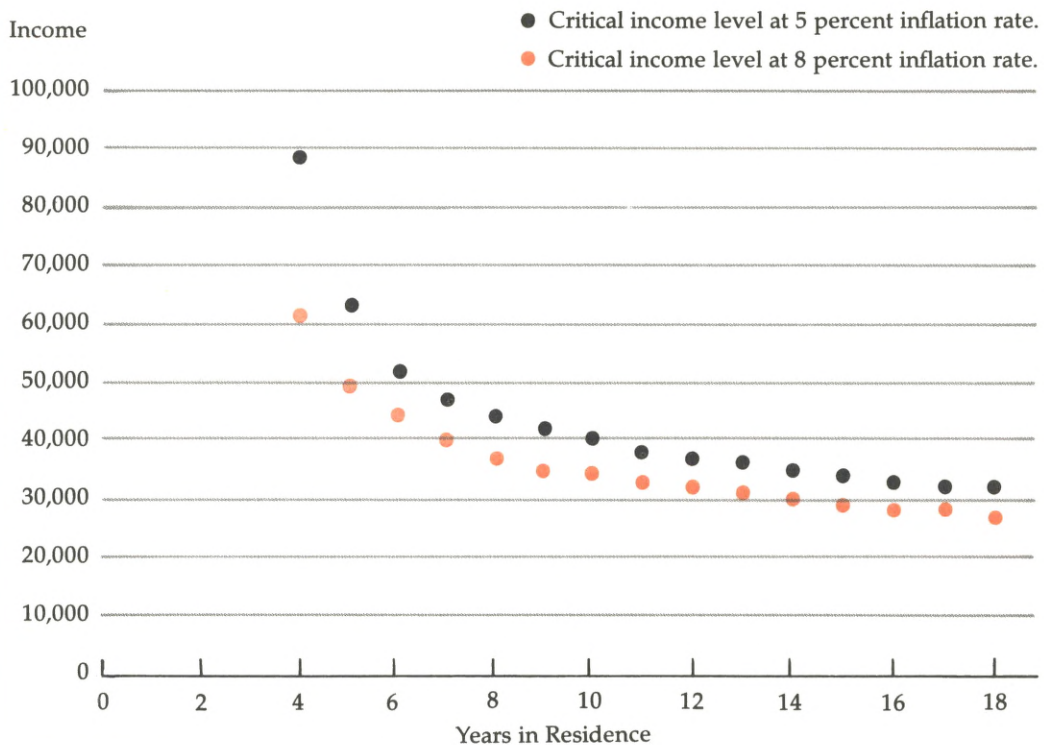
What if the new tax law results in a lower level of interest rates? In this case, the family who intends to remain in the house for 10 years would have to earn only \$31,000 a year under the new tax law to make buying preferable to renting. The advantages to homeownership are even greater under this scenario than in the case of no change in interest rates. Both of the scenarios depicted in Figure 3 indicate that, far from dis-

couraging homeownership, the new tax law will encourage it even more than the old one.

**THE BOTTOM LINE**

What is the bottom line? What can we say with confidence about the new tax law's effect on housing costs, the demand for housing, and homeownership? The changes that affect landlords will result in a rise in rents. Even though most of the deductions that homeowners enjoy are retained, other changes in the law will raise

**FIGURE 2**  
**Higher Inflation Encourages Homeownership**



NOTE: The pre-1987 tax rates, standard deductions, and exemptions have been adjusted to their presumed 1988 levels. The interest rates for the calculations, assuming a 5 percent inflation rate, are 10.4 percent for mortgage interest, 9.19 percent for Treasury securities, and 7.74 percent for tax exempt municipals. For consistency, all interest rates are raised by 3 percentage points under the assumption of 8 percent inflation.

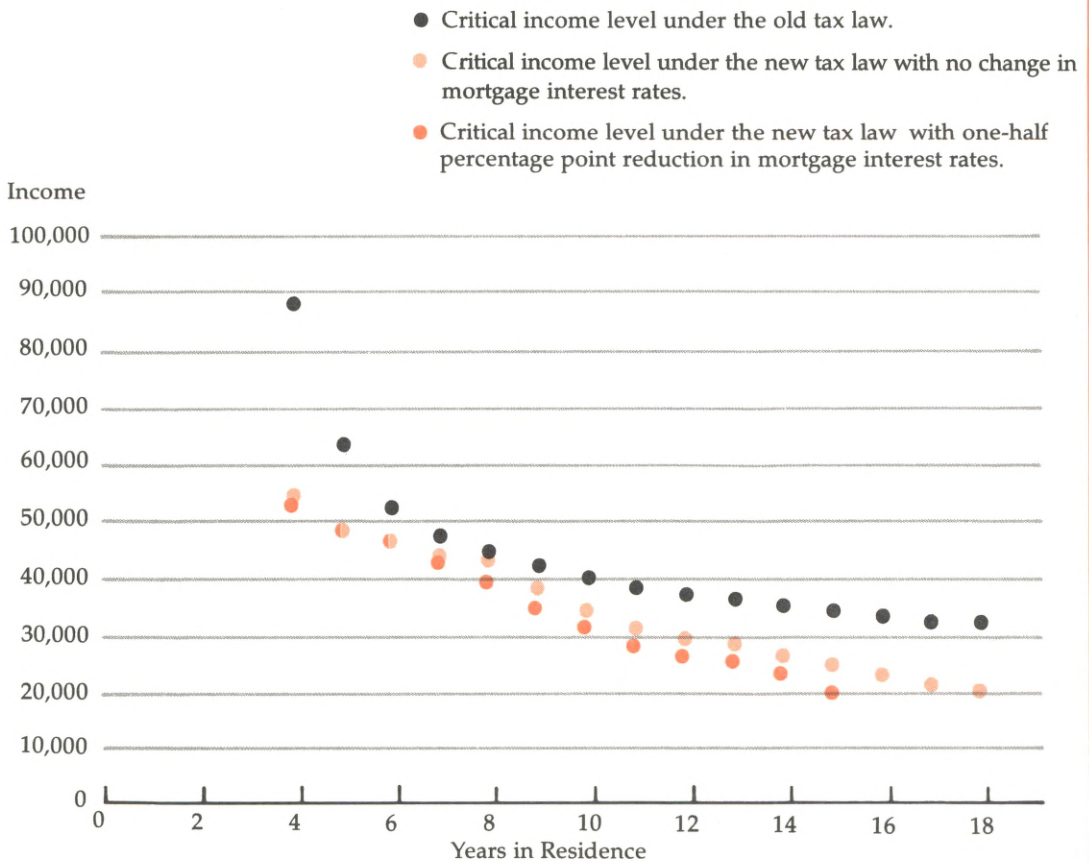
the after-tax cost of owning a home. There may still be some debate about *how much* rents and homeowner costs will change, but one result is clear: the cost of housing will rise for everyone.

Normally, when the price of any item rises, the quantity demanded decreases. From this perspective, we would expect a decrease in the amount of housing demanded by both renters and homeowners. That is, they would seek smaller, relatively less expensive homes, and the proportion of the nation's total capital stock

devoted to housing would decline over time.<sup>9</sup> But, since the recent tax changes are so broad, the prices of many other items that the typical family purchases are likely to change. Also, the removal of many previously tax-sheltered possibilities in the new tax law could increase the *investment* demand for owner-occupied housing.

<sup>9</sup>See the article by Edwin S. Mills in this issue of the *Business Review*.

**FIGURE 3**  
**The New Tax Law Encourages Homeownership**



Moreover, the reduction in the demand for housing due to increased costs will be partially but not totally offset by an increase in disposable income as tax rates are lowered. Thus, without a complete model of the economy, it is impossible to estimate whether total housing demand will actually decline and, if so, by how much.

Since changes in the tax law affect landlords in a negative sense more than they do home-

owners, homeownership should rise as a result of tax reform. No matter how long people intend to stay in a house, the new tax law makes homeownership preferable for more families than the old law. The longer the intended stay, the more advantageous the new law is for homeowners. Thus, the new tax law only strengthens the policy of encouraging homeownership in the U.S.

# Dividing Up The Investment Pie: Have We Overinvested In Housing?

*Edwin S. Mills\**

Capital is an important ingredient in the national economy. In the form of machinery it makes workers more productive and generates high real wages in almost every sector of the economy. In the form of housing it provides shelter for the population. As infrastructure, like roads, utilities, and schools, it helps provide many public and quasi-public services, such as transportation, electricity, and education. Clearly, many kinds of capital exist and they have many uses.

In the U.S., the kinds and uses of capital are mainly decided in complex financial markets, influenced by many government tax and regulatory programs. Economists are naturally interested in whether this system of taxes and regulations has resulted in an efficient allocation of capital. Efficiency means that scarce capital resources are used so as to produce as much as possible of the commodities and services that people want to buy.<sup>1</sup>

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<sup>1</sup>The efficient allocation of capital among its various uses is not the only criterion for judging how well the economy is structured. Questions of equity, which involve the distribution of *ownership*, matter as well for economic well-being. But, for the purposes of this paper, the focus will be exclusively on efficiency.

A number of analyses of capital allocation have concluded that the U.S. has overinvested in housing capital relative to industrial and other kinds of capital. A remarkable new data set on capital stock compiled by the Department of Commerce allows us to calculate new estimates of how efficiently the capital stock has been allocated. These estimates confirm the conclusions of earlier studies. They also allow us to measure how much we have overinvested in housing.

### CAPITAL FORMATION AND ECONOMIC GROWTH

Research during the last three decades has provided economists with a much improved appreciation of the relationship between capital accumulation and economic performance. The term “capital” refers to a varied set of assets (such as buildings, equipment, and homes) and to an equally varied set of entitlements to those assets (such as stocks, bonds, and mortgages).

The growth and use of capital assets are important because they affect living standards. U.S. real incomes and living standards have risen during most of our history for three closely related reasons. First, increasing amounts of productive capital per worker have raised worker productivity and real wages (wages adjusted for inflation). Second, improved education and training of the labor force—which comes heavily into play as we introduce more complex modern capital—also has raised worker productivity and real wages. Third, as technology has improved through time, it also has improved the productivity of both workers and the capital they work with. Most new technology must be built into capital in order to raise productivity and living standards.

Economists debate the relative importance of the three causes of rising living standards. Part of the problem is the difficulty of measuring gradual improvements in technology and labor force productivity. But the important point here is that all three reasons are furthered by capital accumulation. Without capital accumulation, living standards would rise only slowly.

**Focusing on Fixed Reproducible Capital.** If only we had adequate data, we could measure the nation’s wealth by adding up either the value of the assets or the value of the entitlements to those assets. But our data are far from perfect. For example, data for land and other natural resources are not complete. We know how much land there is in the U.S. and some estimates have been made of its market value, but they only cover a few years and are not reliable. No one has estimated the amounts or values of most other natural resources, such as water, minerals, fossil fuels, and so forth.

But at least for man-made physical assets, comprehensive data on capital accumulation have been published, and they are available in some sectoral detail from 1925 to 1984. This is the result of a remarkable data collection effort by the Department of Commerce. The assets in this data set include consumer durables, such as refrigerators, televisions, and automobiles, and fixed reproducible assets.<sup>2</sup> “Fixed” means not normally moved after production and “reproducible” means made as part of the economy’s production. The important kinds of fixed reproducible assets are: industrial plant and equipment; housing; non-housing real estate, including offices, retailing and wholesaling structures, hotels and motels, and warehouses; and infrastructure, such as transportation systems, water supply and waste disposal systems, schools and other public buildings.

Fixed reproducible capital assets are economically important because they provide services that directly or indirectly benefit households or businesses. The dollar value of these capital services combined with the dollar value of labor services and other inputs in the production process represent the gross national product

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<sup>2</sup>The Commerce Department’s data set does not include inventories, that is, commodities at various stages in the production and distribution process. Inventory data are available from other sources, but they are not strictly comparable to the data in the Commerce Department’s capital stock data series, and they are not included in the analysis to follow.

(GNP) or the market value of the economy's output. Industrial machinery, when combined with labor, fuel, and raw materials, provides services that produce commodities. Likewise, office and industrial buildings provide services that enable workers to produce commodities and services for people. Unlike most assets, housing structures provide services directly to consumers instead of through a production process. Infrastructure capital provides services both to consumers and to production activities. For example, roads are used both for social outings and for transporting commodities.

### DIVIDING INVESTMENT AMONG ALTERNATIVE ASSETS

Since total capital accumulation is so important in promoting growth and productivity, allocating capital formation among alternative kinds and uses is also extremely important. Large amounts of resources are involved, with some 10 percent of the economy's total production devoted to capital formation. Total physical capital, almost all accumulated during the last half century or so, is about four times the economy's total annual output or income.

The most important classification of kinds of capital assets is between housing and other kinds of fixed reproducible assets. The distinction is important partly because both categories are large and have important effects on people's living standards. In addition, the two kinds of capital are accumulated and allocated through different kinds of institutions and are subject to different kinds of tax provisions and regulations. Therefore, economists have been concerned to estimate whether the complex laws and institutions result in an appropriate allocation of fixed reproducible capital between housing and other uses.

The historical allocation of capital between housing and non-housing assets is presented in Figure 1 (p. 16). Non-housing capital in this figure includes all non-housing fixed reproducible assets regardless of ownership. Most is privately owned, but a considerable amount is owned by

federal, state, and local governments. The housing capital includes both owner-occupied and rental dwellings. Owner-occupied dwellings are privately owned, but rental dwellings may be owned privately or by government. In total, governments own about 20 percent of the economy's fixed reproducible assets.

Interestingly, non-housing capital has increased faster than housing capital during the 55-year period between 1929 and 1984. By 1984, the non-housing capital stock was nearly twice as large as the housing capital stock. Even though investment was small during the 1930s, the total decrease in both housing and non-housing capital was less than 1 percent. Both kinds of capital increased during World War II. At the end of the war, non-housing capital fell by about 9 percent, mainly because much wartime capital rapidly became obsolete thereafter. Both capital stocks have increased every year since 1949, and they have increased at approximately the same rate—3 percent per year—for the total 1949 to 1984 period.

Reflecting gains in productivity, GNP has risen more rapidly than either housing or non-housing capital, both during the entire 55-year period and during the period of postwar prosperity. The depression of the 1930s had a devastating effect on real output and income. Real GNP fell about 25 percent during the 1930s and first exceeded its 1929 level only in 1939. The postwar period is remarkable for its economic growth, with GNP increasing almost every year for the last 40 years. Output, of course, has also grown faster than labor input. This record of increased output per worker has resulted from the increases in physical capital per worker as well as technological change, and from an increasingly productive labor force.

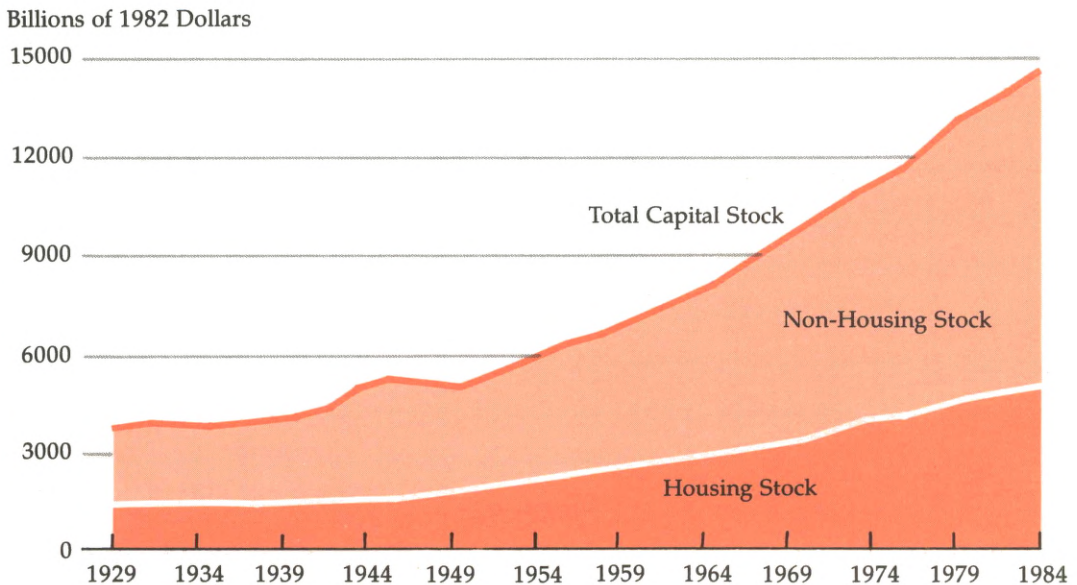
**Efficiency Means Equating Social Returns.** With so much of the economy's resources and such large effects on economic growth at stake, it is important that the country allocate its capital assets as efficiently as possible. If too much capital is used in any sector relative to labor, then the return to capital in that sector falls.

Likewise, if too much of any commodity or service is produced relative to consumer demand, then prices fall and the returns to both capital and labor in the production of that commodity fall. Efficiency requires an allocation of the capital stock such that a small increment to capital will add the same amount to the value of output whether the capital is invested in plant and equipment or in housing. The market value of the extra output produced is referred to as the social return to capital. The social return is the output or income produced by additional units of capital, before taxes and regardless of ownership. Part of the social return goes to private owners, such as corporations or households, and part goes to governments. Governments' shares of returns result partly from taxes on

private capital income and partly from government ownership of considerable amounts of capital stock. Some is housing, mostly built for military personnel and for low-income people. Some is roads and other infrastructure, and some is public utility plants.

Equality of social returns in all uses is necessary to ensure that the capital stock is being used to produce the commodities that people want most. Social returns may not be equated if tax provisions or regulations differ from one use of capital to another. Equality of social returns among sectors is, of course, a long-run criterion of efficiency. Fixed reproducible capital can be reallocated only to a limited degree once it is built. However, in a growing economy, modest shifts in investment among sectors can maintain a

**FIGURE 1**  
**The Allocation of Capital between Housing and Non-Housing Assets**



SOURCE: *Survey of Current Business*, January 1986.



capital allocation that equates returns among sectors.

Estimating the social return to capital is conceptually easy. Most non-housing fixed reproducible capital is used to make products that are sold in markets. From the market value of the product, subtract returns to labor and other non-capital inputs. The remainder is the return to capital. That total return can be divided by the capital stock, yielding the return per unit of capital, or rate of return on capital. For rental housing, rents collected are the relevant value of the output of housing services. The same procedure can be followed as for non-housing capital to calculate returns per unit of rental housing capital. For owner-occupied housing the calculation is somewhat more complex because the output is not sold on a market. The government, however, estimates rents for owner-occupied housing from market rents on comparable rental housing and imputes such rents to owner-occupied housing. These imputed rents can be divided by the owner-occupied housing capital stock to obtain the return per unit of owner-occupied housing.

**“Reality” Means Equating Private Returns.** In the U.S. economy, capital is allocated among sectors and uses mostly by market decisions. Typically, corporate and individual owners try to obtain the highest return possible to themselves on their assets, that is, the highest private return. In so doing, they tend to equalize after-tax returns on capital. Taxes that are levied differently on various kinds of capital result in private returns that are different from social returns to capital, and the difference varies from sector to sector. This distorts the efficient allocation of capital.<sup>3</sup> Tax rates are known, so pre-tax and post-tax returns can be calculated on major capital categories (although our intricate tax provisions make the calculations more complex than might be imagined!). Thus, the economists

who estimate capital distortions have concentrated on tax-induced distortions.

However, differential tax rates are by no means the only possible culprits in distorting capital allocations. Depreciation rates allowed for tax purposes vary from economic depreciation rates—that is, the decline in market value due to aging—and they vary differently among types of capital and have been changed over the years. The same is true of investment tax credits. Also, there are many federal government financial assistance programs, such as the Federal Housing Administration’s (FHA) home mortgage insurance and subsidy programs for health services investments, that are designed to stimulate particular kinds of capital formation. In addition, housing is heavily taxed at the local level. Some housing is owned by governments and rented at subsidized rents to low-income people and to military personnel, generating low returns. Both housing and non-housing investment are strongly regulated by local government land use and other controls, and no one knows how distorting such controls are.

Finally, private capital markets simply may not work as well as they should. Different kinds of capital accumulation are financed through different government and private institutions, and money may not move smoothly among them in search of the highest return. This is true not only in housing but in other areas as well. For example, investments in proprietorships and partnerships are financed by different institutions and on different criteria from corporate investment in plant and equipment. For housing, investment has traditionally been financed through savings and loans, savings banks, and commercial banks—institutions that have typically raised their funds locally and, to some extent, from small savers. Industrial fixed capital, by contrast, is usually financed through stock and bond markets, investment banks, and other such institutions to which small savers have had only limited access. During some periods, investors in institutions that primarily finance housing earned small or negative returns, after account-

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<sup>3</sup>Some such distortions have been instituted by governments as a matter of social policy.

ing for inflation, while the returns to investors in stocks and bonds were larger. No one knows how much distortion in capital formation might result from such segmentation of capital markets.

Thus, at the conceptual level, there are many reasons that capital markets may not equate social rates of return among the many types of fixed capital. Different reasons have different effects on private returns to different kinds of capital. In this situation, facts should be the final arbiter in deciding how efficiently we have allocated our valuable capital assets.

### PREVIOUS STUDIES SHOW OVERINVESTMENT IN HOUSING...

Whether we allocate capital efficiently is not only an intellectually interesting question but also a concern of policymakers designing national government programs. To get an answer, it would be ideal to have estimates of the social and private returns to a comprehensive set of investments: industrial fixed capital, housing, and various other kinds of real estate. But we are far from such a goal.

For housing, a few studies have compared social and private rates of return on owner-occupied housing. As U.S. homeowners realize, the tax status of owner-occupied housing is different from that of other investments. An owner of rental housing, or of any other income-producing asset, pays federal income tax on his profits from the asset—that is, his revenues less costs. For the landlord, revenues are rents received from tenants, and costs include mortgage interest paid, local real estate taxes, depreciation, maintenance, repairs, insurance, and so forth. For owner-occupiers, the analogous sum would be imputed rent less the same costs. But the federal income tax code does not require owner-occupiers to pay tax on imputed rent net of costs; furthermore, the code does permit two large costs—mortgage interest and local real estate taxes—to be deducted from other income before computing tax liability. The 1986 Tax Reform Act reforms will continue these provisions. Of course, industrial investments and

rental housing have also been subject to special provisions in the federal tax code, notably artificially short depreciable lives of assets, accelerated depreciation, and investment tax credits. These provisions are being made less generous under the 1986 Tax Reform Act.

A sequence of increasingly careful and detailed studies has compared before-tax and after-tax returns to owner-occupied housing with returns to industrial and other investments.<sup>4</sup> Roughly speaking, such studies conclude that when homeowners receive the same *private* returns on their homes as on other investments, the *social* return on their housing investment will be 15 to 25 percent lower than the social return on those other investments. All the scholars who have done such studies conclude that the U.S. economy has overinvested in owner-occupied housing relative to industrial and other kinds of capital.

### ...AND NEW ESTIMATES CONFIRM AND QUANTIFY IT

The Department of Commerce's complete set of accounts of fixed reproducible capital has provided the basis for a more comprehensive look at the issue of overinvestment in housing. The assets in this data set are classified into owner-occupied and rental housing and various non-housing categories. By matching data from these capital accounts with components of GNP from the Commerce Department's national income and product accounts, it is possible to compare returns to housing and other fixed reproducible capital. Both the capital accounts and the national income and product accounts go back to 1929 and are available in both current

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<sup>4</sup>See, for example, Henry Aaron, *Shelter and Subsidies*, (Washington: Brookings Institution, 1972); Martin Feldstein, "Inflation, Tax Rates and the Accumulation of Residential and Nonresidential Capital," National Bureau of Economic Research, Working Paper No. 753 (September 1981); and Patric Hendershott, "Government Policies and the Allocation of Capital Between Residential and Nonresidential Uses," National Bureau of Economic Research, Working Paper No. 1036 (December 1982).

and 1982 prices. All the data presented in this section are in real terms, using 1982 prices.

In order to estimate the social returns to housing and other kinds of fixed reproducible capital, a statistical model must be estimated. (See the Appendix, p. 22, for details of this model.) The model relates the returns to the two kinds of capital to the amounts of such capital employed in producing housing services and other commodities and services. The market values of the outputs are related both to production costs and to the demands for the commodities and services.

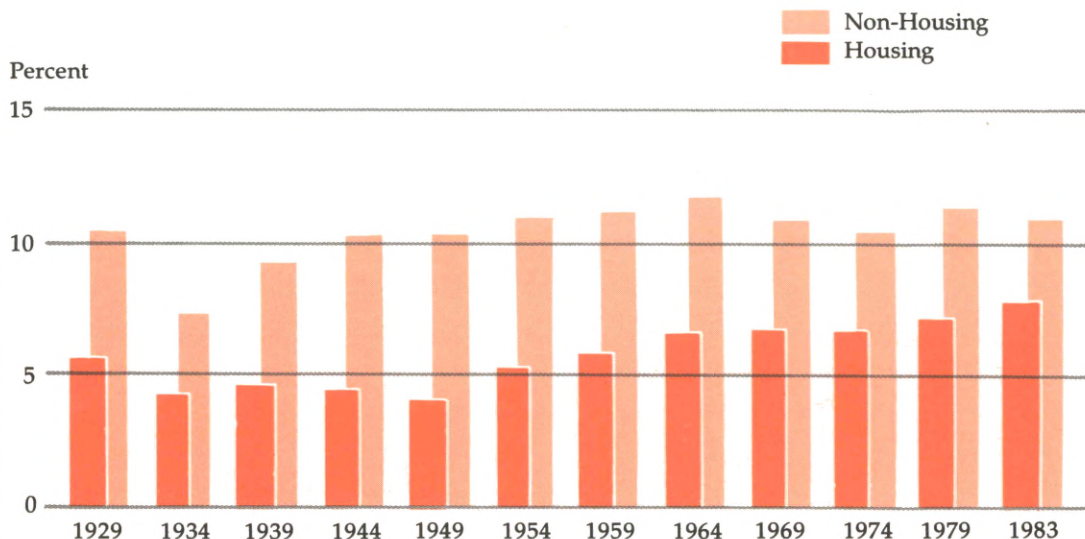
How close has the U.S. economy come to equating social returns to housing and other fixed reproducible capital? As Figure 2 shows, the social returns to housing capital have been much smaller than the social returns to non-

housing capital, with housing returns averaging somewhat more than half of non-housing returns. In fact, estimates from the model in the Appendix indicate that the social return to housing is about 55 percent of the return to non-housing.<sup>5</sup>

The data in Figure 2 make clear that the low social returns to housing are not entirely the result of the deductibility provisions for homeowners. If they were caused entirely by deducti-

<sup>5</sup>This estimate was made using GNP and gross housing and non-housing capital stock. The model was also estimated using net capital stocks and net national product and its components. With these data, the housing returns are even less than the 55 percent of non-housing returns estimated with gross data. See Edwin S. Mills, "Has the U.S. Overinvested in Housing?" Federal Reserve Bank of Philadelphia Working Paper No. 86-1 (January 1986).

**FIGURE 2**  
**Social Returns to Housing and Non-Housing**



SOURCE: Edwin S. Mills, "Has the U.S. Overinvested in Housing?" Federal Reserve Bank of Philadelphia Working Paper No. 86-1 (January 1986).

bility provisions, then social returns to housing would have been smaller relative to non-housing during the postwar period than in the pre-war period, because marginal income tax rates were higher after the war, and therefore the value of the deductibility provisions for homeowners was greater. During the 30 years between 1954 and 1983, the rate of return to non-housing capital has risen and fallen, but has not been subject to a trend. The return to housing in that period, in contrast, has been steadily upward. Thus, the gap between the two social returns is narrowing.

How much resource misallocation of capital do these results imply? The criterion for efficient allocation of capital investment is that any new capital be devoted to that use which earns the highest social rate of return, until the return is the same in all uses. On this basis, we would have invested a larger share of savings in non-housing and a smaller share in housing than we did during the last 55 years. If this had been the case, the ratio of non-housing to housing capital would be greater than it is today. But this does not necessarily mean that there would be less housing capital today, because total capital would have increased faster over the entire period. The discrepancy in social returns for housing and non-housing capital implies that real incomes have been lower than they would have been if social returns had been equated. Since total saving rises proportionately with income, total savings and capital formation would have been greater if social returns had been equated. Thus, housing capital would be a smaller share of a larger total, and it is not easy to calculate whether equalizing social returns would have resulted in a larger or a smaller housing capital stock.

A beginning has been made in calculating the resource misallocation by looking at a hypothetical situation. Suppose the social return to housing and non-housing capital *had* been the same in 1983. Then what would the allocation between housing and non-housing capital have been? And what would total GNP have been? To answer this question, take the total capital

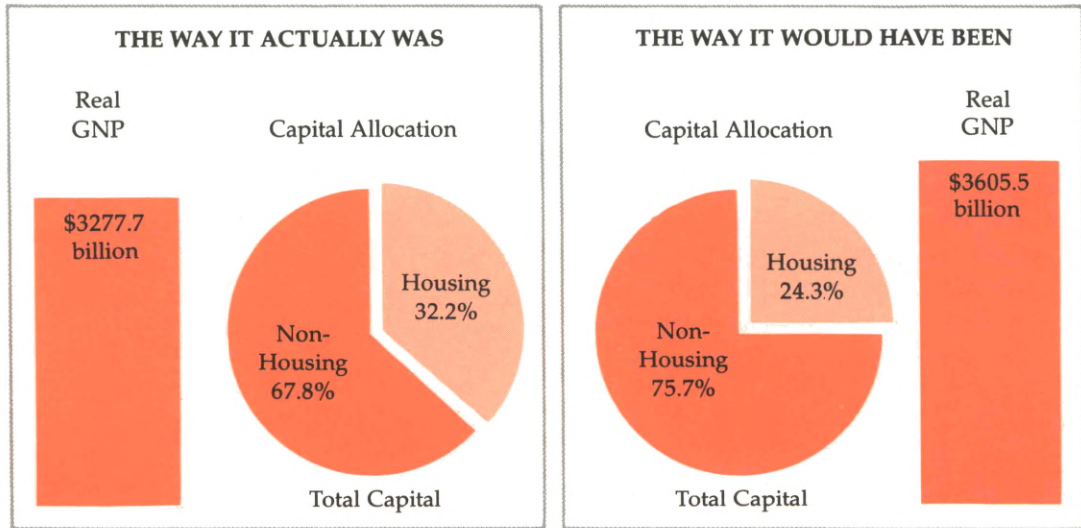
stock at the end of 1982 as given, but not the division between housing and non-housing. Suppose that, at the end of 1982, housing could magically be converted into non-housing capital. Of course, in the long run, the mix of capital can change as old capital wears out and is replaced by new capital that may be in the same sector or in a different sector. The calculation for 1983 is merely intended to obtain an approximation to what would happen in the long run. Now, require that the social returns to housing and non-housing be equal in 1983. Using the actual 1983 values for the size of the labor force and other variables, what does the model we used to estimate the return to housing imply about the division of capital between housing and non-housing? This calculation shows not only the effect of the capital stock reallocation, but also the effect of the larger GNP that it would have generated in 1983. The calculation is described in somewhat more detail in the Appendix.

The results presented in Figure 3 are quite striking. The 1983 housing stock would have been almost 25 percent smaller than it was, and non-housing capital would have been about 12 percent greater than it was. (The non-housing capital stock was about twice the housing capital stock in 1983.) Real GNP would have been about 10 percent greater than it was in 1983. The relative price of housing services, in turn, would have been 28 percent greater.

It is likely that the hypothetical reallocation would imply that income would be shifted somewhat from high to low income people. If social returns were equated, the real interest rate would fall by almost one percentage point to 7 percent, and the share of wages and salaries in total income would rise. Even this one-year calculation indicates that wages would increase 13 percent, which is greater than the 10 percent increase in GNP. In the long run, the shift from property income to earned income would be greater. Since earned income is less unequally distributed than is property income, the move to a socially efficient capital allocation could also reduce income inequality.

**FIGURE 3**  
**Equating Social Returns Affects Capital Allocation and GNP**

1983



SOURCE: Edwin S. Mills, "Has the U.S. Overinvested in Housing?" Federal Reserve Bank of Philadelphia Working Paper No. 86-1 (January 1986).

**CONCLUSIONS**

We have calculated the size of the discrepancy between social returns to housing and non-housing capital and have presented a simple calculation of the implied resource misallocation. The results indicate that the social return to housing is only about 55 percent of that to non-housing and that, based on an efficiency criterion, we have accumulated about 25 percent too much housing.

We have not tried to identify the causes of this misallocation. Although the special provisions for owner-occupied housing in the federal income tax code must be an important contributing cause, they cannot account for the entire discrepancy. Other studies have concluded that federal income tax provisions account for no

more than half the discrepancy in social returns that has been found here.

What other causes might be at work? Earlier, it was suggested that discrepancies between social returns to housing and other fixed reproducible capital probably result from differences in tax provisions, regulatory controls and capital market segmentation. The present study does not permit estimation of the relative importance of these factors. However, some hints about the causes of the discrepancy between social returns are provided by the apparent reduction in the discrepancy during the last 30 years covered by the sample data. At least the last decade of that interval saw gradually decreasing average marginal federal income tax rates. That reduces the value of the deductibility provisions and there-

fore should reduce the discrepancy between social returns to housing and non-housing capital. The Tax Reform Act of 1986 will reduce average marginal tax rates even more, and should further reduce the discrepancy between social returns.

It also seems likely that capital markets have gradually become more efficient in allocating savings where returns are highest during the last 30 years. Deregulation, computerization, and generally increasing sophistication of capital markets have probably reduced the segmentation of capital markets. Previously, small and low income savers had few alternatives to investing their savings in commercial banks and savings institutions, which used much of their money to finance housing. Recently, mutual

funds, money market funds, certificates of deposits, variable rate mortgages and other instruments have become available to a wide segment of the public and have forced institutions that finance housing to compete on a more nearly equal basis for funds with other kinds of investments.<sup>6</sup> Only further research can indicate how important these various factors have been in causing the discrepancy between social rates of return, and what the explanation is for the recent narrowing of that discrepancy.

<sup>6</sup>In addition, the possibility of bad data cannot be excluded. Although the U.S. national income and product accounts are compiled with care and expertise, the Commerce Department may simply underestimate the imputed rents to owner-occupied housing.

## Appendix

This appendix briefly describes the model in which the social returns to housing and other fixed reproducible capital are estimated. It also describes the simulation from which the overinvestment in housing was calculated. For more detail, see Edwin S. Mills, "Has the U.S. Overinvested in Housing?" Federal Reserve Bank of Philadelphia Working Paper No. 86-1 (January 1986).

The model can be written as follows:

$$(1) \quad X_1 = A_1 e^{g_1 t} N^\alpha K_1^{1-\alpha}$$

$$(2) \quad X_2 = A_2 e^{g_2 t} K_2$$

$$(3) \quad Y = X_1 + P_2 X_2$$

$$(4) \quad A_1 e^{g_1 t} \alpha N^{\alpha-1} K_1^{1-\alpha} = W$$

$$(5) \quad A_1 e^{g_1 t} (1-\alpha) N^\alpha K_1^{-\alpha} = r$$

$$(6) \quad P_2 A_2 e^{g_2 t} = \theta r$$

$$(7) \quad S_0 + S_1 Y = \Delta K_1 + \Delta K_2$$

$$(8) \quad X_2 = \gamma_2 N + \beta_2 [(1 - S_1) Y - S_0 N] / P_2 + \gamma_1 N / P_2$$

$$(9) \quad K_1 = K_{1,-1} + \Delta K_1$$

$$(10) \quad K_2 = K_{2,-1} + \Delta K_2$$

Here,

$X_1$  = output per year of non-housing commodities and services

$X_2$  = output of housing services

$N$  = labor input in non-housing production

$K_1$  = capital input in non-housing production

$K_2$  = capital input in production of housing services

$Y$  = real income, in units of non-housing prices

$P_2$  = relative price of housing services

$W$  = real wage rate

$r$  = social return to capital in non-housing

$\theta r$  = social return to capital in housing

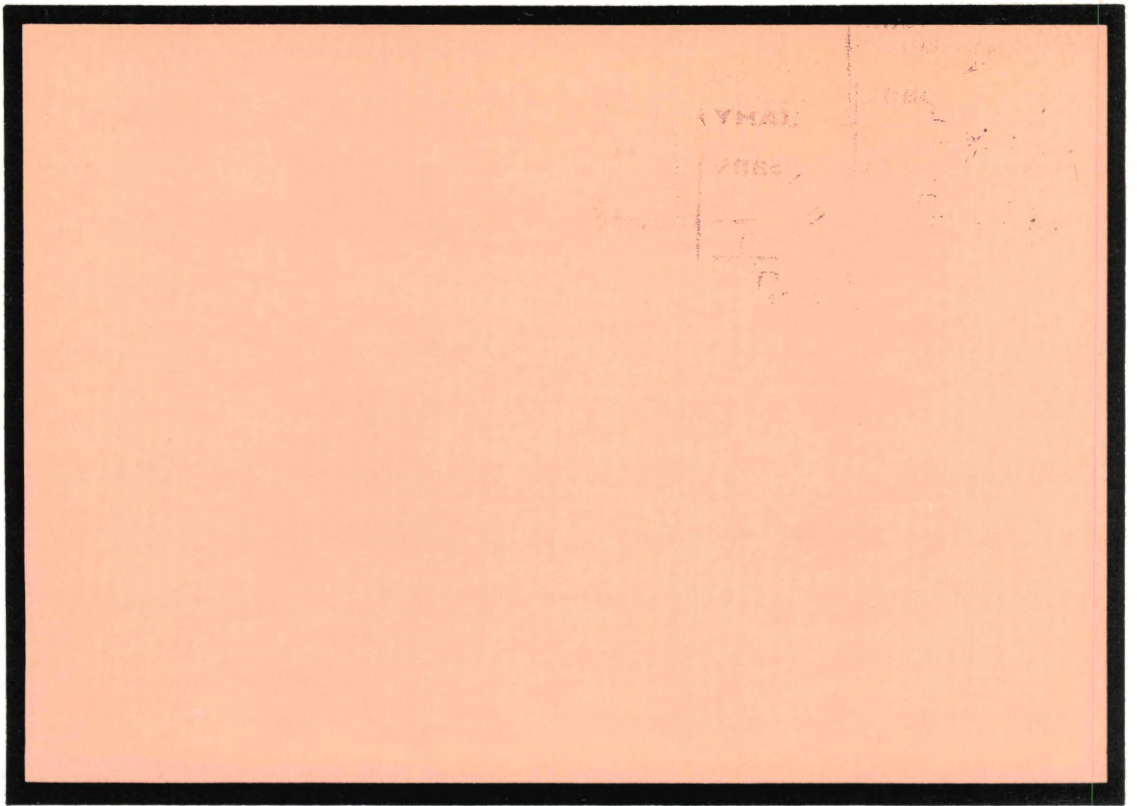
$\Delta K_1$  = annual investment in non-housing capital

$\Delta K_2$  = annual investment in housing capital.

Equations (1) and (2) are the production functions for non-housing and housing services, where  $e^{\delta_1 t}$  and  $e^{\delta_2 t}$  allow for technical progress in the two sectors. Equation (3) defines real national income. Equations (4)–(6) are the first order conditions for capital and labor in the two production sectors. They ensure that the social returns equal the value of the marginal products, but  $\theta$  permits the social returns to differ between housing and non-housing capital. Equation (7) equates savings, as a function of income, to investment in non-housing and housing capital. Equation (8) is the demand for housing services. (The demand for non-housing is satisfied identically.) Equations (9) and (10) define investment in the two sectors.

The ten equations can be solved for the ten endogenous variables:  $X_1, X_2, K_1, K_2, Y, P_2, W, r, \Delta K_1$  and  $\Delta K_2$ .  $N$  and  $t$  are exogenous, and  $K_{1,-1}$  and  $K_{2,-1}$  are lagged endogenous variables. The model was estimated with data from 1929 to 1983 using the full information maximum likelihood procedure.

The simulations consisted in setting  $K_{1,82} + K_{2,82}$  at its actual 1982 value, and  $N$  at its actual 1983 value, and putting  $t = 1983$ . Then the model was solved, using estimated parameters, for the ten endogenous variables for 1983 with  $\theta=1$ , that is, equating social returns to housing and non-housing capital. This calculation shows what  $K_{1,83}$  and  $K_{2,83}$  would have been if social returns had been equal in 1983.



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