

ANALYSIS

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Capital Gains Taxes and the Misallocation of Housing

BY CRISTIAN DERITIS AND MARK ZANDI

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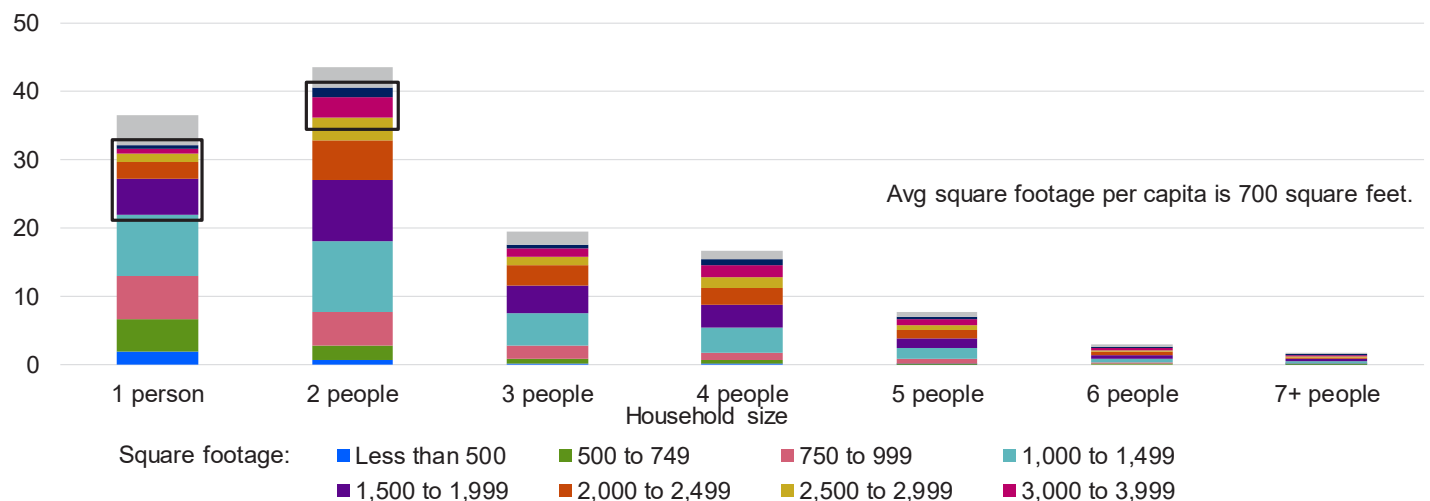
QUANTIFYING THE HOUSING MISMATCH

Analysis of the latest housing data from the Census Bureau's American Housing Survey reveals substantial misalignment between household size and housing unit size. With Americans averaging nearly 700 square feet per capita, a consistent allocation would suggest that two-person households would live in units close to 1,400 square feet, three-person households would occupy 2,100 square feet, and four-person households would live in homes approaching 2,800 square feet. The reality diverges dramatically from this pattern.

Nationally, single-person households occupy 36 million housing units, with 10.2 million (28%) residing in homes exceeding 1,500 square feet—more than double the per capita norm (see Chart 1). Two-person households demonstrate less misallocation, with 10% of their 44 million units exceeding 3,000 square feet. Among the most extreme cases, approximately 2.4 million single-person households occupy homes exceeding 2,500 square feet, representing nearly four times the national per capita average.

Chart 1: More Than 15 Million Households Live in Relatively Large Houses

of housing units by square footage and size of household, mil

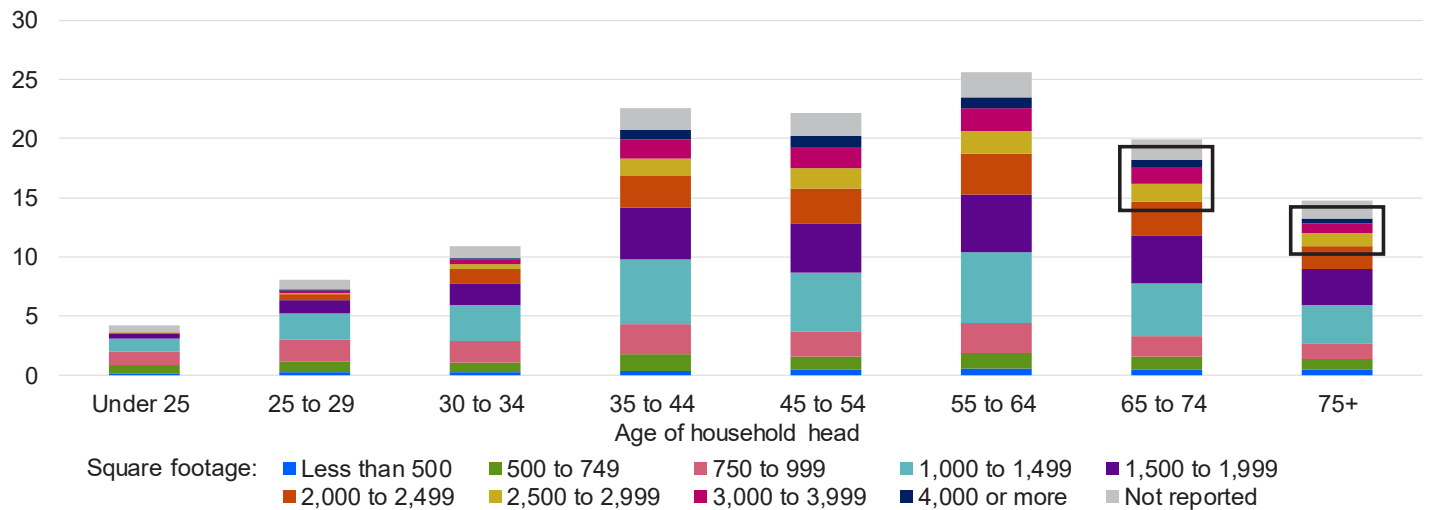


Sources: Census Bureau, Moody's Analytics

The age distribution of this misallocation proves particularly striking (see Chart 2). Approximately 3.5 million households led by people aged 65-74 live in homes larger than 2,500 square feet, while those 75 and older account for 2.3 million such households, mainly with one or two occupants (see Chart 3). Together, these two age cohorts represent nearly 6 million potentially overhoused households occupying homes that could more efficiently serve larger households living in smaller spaces.

Chart 2: Distribution of Housing Space by Age Is Highly Skewed

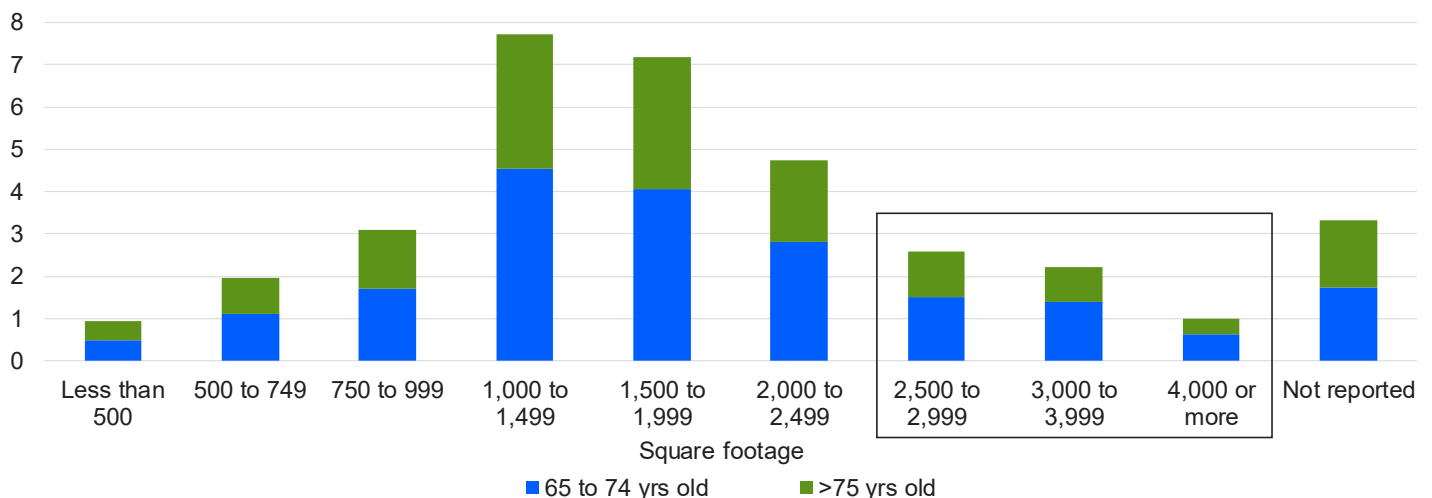
of housing units by square footage and size of household, mil



Sources: Census Bureau, Moody's Analytics

Chart 3: 6 Million 65+ Households Live in Relatively Large Houses

of housing units by square footage and size of household, mil



Sources: Census Bureau, Moody's Analytics

The misallocation is even more acute for so-called pent-up households, or households unable to form as couples and individuals cannot find adequate housing in a reasonably affordable price range.

With the housing market's plumbing backed up, households cannot trade up and down as usual. Besides slowing down mobility, the backlog prevents first-time homebuyers from purchasing homes, as families stay longer in their starter homes. Consequently, annual household formation growth decreases, as does potential family size, as space limitations restrict the number of children families may choose to have.

THE DEMOGRAPHIC DIMENSION

The persistence of elderly households in family-sized homes reflects life-cycle patterns intersecting with market frictions. Older homeowners typically acquired their homes during their peak earning years when their household included three to five people. Following the departure of children from the family home and/or the death of a spouse, their household size contracted while the amount of physical space occupied remained the same.

This is unlikely to be explained solely by preferences, as surveys show that many seniors desire smaller, more manageable homes closer to healthcare and other amenities. While a recent [AARP survey](#) showed that 75% of older adults expressed a preference to age in place, 44% acknowledged they will likely need to move, primarily for financial reasons, including housing costs (71%), maintenance expenses (60%), and property taxes (55%). The gap between stated preferences and economic realities suggests that other barriers, including capital gains taxation, may prevent optimal housing transitions.

CAPITAL GAINS TAX FRAMEWORK

The Taxpayer Relief Act of 1997 (TRA97) established the current capital gains exclusion structure for primary residences, replacing the previous rollover provision and a onetime \$125,000 exclusion for those over age 55 with exclusions of \$250,000 for single filers and \$500,000 for married couples. These exclusions apply to home sales where the owner has lived in the home for at least two of the past five years and remain in effect today.

Before the passage of these exclusions, homeowners had to keep careful records of any repairs or remodeling done on their homes to calculate their capital gains and minimize their taxes correctly. Congress set the capital gains exclusions at “relatively high” thresholds so that most taxpayers would be relieved of this complex recordkeeping requirement.

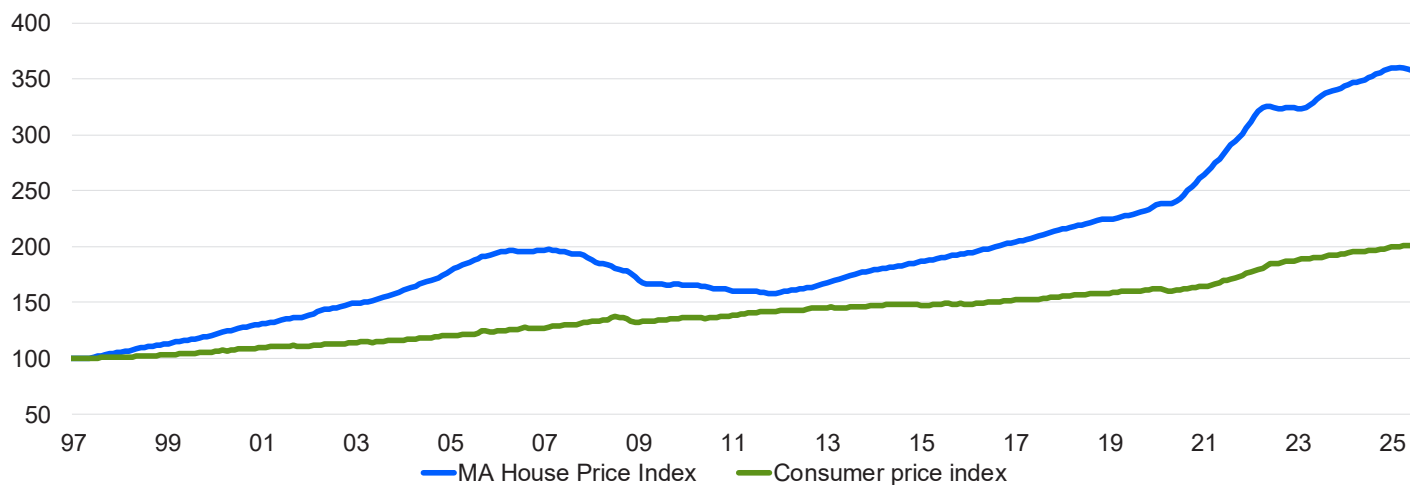
However, nearly three decades of housing appreciation have occurred without corresponding adjustment to the caps (see Chart 4). If the caps were indexed to house price growth, they would now be \$885,000/\$1,775,000. If indexed to consumer price inflation, they would be \$500,000/\$1,000,000.

The dramatic difference between general inflation indexing (100% increase) and housing price indexing (250% increase) illustrates how housing price appreciation has far outpaced overall economic inflation, making the static caps increasingly inadequate for their original purpose of exempting most home sales from capital gains taxation.

House price increases are even more dramatic in some areas of the country, with Florida, California, and parts of the West and Northeast experiencing gains of more than 300% from

Chart 4: House Prices 250% Higher Today Than in 1997

Moody's Analytics House Price Index, 1997Q1=100

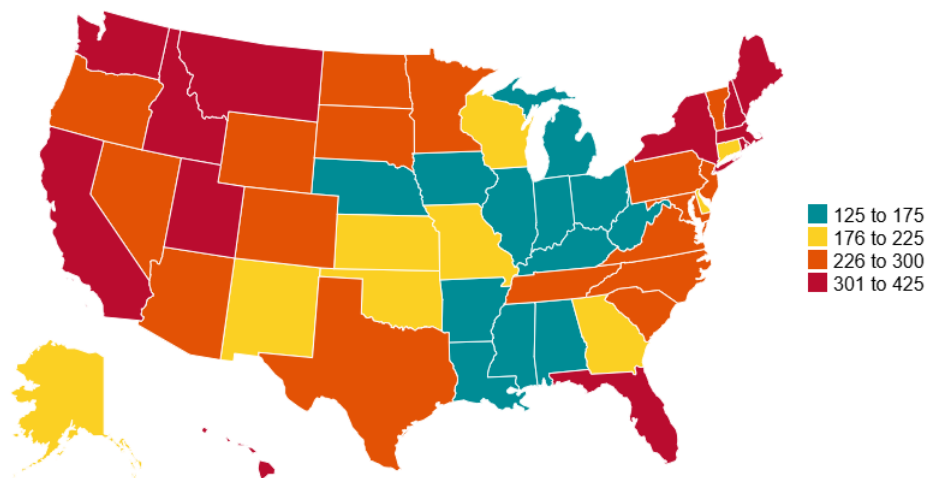


Source: Moody's Analytics

1997 to 2025 (see Chart 5). Consequently, the impact of capital gains-induced lock-in varies substantially across regions. An analysis of house price growth compared with the ratio of home sales to housing stock by metropolitan area shows a slightly positive correlation (see Chart 6).

Chart 5: House Price Increases Largest in Florida and the West

Moody's Analytics House Price Index, change from 1997Q1 to 2025Q2, %



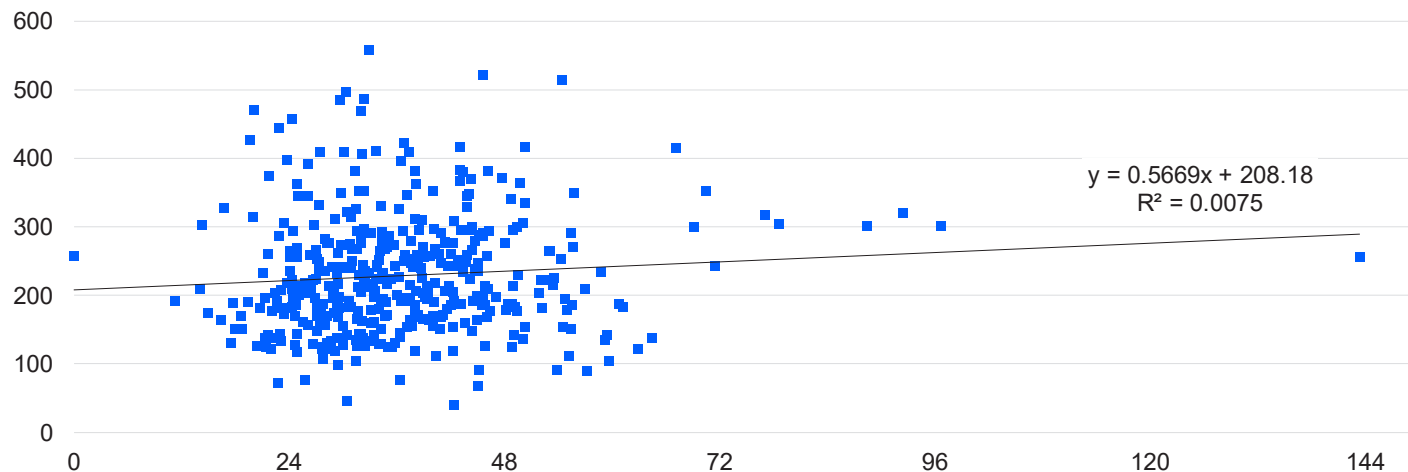
Sources: NAR, Moody's Analytics

For long-tenured homeowners, capital gains taxation creates transaction costs that can easily exceed \$100,000 on modest properties in high-appreciation markets. A representative case illustrates the severity: Suppose a widow owning a 2,800-square-foot home faces

Chart 6: Home Sales Positively Correlated With House Price Growth

X-axis: Avg ratio of existing single-family sales to housing stock from 1997Q1-2025Q2;

Y-axis: Moody's Analytics House Price Index growth from 1997Q1-2025Q2, %



Sources: NAR, Moody's Analytics

capital gains of \$750,000 on a property purchased decades ago. After her \$250,000 exclusion, she confronts taxes exceeding \$100,000 at combined federal and state rates.

This tax liability represents more than 20% of her downsizing proceeds, effectively keeping her in a home requiring extensive maintenance, higher utility costs, and property taxes she may struggle to afford on a fixed income. The disincentive to sell is strong, as her alternative is to continue living in the house until death. Her heirs would inherit the home on a stepped-up cost basis, avoiding the capital gains tax altogether. Meanwhile, her 2,800-square-foot home could have housed a family of four at the national per capita average of 700 square feet per person while potentially providing her sufficient wealth to downsize to a smaller home, apartment, or senior living facility.

Moreover, most older homeowners either do not have a mortgage or have a relatively small outstanding balance. As a result, they do not experience interest rate lock-in effects. Instead, the capital gains lock-in effect represents the primary financial factor affecting these homeowners' mobility decisions.

ANALYZING THE FISCAL IMPACT

Changes to the capital gains tax exclusion could affect housing market activity and the allocation of housing across households of varying sizes. Various approaches to indexing the caps to inflation or house price growth would align with different interpretations of the law's original intent. However, modifications to current policy would involve fiscal implications that require careful consideration.

The Congressional Research Service [estimates](#) that the current annual revenue from capital gains taxation on homes exceeding exclusion limits is \$6 billion to \$10 billion. However, this static analysis may not capture the full fiscal dynamics of reform, which could involve several offsetting revenue streams, reduced costs, and behavioral responses. Dynamic scoring would

account for transaction-based revenues that could increase substantially as the number of home sales increases, though these would accrue locally rather than at the federal level.

Under scenarios where housing turnover rises by 10%, or 400,000 existing-home sale transactions, in response to reduced capital gains lock-in effects, state and local transfer taxes (ranging from 0.5% to 1%) could generate an additional \$800 million to \$1.6 billion annually based on recent median house price data. Federal and state income taxes (averaging 25%) on Realtor commissions for these sales (near 6%) could yield \$2.4 billion in additional revenue. Furthermore, local property tax bases could strengthen as homes transfer from owners with significant homestead exemptions that restricted property tax growth to owners responsible for property taxes on a stepped-up basis. These transfers could generate upwards of \$1 billion in additional property tax revenue (which totaled \$797 billion in 2024), especially in states like California and Florida, where provisions such as Proposition 13 and Save Our Homes, respectively, restrict property tax increases for long-time homeowners.

Income and sales tax collection stemming from additional economic activity that home sales typically generate, such as remodeling or furniture sales, could further offset revenue effects from changes to capital gains taxes on primary home sales. In addition, unlocking the housing stock could affect labor mobility, potentially enhancing productivity and taxable income.

From a cost perspective, optimizing the allocation of housing among households could alleviate strain on infrastructure and enhance the efficiency of government services, potentially resulting in substantial public expenditure savings.

More efficient housing allocation could also reduce demand for housing assistance programs as price growth normalized across markets with substantial housing constraints. Combined, these effects could substantially offset changes in capital gains taxes, with declines in federal tax revenue matched by increases in state and local revenue.

COMPARISON WITH ALTERNATIVE TAX EXPENDITURES

The \$6 billion to \$10 billion annual cost of excluding capital gains on primary home sales is smaller than other housing-related tax expenditures. Mortgage interest deduction costs exceed \$25 billion annually, primarily benefiting upper-income households. State and local tax deductions for property taxes are *estimated* to cost an additional \$14 billion annually following the enactment of the One Big Beautiful Bill Act, with comparable distributional effects.

For context, the current \$250,000/\$500,000 capital gains tax exclusions reduce federal tax revenue by approximately \$46 billion annually. Eliminating the cap on exclusions would raise the “cost” of capital gains exclusion by around 20% but would end the differential tax treatment between frequent movers and long-term residents.

The federal expenditure associated with eliminating the capital gains tax is comparable to or less than the costs incurred by most other housing policies. This expense could be substantially offset by the collection of transfer and property taxes and increased state and federal income tax revenue resulting from heightened real estate and overall economic activity.

MARKET EFFICIENCY AND WELFARE ANALYSIS

The current policy framework creates measurable effects across multiple dimensions. Overhoused seniors bear excess costs estimated at \$3,000 to \$5,000 annually per household in additional utilities, maintenance and property taxes for space exceeding their needs by 2-3 times. With 6 million affected households, aggregate excess housing costs approach \$20 billion to \$30 billion annually.

Simultaneously, underhoused families face challenges due to spatial constraints. Families living in spaces with less than 500 square feet per capita (versus the 700-square-foot average) may experience increased stress, [reduced educational outcomes](#), and [adverse health impacts](#). While difficult to quantify, the social cost of this underhousing likely equals or exceeds the economic inefficiency stemming from overhousing.

In addition, constraints on household formation or building housing wealth at early stages of adulthood can have long-term intergenerational impacts that may result in inferior economic outcomes at both an individual and national level, lower quality of life, and greater demand for government services due to deficiencies in private saving.

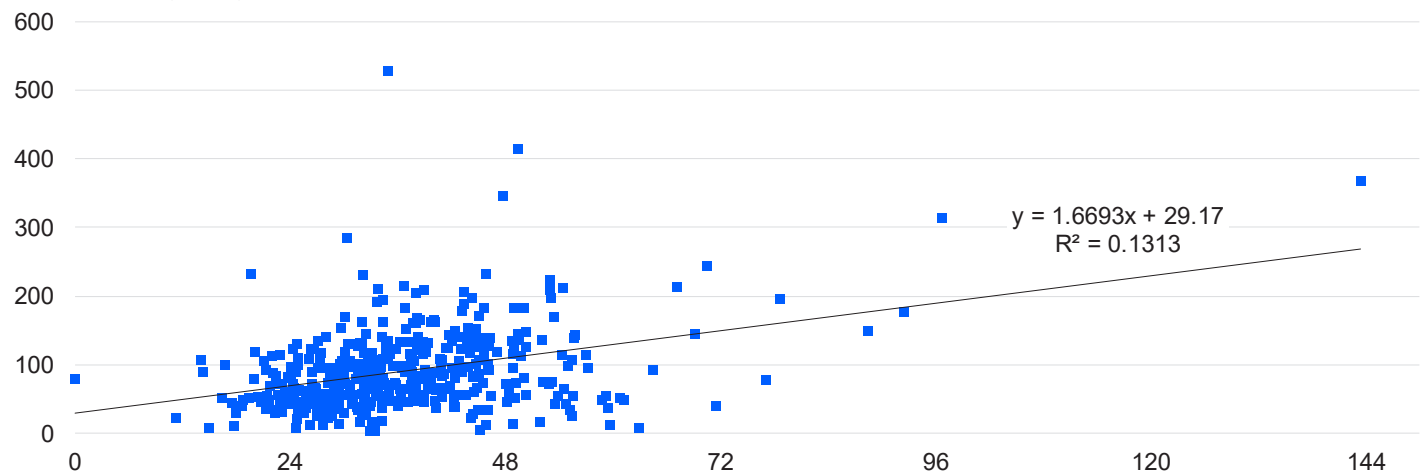
THE LABOR MARKET IMPACT

The lock-in effects of capital gains taxes extend beyond the housing market to labor allocation, as the lack of available housing is a primary reason workers decline relocations. Reduced mobility affects job-matching efficiency, potentially limiting individual economic prospects and business expansion capabilities in local areas. Correlation analysis shows a strong positive connection between home sales (as a share of the local housing stock), gross metro product, and employment growth within metropolitan areas (see Charts 7 and 8).

Chart 7: Metro Areas With More Housing Turnover Grow Faster

X-axis: Avg ratio of existing single-family sales to housing stock from 1997Q1-2025Q2;

Y-axis: Change in gross metro product from 1997Q1-2025Q2, %

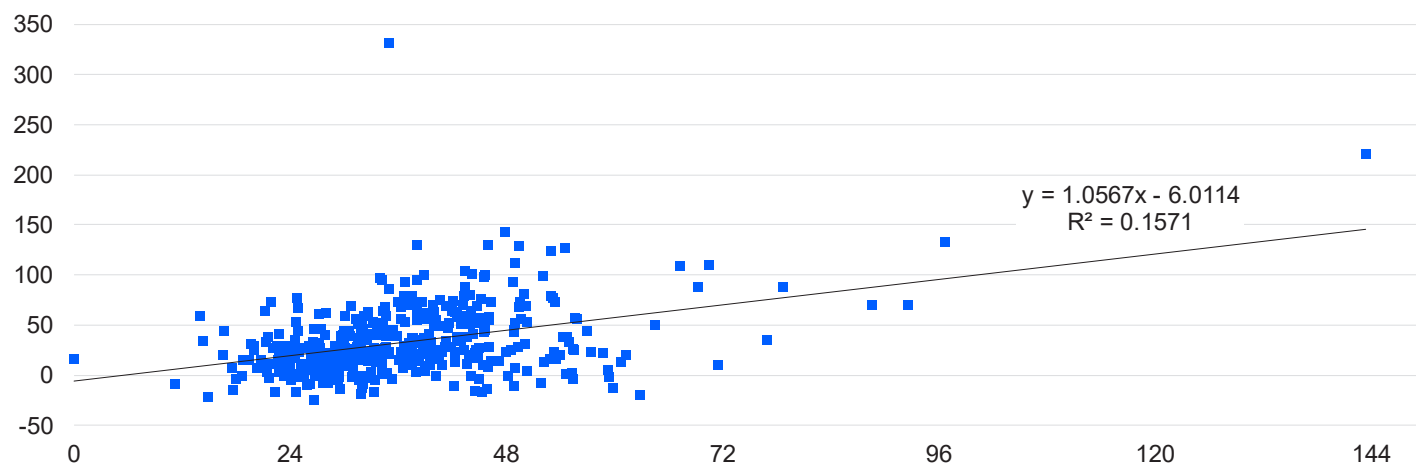


Sources: BEA, Moody's Analytics

Chart 8: Metro Areas With More Sales Have Stronger Employment Growth

X-axis: Avg ratio of existing single-family sales to housing stock from 1997Q1-2025Q2;

Y-axis: Change in employment from 1997Q1-2025Q2, %



Sources: BLS, Moody's Analytics

Economic research on this topic includes findings from Cunningham and Engelhardt (2008), who found that repealing differential capital gains tax treatments increased the mobility rate by about 1 to 1.4 percentage points. Given a mean mobility rate of 4%, this represented an increase of 20% to 30% in homeowners' mobility rate in their early 50s.

Using housing transaction data from affluent Boston-area towns, Shan (2011) found that the TRA97 reversed the lock-in effect of capital gains taxes on houses with low and moderate capital gains. Specifically, the sales rate of houses with positive gains up to \$500,000 increased by 0.4 to 0.6 percentage point, an increase of around 20% from the pre-TRA97 baseline sales rate.

Research from Hsieh and Moretti (2019) estimated that post-TRA97, a \$10,000 increase in capital gains taxes reduced the home sales rate by about 0.1 to 0.2 percentage point, or 6% to 13% from the post-TRA97 average sales rate.

While capital gains taxes are not the only cause of the housing lock-in effect, they can be a significant contributor for older households and households in high-cost areas.

Regional disparities amplify the effects of housing lock-in. High-productivity, high-cost regions such as the San Francisco and Boston metropolitan areas have some of the strongest capital gains lock-in effects precisely where labor mobility could generate substantial returns. Due to limited available housing, workers may remain in lower-productivity regions, perpetuating geographic inequality.

POTENTIAL TRANSITION EFFECTS

Immediate elimination of the capital gains tax on primary home transactions for all income and age groups could increase the number of homes for sale, potentially helping to stabilize price growth and providing prospective homebuyers with more options.

However, most of the additional home sellers would also be homebuyers, particularly for smaller homes and condominiums, as older homeowners look to downsize. This could lead to greater competition at the lower end of the market and potentially make it more challenging for first-time homebuyers to compete with cash-rich buyers—at least in the short term.

Over time, the housing market would readjust as middle-income buyers move up and out of their starter homes, potentially freeing up inventory at the lower end of the market. In addition, some older buyers could be expected to occupy the excess supply of new townhouses and condominiums built in recent years. Filling these units could lessen price pressure on existing homes, as new-home sales do not displace existing families.

Some home sellers could be expected to take advantage of changes to capital gains taxes to move into senior living facilities, potentially improving their quality of life and reducing the financial burden on their families while minimizing price impact on the housing market stemming from additional demand.

One consideration regarding changes to capital gains tax treatment involves potential market disruption if modifications incentivized homeowners to sell properties all at once. Given the extremely low level of new and existing single-family home sales, this is less of a concern today. At 4 million annualized units, existing-home sales are at their lowest outside of recessions. Even if eliminating capital gains taxes led to an immediate 25% increase in the number of homes available for sale (an improbable scenario), the market would only return to its long-term equilibrium at that level.

Given current conditions, policymakers could consider whether modifications should be designed to jump-start the market quickly and return housing turnover to normalized levels. To achieve such effects, time-limited adjustments to capital gains treatment could be structured to motivate homeowners to act within specific time frames.

GAINS FROM ADMINISTRATIVE SIMPLIFICATION

Beyond the direct market effects, reform could generate substantial compliance benefits. To avoid exceeding the cap on capital gains exclusions, taxpayers must maintain decades of receipts distinguishing repairs from improvements, tracking basis adjustments, and documenting occupancy periods when they sell a home. Modifications to caps could reduce IRS administrative expenses related to auditing and processing these complex returns. In addition, private tax preparation costs could decrease by millions of dollars each year, as taxpayers would no longer need to perform intricate capital gains calculations.

DISTRIBUTIONAL ANALYSIS

Questions arise regarding whether eliminating or increasing the caps on the exclusion of capital gains would disproportionately favor higher-income households. While one might assume the wealthiest homeowners would be most affected by the \$250,000/\$500,000 caps, data analysis shows a different pattern. According to an [analysis](#) of tax returns from 1995-1996, 20% to 25% of the tax that would have been collected under today's caps came from individuals with incomes below \$20,000. Those with incomes of more than \$100,000 would have paid less than 20%. Several factors explain why those paying capital gains taxes above the caps are often not wealthy, including:

Life crisis events. Many affected sellers face divorce, job loss, or serious health issues that force home sales regardless of tax consequences. These households cannot afford to remain “locked in” to avoid taxes.

Surviving spouses. Widowers face a particularly harsh penalty as their capital gains exclusion drops from \$500,000 to \$250,000 after their spouse’s death, precisely when downsizing might be most needed for health or financial reasons.

Geographic disparities. Middle-class homeowners in high-cost states (such as California or Massachusetts) hit the caps even with modest incomes, while wealthy homeowners in low-cost states may never exceed them.

Lack of financial flexibility. Wealthy individuals often have resources to avoid forced sales. For example, they can maintain homes through job loss, health crises or divorce. They can wait to pass along property on a stepped-up basis at death or time sales strategically.

In addition, multiple legal strategies for capital tax avoidance are written into the tax code, including moving frequently to claim capital gains tax exclusions every two years repeatedly; like-kind exchanges and property conversions for investment properties; strategic ownership structures that divide gains among multiple family members (for example, parents with an adult son living at home); and holding properties until death for complete tax forgiveness.

CURRENT POLICY IMPLICATIONS

These strategies are not explicitly targeted toward wealthier households, but higher-income households typically have the financial incentive and flexibility to take advantage of them. As a result, current payers of capital gains taxes above the exclusion limits tend to be moderate-income individuals with fewer financial options due to divorce, the death of a spouse, or the high cost of housing where they live.

This creates outcomes where capital gains taxes above the caps function less as a tax on wealth and more as a financial burden on middle-class households facing life transitions. This affects the equity and efficiency characteristics of maintaining the caps, as they may not meaningfully increase tax progressivity while creating substantial challenges for existing households and potential homebuyers.

SUMMARY OF FINDINGS

Current capital gains tax caps affect millions of empty-nest households living in homes exceeding their needs by 3-4 times while constraining growing families in inadequate spaces. The fiscal cost of various reform approaches must be weighed against the billions in excess housing costs borne by overhoused seniors, the unmeasured welfare effects on underhoused families, and the productivity loss from reduced labor mobility.

The 700-square-foot per capita norm provides a benchmark for evaluating misallocation severity. Current policy perpetuates conditions in which millions of single individuals occupy homes exceeding 2,500 square feet while millions of families of four or more are housed in less than 2,000 square feet. This misallocation in housing consumption represents a market outcome influenced by tax system incentives.

Various reform approaches range from modest indexing to inflation, which would reduce collected revenue by \$3 billion to \$5 billion annually, to total elimination, which would lower revenue by \$6 billion to \$10 billion on a static basis. Even complete elimination, without consideration of offsetting revenue sources and cost reductions, represents a marginal change in federal spending relative to addressing market distortions affecting potentially millions of households and constraining economic dynamism.

REFERENCES

Biehl, A., & Hoyt, W. (2007). The Taxpayer Relief Act of 1997 and homeownership: Is smaller now better? *Public Finance Review*, 35(6), 726-741.

Bloze, G., & Skak, M. (2002). Capital gains taxation and residential mobility in Sweden. *Journal of Public Economics*, 83(3), 311-334.

Cunningham, C., & Engelhardt, G. V. (2008). Housing capital-gains taxation and homeowner mobility: Evidence from the Taxpayer Relief Act of 1997. *Journal of Urban Economics*, 63(3), 803-815.

Farnham, M. (2006). The impact of the Taxpayer Relief Act of 1997 on homeowner mobility. *Tax Notes*, 113(12), 1187-1193.

Gravelle, J. G. (2025). *The exclusion of capital gains for owner-occupied housing* (Congressional Research Service Report [RL32978](#)). Congressional Research Service.

Harrell, R., et al. (2024). *2024 Home and Community Preferences Survey: National survey results*. AARP Public Policy Institute. <https://www.aarp.org/pri/topics/livable-communities/housing/2024-home-community-preferences/>

Shan, H. (2011). The effect of capital gains taxation on home sales: Evidence from the Taxpayer Relief Act of 1997. *Journal of Public Economics*, 95(1-2), 177-188.

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Dr. Zandi is the author of *Paying the Price: Ending the Great Recession and Beginning a New American Century*, which provides an assessment of the monetary and fiscal policy response to the Great Recession. His other book, *Financial Shock: A 360° Look at the Subprime Mortgage Implosion, and How to Avoid the Next Financial Crisis*, is described by The New York Times as the "clearest guide" to the financial crisis. Dr. Zandi is host of the Inside Economics podcast.

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