# 6

# *The Value of Land in the United States: 1975–2005*

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This chapter estimates the value of land in the United States between 1975 and 2005 using a large number of independent data sources, but relying heavily on the extensive work carried out by the U.S. Census Bureau and the Bureau of Economic Analysis (BEA) in support of the National Income and Product Accounts (NIPA) and the Federal Reserve Flow of Funds Accounts (FOF). The results show that in 2005 the total value of real estate in the United States, including farmland, was approximately $35.8 trillion, of which just under $20 trillion was owner-occupied housing value. Of the total, land accounted for about $11.9 trillion. Between 2000 and 2005, a period of low inflation, the total value of residential real estate increased by $10 trillion, a 68 percent increase, with land accounting for about half of the total increase. The bulk of the increase in residential property values was on the West Coast and in the Northeast, where seven states account for 47 percent of the total real estate value and a larger percentage of land value. Between 2000 and 2005, the total value of all real estate assets increased by $12.7 trillion, with $5.1 trillion of the gain in land value. Between 1995 and 2005, the increase in real estate assets was just under $20 trillion, with land accounting for $7.9 trillion. Table 6.1 summarizes the key findings of this study.

## *Measuring Land Value*

Accurate measures of urban land value are important for a variety of reasons. Real estate, including land, is an increasingly significant component of the nation's

The author thanks Sonya Lai and Alex Toteva for invaluable research assistance. Thanks also to Steve Malpezzi, who has been thinking and writing about this topic for many years, for extensive comments.

**Table 6.1**
The Value of U.S. Real Estate and Land, 1990–2005 ($ trillions)

| | 1990 | 1995 | 2000 | 2005 |
|---|---|---|---|---|
| *Owner-occupied housing* | | | | |
| Total value | $6.6 | $8.0 | $11.4 | $19.9 |
| Land value | 2.2 | 2.2 | 3.3 | 7.6 |
| *All residential real estate* | | | | |
| Total value | 8.7 | 10.3 | 14:8 | 24.8 |
| Land value | 2.8 | 2.7 | 4.3 | 9.5 |
| *Nonresidential real estate* | | | | |
| Total value | 5.1 | 4.8 | 7.3 | 9.9 |
| Land value | 1.3 | 0.2 | 1.3 | 1.3 |
| *All real estate* | | | | |
| Total value | 13.8 | 15.1 | 22.1 | 34.7 |
| Land value | 4.1 | 2.9 | 5.6 | 10.8 |

assets. For most homeowners, leveraged real estate is a dominant element of the household asset mix. For pension funds, insurance companies, banks, and mutual funds, real estate has assumed a much more prominent role in recent years. Data on the risk, return, cyclicality, and long-run predictability of real estate returns are critical to the asset allocation process. But it is land that makes real estate investment unique. The return to a real estate asset is made up of returns to both improvements and the holding of land itself.

Recent literature has focused on the effects of land and real estate values on the behavior of households and firms in the economy. Case, Quigley, and Shiller (2005) find that changes in housing wealth have had significant effects on consumer spending in both the United States and Europe. Clearly, the character of U.S. regional recessions in the late 1980s and early 1990s, particularly in California and the Northeast, were heavily influenced by the volatility of housing prices and commercial real estate values (Case 1991; Browne and Case 1992).

Between 1995 and 2005, real estate became an important driver of the national macroeconomy (Case 2000). The boom real estate market between 2000 and 2005 accounted for much of the growth in U.S. real output and employment. It is clear that without the string of years, each with over 2 million housing starts and 7 million existing home sales, employment growth would have been flat at a minimum. The national data, for example, show that construction alone accounted for about 7.5 million jobs in 2006, the highest level in history. Now the fear is that the real estate bubble will burst. Many observers see sharp declines in the number of housing sales and starts as well as price declines driving down employment and causing severe problems for financial markets.

This chapter begins with a brief discussion of the conceptual problems associated with valuing land and with alternative approaches to measurement. Next, it

presents estimates of the aggregate value of residential and nonresidential land in the United States quarterly from 1975 through 2005. The chapter also presents some estimates of residential and nonresidential land values in key states to show the real importance of land markets on the East and West Coasts. Finally, the chapter examines the sources of volatility in land value over the last 25 years.

## *The Nature of Land Value*

The heterogeneity of land is extraordinary. The value of land is really the value of the bundle of rights and the set of neighborhood characteristics that are attached to it, which include accessibility, amenity, access to schools, environmental quality, crime, and neighbors.

As development proceeds over time, the best locations are developed first. Ricardo's description and model of how land rent arises explicitly assumes that the best land will be used to capacity before lower-quality parcels are brought under till or developed. This assumption makes current raw land sales a somewhat suspect guide to the value of land under previously developed real estate (Case 1999).

The estimates presented in this chapter rely on derivations from data on the value of land in various uses in combination with capital and labor as real estate. The trade-off is that here the value of land must be separated from the value of the attached capital. All asset values are measured at a point in time. They reflect the net expected flow of cash or valuable services that come with ownership. Where cash flows and interest rates are known and observable, asset values can be derived directly and accurately with straightforward present-value calculations and adjustments for things such as leverage, tax treatments, and imbedded options. For commercial real estate, the relationship between expected cash flow and land value is direct. If $L_f$ is the value of land per square foot and $R_f$ is the expected annual gross rent per square foot, then

$$(1) \qquad L_f = [(R_f - O_f)/r - C_f]^* S/L,$$

where $O_f$ is annual operating costs and taxes per square foot; $r$ is an appropriate capitalization rate; $C_f$ is the full cost of construction per square foot, excluding land; $S$ is the total number of rentable square feet of space; and $L$ is the size of the land parcel to be developed in square feet. $S/L$ is the floor area ratio, or FAR. Assuming that $O_f$, $r$, $C_f$, $S$, and $L$ are constant, $L_f/R_f = S/rL$.

Viewed through this lens, it is not surprising that land value may be volatile. If the ratio of building space to land area is 10 and the cap rate is 0.10, a change in expected annual rent of \$1 a foot leads to a change in land value of \$100 per foot. A change in expected rent of \$5 per square foot on a 10-story building built on a two-acre lot (50 percent footprint) would swing the value of the lot by \$21.8 million. In addition, the lower the cap rate, the higher would be the potential volatility. This point is important in explaining the huge drop in land values in the 1990s in the United States. Regardless of whether expectations are formed rationally, if they adjust quickly to new information, land markets will be volatile.

Because information is available on the rents and operating costs of commercial property, land value estimates for nonresidential property can be derived from

rough estimates of current cash flows. For a homeowner, however, the flow of benefits comes in the form of housing services net of depreciation, maintenance, and taxes. Because data on comparable rental properties are not plentiful, it is difficult to estimate accurately values from "imputed rents." Rather, the imputed rents needed to measure flows such as the gross domestic product (GDP) calculations for the National Income and Product Accounts are actually derived from the plentiful data on sales prices. Similarly, this chapter will rely on recorded sales data and homeowners' direct estimates of value in deriving estimates of land value under owner-occupied housing.

## *The U.S. Housing Market: Aggregate Value*

The value of housing in the United States has increased substantially in recent years. Based on repeat sales, single-family housing prices rose on average 294 percent in nominal terms between 1980 and 2006—about half that amount in real terms and substantially more in markets in the Northeast and on the West Coast. At the same time, until 2004 construction costs barely kept up with prices in general.

The two sources used to estimate the value of the total owner-occupied stock were reassuringly similar in order of magnitude. First, the U.S. Census collects homeowner estimates of value in great detail every 10 years. Estimates of aggregate market value by state were constructed from repeat sales price indexes applied to the base values reported in the 2000 Census of Population and Housing by state. The Office of Federal Housing Enterprise Oversight (OFHEO) publishes state-level repeat value indexes quarterly based on the methodology of Case and Shiller (1989).

The panel on aggregate housing wealth was constructed for each state by means of

$$(2) \qquad V_{it} = R_{it} N_{it} I_{it} V_{i0},$$

where $V_{it}$ is the aggregate value of owner-occupied housing in state $i$ in quarter $t$; $R_{it}$ is the home ownership rate in state $i$ in quarter $t$; $N_{it}$ is the number of households in state $i$ in quarter $t$; $I_{it}$ is the weighted repeat sales price index, WRS (OFHEO), for state $i$ in quarter $t$ ($I_{i1} = 1$ for the 1st quarter of 2000); and $V_{i0}$ is the mean housing price for state $i$ in the base year, 2000.

The total number of households $N$ and the home ownership rates $R$ were obtained from the Current Population Survey conducted by the U.S. Census Bureau annually and interpolated for quarterly intervals. Aggregate value varies as a result of price appreciation of the existing stock as well as additions to the number of owner-occupied dwellings.

Repeat sales indexes were conceived as a way of capturing the appreciation and depreciation of property, as distinct from changes in the mix of properties and major improvements in the stock that have large effects on median price measures such as the National Association of Realtors median reported monthly (see Case 1986; Case and Shiller 1987). Clearly, capital investment in a house is required to maintain and repair the existing structure over time, and that investment or lack of investment influences the price of a resale unit. Thus, repeat sales indexes capture

both pure appreciation and some investment. Indeed, it can be argued that improvements such as periodically modernizing bathrooms and kitchens are as necessary as replacing old windows and repairing the roof since depreciation includes obsolescence. The final series on home value therefore includes pure appreciation, new units, and the capital added to maintain and modernize homes.

The baseline figures for state-level mean housing prices, $V_{i0}$, are derived from homeowner estimates of property values reported in the 2000 Census of Population and Housing. As noted, several studies have attempted to measure the bias in homeowner estimates of housing values. The estimates range from –2 percent (Kain and Quigley 1972; Follain and Malpezzi 1981) to +6 percent (Goodman and Ittner 1992). However, Goodman and Ittner point out that for many purposes homeowners' estimates may indeed be the appropriate measures of housing wealth; household consumption and savings behavior is likely to be based on perceived housing value. Antoniewicz (1996) asserts that the FOF figures presented later in this chapter reduce owner estimates by 6 percent to take account of this bias. However, this assertion could not be independently documented.

The second source used to estimate national aggregates is the FOF data produced and maintained by the Federal Reserve. The FOF data are produced quarterly from thousands of sources. Included in the FOF accounts are sector balance sheets that include the market value of real estate. For the household sector, table B100 estimates the market value of all types of owner-occupied housing, including farmhouses, mobile homes, second homes that are not rented, vacant homes for sale, and vacant land. It should be noted that the aggregate state data do not add in vacant land values (see again Antoniewicz 1996).

In 2002 the FOF data for households were revised back to 1984. Although the exact methodology is not disclosed, the revisions and the current values rely heavily on the American Housing Survey conducted biennially by the U.S. Census Bureau. These data will be discussed in more detail later in this chapter.

Table 6.2 presents the results of the two tabulations of the total value of the owner-occupied stock. Even though different data sources and methodologies are used, the results are remarkably similar. The aggregate figure from the

**Table 6.2**
Real Estate Assets Owned by Households and Market Value of Owner-Occupied Houses, 1980–2005 ($ billions)

| | Aggregate State Data | Flow of Funds Data[a] | Flow of Funds Data in 2005 Dollars |
|---|---|---|---|
| 1980 | $3,612 | $2,943 | $6,973 |
| 1985 | 4,794 | 4,658 | 8,453 |
| 1990 | 6,689 | 6,576 | 9,829 |
| 1995 | 8,260 | 7,989 | 10,242 |
| 2000 | 11,255 | 11,397 | 12,921 |
| 2005 | 18,336 | 19,871 | 19,871 |

[a]Encompasses all types of owner-occupied housing, including farmhouses and mobile homes, as well as second homes that are not rented, vacant houses for sale, and vacant land.

Source: Data sources are described in the text.

**Table 6.3**
Estimated Market Value of Owner-Occupied Housing Units in United States, West Coast, and Northeast: 1980, 1990, and 2005 ($ billions)

| | 1980 | | 1990 | | 2005 | |
|---|---|---|---|---|---|---|
| | Value | Percentage | Value | Percentage | Value | Percentage |
| *United States* | $3,612 | 100.00 | $6,689 | 100.00 | $18,337 | 100.00 |
| California | 556 | 15.39 | 1,399 | 20.92 | 4,554 | 24.83 |
| Washington | 77 | 2.13 | 156 | 2.33 | 491 | 2.68 |
| Oregon | 47 | 1.30 | 67 | 1.00 | 255 | 1.39 |
| *Total, West Coast* | 680 | 18.83 | 1,622 | 24.25 | 5,300 | 28.90 |
| New York | 201 | 5.56 | 565 | 8.45 | 1,382 | 7.54 |
| New Jersey | 126 | 3.49 | 321 | 4.80 | 881 | 4.81 |
| Connecticut | 63 | 1.74 | 166 | 2.48 | 354 | 1.93 |
| Massachusetts | 75 | 2.08 | 223 | 3.33 | 626 | 3.41 |
| *Total, Northeast* | 465 | 12.87 | 1,275 | 19.06 | 3,243 | 17.69 |
| *Total, West Coast and Northeast* | 1,145 | 31.70 | 2,897 | 43.31 | 8,543 | 46.59 |

Flow of Funds household asset tables reveals a total value of $2.9 trillion in 1980 ($7 trillion in 2005 dollars), which grows to just under $20 trillion in 2005. The aggregate value of the owner-occupied stock essentially tripled in real terms in the last quarter-century.

The increase was not uniform across the country, however. Much more rapid increases were recorded on the East and West Coasts. Table 6.3 presents the state totals for the West Coast and the Northeast. In 2005 California alone accounted for a quarter of the total owner-occupied housing value in the country, while the northeastern states of New York, New Jersey, Connecticut, and Massachusetts accounted for an additional 18 percent. A combined seven states on the East and West Coasts contained 47 percent of the total value in the country ($8.6 trillion of $18.3 trillion). By comparison, California is home to just 12 percent of the U.S. population, and the seven states in table 6.3 are home to 28 percent. A look at the changes since 1980 reveals that the owner-occupied stock increased in value by just under $15 trillion, with about half in six states.

## *Separating Land from Total Value*

The most difficult task in estimating total land values is separating the land component from the total value of real estate. For the purposes of this chapter, an exhaustive search of sources and methodologies was conducted. Perhaps the best local source is the property tax assessor files, which in many but by no means all jurisdictions are based on some ad hoc combination of lot sales, the sales prices of

existing units by neighborhood, and a hedonic analysis of current sales. Although such data are available at the local level, no comprehensive property tax data are available (Case 1978, 1999).

The only alternative to a direct measure of land value is to estimate the replacement cost of structures or to monitor continually new construction, alterations, and depreciation and take land to be the residual between the market value and full capital cost of the structures.

In the FOF accounts, tables available by sector detail the total holdings of real property and the flows of new residential and nonresidential real estate, including new construction and remodeling and repair, as well as depreciation. The FOF data are taken directly from the BEA's National Income and Products Accounts estimate of fixed residential (and later nonresidential) construction. Tracing the lineage of the raw data further, the NIPA accounts base their estimates on monthly surveys of construction activity (SOCs) produced and made available by the U.S. Census Bureau. These surveys are popular, because they are the source of the oft-quoted permits and starts data from the census.

The FOF data on owner-occupied, single-family homes are based on builder surveys drawn from a stratified random sample of 900 permit issuing places. For 2005, a total of 30,753 completed questionnaires were tabulated (the survey instrument, to be completed by the builder or developer, can be found at http://www.census.gov/const/www/). For new, single-family houses, it contains 42 data elements, including total sales price, total square footage, and construction cost per square foot (specifically excluding the value of the improved lot). Tabulations are available for the United States annually since 1992. The resulting estimates of replacement costs are then subtracted from the total value figures to obtain land value.

A similar sampling frame and methodology are used to collect data on construction costs for multifamily housing. Each year, the survey collects data from approximately 30,000 builders and developers at a rate of 2,500 projects a month. The survey, which is similar to the owner-occupied housing survey, asks that land and preexisting structures be excluded from the cost data. This survey specifically includes site preparation expenses as part of replacement costs.

Finally, commercial building capital costs are estimated from data supplied by McGraw-Hill Construction to the Federal Reserve, as well as SOC data from about 85,000 individual nonresidential projects.

Comparison of these data with other sources of construction cost data show similar patterns. Table 6.4 and figure 6.1 present the changes in cost per square foot in new construction obtained from the census with changes provided in the oft-cited *Engineering News-Record* data, the Consumer Price Index (CPI), and the OFHEO index of single-family housing prices. With quality-controlled house prices rising faster than capital costs, the percentage of total value accounted for by land has risen substantially over time. Nationally, the difference between the selling price of new homes and the construction costs excluding land costs as calculated from the Census Survey of Construction rose from 18.5 percent in 1993 to 23 percent by 2000 and 27.4 percent by 2004. Survey work conducted by the National Association of Home Builders and reported by Carliner (2003) finds lots accounting for 23.5 percent of the cost of new units in 2002, and the SOC data show 23.2 percent in 2002.

**Table 6.4**
Changes in U.S. Housing Prices, Consumer Price Index, and Construction Costs: 1980–2005 and 1992–2005

| | 1980–2005 | | 1992–2005 | |
|---|---|---|---|---|
| | Percentage Change | Annual Percent | Percentage Change | Annual Percent |
| OFHEO housing prices | 266 | 5.4 | 117 | 6.1 |
| CPI | 137 | 3.5 | 40 | 2.6 |
| Construction costs (national *ENR*) | 123 | 3.3 | 53 | 3.3 |
| Construction costs (Boston *ENR*) | 160 | 3.9 | 46 | 3.0 |
| Construction costs (SOC) | | | 64 | 3.9 |

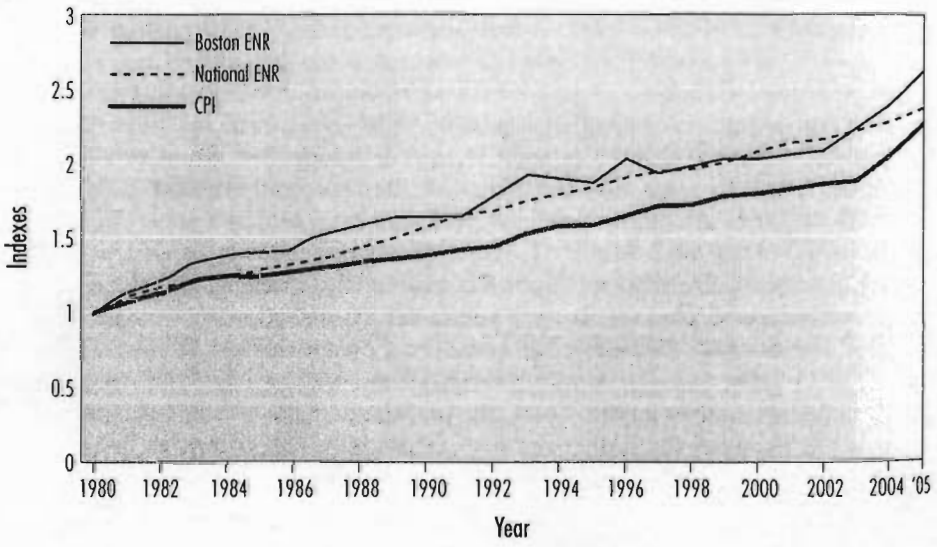
Note: OFHEO = Office of Federal Housing Enterprise Oversight.

Sources: U.S. Census Bureau, Survey of Construction (SOC), http://www.census.gov/const/; *Engineering News-Record*, Construction Cost Index History, http://www.ENR.com; U.S. Bureau of Labor Statistics.

Land under existing units may be a larger percentage of total value than land under new units for two reasons. First, capital depreciates and becomes obsolete; new units contain all new appliances, fixtures, and technology. Second, the most desirable lots were built on long ago and are likely to contain older units. New lots could be teardowns, previously undeveloped land farther out, or less desirable.

In the last few years, a significant rise in construction costs has reduced land values somewhat. In estimating the value of land as a residual, it is important to

**Figure 6.1**
Construction Costs, United States: 1980–2004




Note: CPI = Consumer Price Index.

Sources: *Engineering News-Record* (ENR), Construction Cost Index History, http://www.ENR.com; U.S. Bureau of Labor Statistics.

use replacement costs rather than the historical costs of the structures. Because construction costs have jumped sharply since 2002, the split between land and capital for existing real estate has changed significantly in favor of structures. Take the example of a parcel of real estate developed in 2000 for $100,000, with 50 percent of its value in land and 50 percent in capital. If the building value did not increase between 2000 and 2005 but construction costs went up by 50 percent, the estimated replacement cost value of the structure in 2005 would be $75,000, while the land component would drop from $50,000 to $25,000, or from 50 percent to 25 percent of the total.

Detail on the depreciation rates applied to both residential and nonresidential structures is provided in Fraumeni (1997). Citing work by Chinloi (1977), Malpezzi, Ozanne, and Thibodeau (1987), and Taubman and Rasche (1969), the BEA settles on rates of between 1.1 percent for new one- to four-unit structures and 4.5 percent for mobile homes.

The remainder of the residential assets held in the United States is made up of rental units. The total value of those units was obtained from the FOF data, quarterly since 1975 (no independent estimates were produced). The FOF data are fully consistent with other research (see, for example, Case 2000), which finds the rental stock to be worth between 20 and 25 percent of the value of the owner-occupied stock.

## *Land and Housing*

Tables 6.5 and 6.6 and figures 6.2 and 6.3 present a picture of the U.S. housing market over the last 30 years based on the FOF data. As of 2005, the single-family market was valued at just under $20 trillion (table 6.5) and the total residential market at just under $25 trillion (table 6.6). The land under owner-occupied units was valued at $7.6 trillion, and the capital stock was worth $12.3 trillion. The total of all residential assets was split between capital of $15.4 trillion and land of $9.5 trillion. As a reference, total household financial assets in 2005 were just under $40 trillion.

The growth of this asset class has been extraordinary. Over the last five years alone, a period of very modest inflation, residential assets have increased by

**Table 6.5**
Land and Structure Values: Owner-Occupied Housing, 1975–2005 ($ billions)

| | Housing Assets | Replacement Cost of Structure | Land | Land as a Percentage of Assets |
|---|---|---|---|---|
| 1975 | $1,413.7 | $1,161.9 | $251.8 | 17.81 |
| 1980 | 2,943.2 | 2,372.7 | 570.5 | 19.38 |
| 1985 | 4,658.4 | 3,137.8 | 1,520.6 | 32.64 |
| 1990 | 6,576.5 | 4,367.0 | 2,209.5 | 33.60 |
| 1995 | 7,989.3 | 5,816.6 | 2,172.7 | 27.20 |
| 2000 | 11,397.0 | 8,105.6 | 3,291.4 | 28.88 |
| 2005 | 19,870.9 | 12,273.7 | 7,597.2 | 38.23 |

Sources: Federal Reserve Flow of Funds data and author's calculations (see text).

**Table 6.6**
Land and Structure Values: Residential Real Estate, 1975–2005 ($ billions)

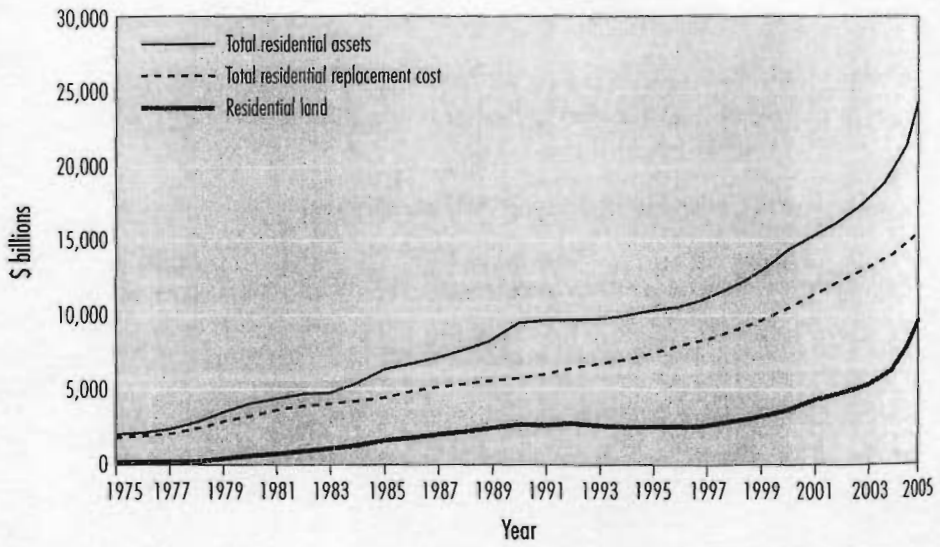
| | Residential Assets | Replacement Cost of Structure | Land | Land as Percentage of Total Residential Assets |
|---|---|---|---|---|
| 1975 | $2,019.42 | $1,727.68 | $291.74 | 14.45 |
| 1980 | 4,094.16 | 3,392.44 | 701.72 | 17.14 |
| 1985 | 6,337.96 | 4,421.46 | 1,916.50 | 30.24 |
| 1990 | 8,702.66 | 5,937.15 | 2,765.51 | 31.78 |
| 1995 | 10,339.12 | 7,646.33 | 2,692.79 | 26.04 |
| 2000 | 14,772.31 | 10,436.47 | 4,335.84 | 29.35 |
| 2005 | 24,847.34 | 15,386.35 | 9,460.99 | 38.08 |

Note: Figures are for the fourth quarter of the years shown.

Sources: Federal Reserve Flow of Funds Accounts and author's calculations (see text).

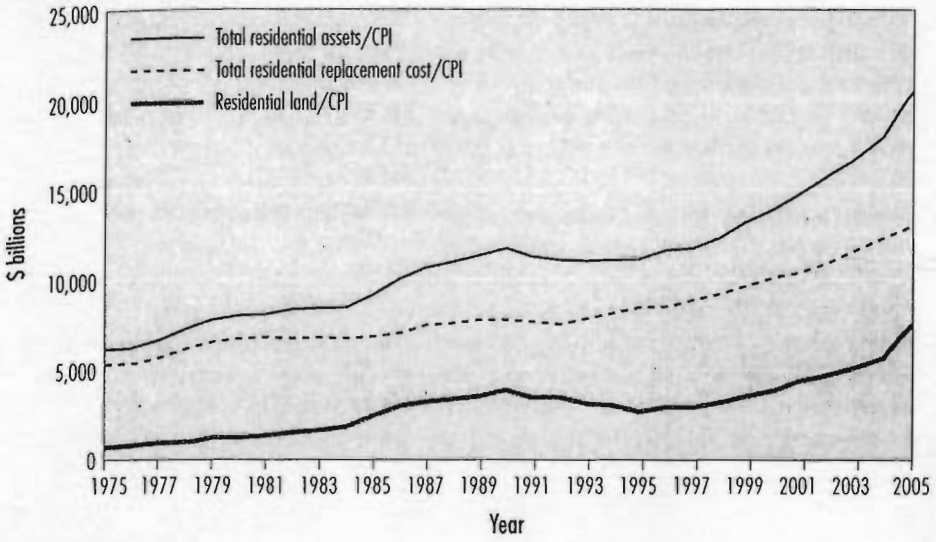
$10 trillion (table 6.6), or $8.1 trillion in real terms. Roughly half of the increase has been the result of added capital in the form of millions of new units and a booming remodeling and repair market. The other half has stemmed simply from the increase in the value of land. Even more extraordinary, this trend is simply an acceleration of the one under way for 30 years. Over that period, in real terms, residential assets have increased fivefold, while the value of land has gone up fourteenfold (see figure 6.3).

**Figure 6.2**
Summary of Residential Values




Source: Federal Reserve Flow of Funds Accounts.

**Figure 6.3**
**Real Residential Values**




Note: CPI = Consumer Price Index.

Source: Federal Reserve Flow of Funds Accounts.

The state-level data presented in table 6.7 reveal an even more extreme result in the recent period. Recall that the state-level data value the stock using the mean house value from the 2000 census, which has been inflated by means of the state-level OFHEO repeat sales indexes. Recall also that the FOF data in tables 6.5 and 6.6 are based on estimates from the American Housing Survey (AHS). The AHS survey data come with a significant lag. The tabulations in table 6.7 assume that the replacement cost of existing homes moves with the increase in construction costs since 1980. These calculations find that the value of the aggregate land under U.S. owner-occupied housing was itself just over $10 trillion, or more than half of the total value of housing.

The 2000 census found that in 2000 the mean housing price in the United States was $151,000; in California the data show a mean of $271,000 and in Massachusetts a mean of $231,000. These figures seem reasonable and are consistent with other sources. Since 2000, according to the OFHEO, U.S. constant quality housing prices have risen 61 percent in value, while the CPI has risen only 13 percent, putting the mean at $252,000. In California, prices are up 137 percent, from a 2000 mean of $271,000 to $641,400. Massachusetts follows with a 2005 mean of $420,134 (see table 6.7). If these figures are correct, they would mean that land constitutes a significantly higher percentage of value and that capital is somewhat lower. The total value for land would be 57 percent of the total bundle in the United States and nearly 70 percent in Massachusetts and California. These values are consistent with figures from Davis and Palumbo (2006), who find land's share to be 74 percent on the West Coast, 64 percent on the East Coast, and 51 percent nationally.

**Table 6.7**
Value of Owner-Occupied Houses in United States, California, and Massachusetts: 1980 and 2005

| | 1980 | 2005 |
|---|---|---|
| *United States* | | |
| Mean housing price indexed | $65,000 | $252,000 |
| *L* per unit | $16,250 | $143,288 |
| *K* per unit | $48,750 | $108,712 |
| Units | 51.6 million | 72.6 million |
| Aggregate value | $3.35 trillion | $18.29 trillion |
| Aggregate capital | $2.515 trillion | $7.89 trillion |
| Aggregate land value | $836 billion | $10.40 trillion |
| *California* | | |
| Mean housing price indexed | $115,800 | $641,400 |
| *L* per unit | $28,960 | $447,378 |
| *K* per unit | $86,850 | $194,022 |
| Units | 4.8 million | 7.1 million |
| Aggregate value | $556 billion | $4.554 trillion |
| Aggregate capital | $417 billion | $1.38 trillion |
| Aggregate land value | $139 billion | $3.174 trillion |
| *Massachusetts* | | |
| Mean housing price indexed | $64,370 | $420,134 |
| *L* per unit | $12,231 | $283,924 |
| *K* per unit | $52,188 | $136,210 |
| Units | 1.165 million | 1.49 million |
| Aggregate value | $75.0 billion | $626 billion |
| Aggregate capital | $60.8 billion | $203 billion |
| Aggregate land value | $14.3 billion | $423 billion |

## *Nonresidential Land Value*

This section discusses various estimates of the value of land being used for nonresidential purposes in the United States. The first part illustrates the potential for volatility in real property held for cash flow with a set of numbers generated from a variety of sources. The second part uses Boston Redevelopment Authority (2003) data on land use to provide a crude estimate of the value of land under nonresidential real estate in the city of Boston. Blowing these figures up to the state level and comparing them with the value of residential real estate will provide a check on the order of magnitude of the estimates. In addition, a very rough estimate of the aggregate value of nonresidential assets for the nation is made for the same purpose using Department of Energy data on buildings. Finally, the Flow of Funds data provide estimates of the gross value of nonresidential real estate assets held by households and nonprofits (Table B100), the nonfarm corporate sector (Table B102), and the nonfarm, noncorporate sector (Table B103). In addition, as with

residential property, the FOF accounts track investment, including new structures as well as maintenance and repair, adjusted for obsolescence and depreciation. The replacement cost series is used to generate nonresidential investment in structures for the NIPA accounts. As discussed earlier, the BEA relies on census surveys of about 85,000 commercial developers on a per project basis, as well as on McGraw-Hill Dodge data on construction costs. The difference between the gross value and replacement cost is an estimate of the value of land over time.

What sets commercial property apart from most residential property is the potential availability of data on flows of rent and costs. As mentioned earlier, the present value of any asset can be derived if one knows the basics of the expected flows of benefits and costs to which the buyer is entitled as an owner. If the flows are known with certainty, the present-value calculation can be made with a high degree of accuracy. Table 6.8, using data that were discussed with officials at the National Council of Real Estate Investment Fiduciaries (NCREIF), shows in a very rough way how nonresidential real estate values have behaved over the past 20 years.

To illustrate, in 1987 the going rate for Class A office space in Boston was $35 per square foot per year. With a vacancy rate of 10 percent, the average property earned $31.50 per square foot. Taxes and operating costs at the time came to about $10 per square foot, leaving $21.50 in net rent per foot. The going cap rate in 1987 was about 9 percent, which implies a total present value of $23.9 million for every 100,000 square feet. The cost of construction at the time was about $145 per square foot, or $14.5 million per 100,000 square feet of occupied space. The maximum bid for the land was thus $9.4 million. With a floor area ratio of six (six square feet of occupied space for every square foot of land), a million-square-foot building would require 166,666 square feet of land (3.8 acres), and the developer would bid up to $2.5 million per acre for the land.

Beginning in 1987, the commercial real estate market became overbuilt. A boom in services sector employment in the early 1980s, an increasingly standard percentage allocation to real estate as an "alternative asset" by insurance companies and pension funds with long-term liabilities, and the Economic Recovery Tax Act of 1981 had all provided substantial incentives to build office space (see Browne

**Table 6.8**
Income Capitalization and Land Bids Over the Office Cycle, Selected Years

| | Gross Rent[a] | Vacancy Rate (%) | Effective Gross Rent[a] | Minus Taxes[a] | Minus Operating Expense[a] | Net Effective Rent[a] | Cap Rate (%) | Present Value[b] | Cost of Construction[b] | Land Bid[b] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1987 | $35 | 10 | $31.50 | $5 | $5 | $21.50 | 9 | $23.9 | $14.5 | $9.4 |
| 1992 | 30 | 20 | 24.00 | 5 | 5 | 14.00 | 12 | 11.6 | 17.0 | –5.4 |
| 2000 | 50 | 5 | 47.50 | 7 | 8 | 32.50 | 7 | 46.4 | 19.7 | 26.7 |
| 2004 | 35 | 15 | 29.75 | 7 | 8 | 14.75 | 5 | 29.5 | 25.0 | 4.5 |

[a] $ per square foot.
[b] $ millions per 100,000 square feet.

Source: From interviews with officials at the National Council of Real Estate Investment Fiduciaries (NCREIF).

and Case 1992). But by the late 1980s, services sector employment had not kept pace, vacancy rates had begun to rise, the Tax Reform Act of 1986 had removed virtually all the incentives for real estate investment, and the boom had become a rout when the regional economy went into recession in 1990.

Fresh from the banking disaster in Texas, federal regulators forced banks to liquidate commercial real estate loan portfolios even when loans were not in default. By 1992 the commercial real estate market was almost nonliquid (table 6.8). With rents down to $30 per square foot and perceived risk and forced liquidations pushing cap rates to as high as 12 percent, the identical calculation puts the value of the building as $5.4 million below replacement capital costs. One could argue that the implicit value of land was negative. For example, in 1992 the Wang Tower in Lowell, Massachusetts, a well-built, one-million-square-foot office building with good accessibility, sold for $525,000, at $0.52 per square foot.

The late 1990s saw a major boom. In 2000 leases were signed in Boston at $70 a square foot. Using the same example, with rent at $50 per square foot, a 5 percent vacancy, and a cap rate now back to 7 percent, land jumps to $26.7 million, or $6.8 million per acre.

In 2004 office rents were down, and vacancies were up. The difference was that liquidity in world markets had bid up building values to levels that implied very low cap rates despite high levels of risk. Even with rent back to 1987 levels, with operating costs and taxes higher, and despite a big increase in construction costs, especially materials, property values remained high. Again using the same example, these numbers put the value of the parcel at $4.5 million, or close to $1 million per acre.

Using the cash flow approach to land valuation, a crude estimate of the total value of land in Massachusetts was constructed using a wide variety of data sources. The details of the analysis appear in the appendix to this chapter. In 2003 the Boston Redevelopment Authority published an inventory of all buildings in Boston that included information on the total square footage of both the buildings and land. In the inventory, the city is broken down into nine land use sectors: office, mixed use, retail, auto, lodging, scientific/medical, service, entertainment, and undeveloped. As an illustration of how the estimates were done, the appendix shows the calculation for Class A office space in Boston in 2005: 38.6 million square feet with a floor area ratio of 6.42. Using the same calculations carried out earlier and assuming a rent level of $38 per square foot, operating costs and taxes of $15 per square foot, a cap rate of 7 percent, and substantially higher building and materials costs reveals that the total value of the land is just under $2 billion. When the value of land under the remaining non-Class A office space is added, the total value of land comes to $3.5 billion.

In total, the value of land under commercial property in the City of Boston is crudely estimated from cash flow assumptions to be $11.2 billion for 2005. For the state, including the rest of the Boston metropolitan area and Boston itself, the total is estimated to be $96.3 billion. Adding land under owner-occupied housing of $423 billion (see table 6.7) and agricultural lands of $2.3 billion brings the total land value for Massachusetts to $521.6 billion. As will be shown shortly, land under nonresidential real estate in the United States is estimated to be about 11 percent of the total land value, while for Massachusetts the figure is 18 per-

**Table 6.9**
Land and Structure Values: Nonresidential Real Estate, 1975–2005 ($ billions)

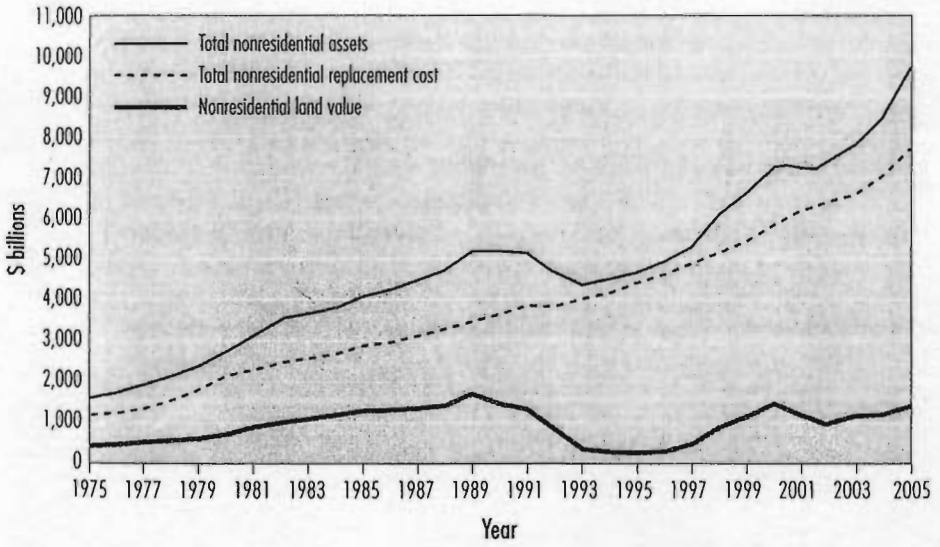
| | Nonresidential Assets | Replacement Cost | Land | Land as Percentage of Nonresidential Assets |
|---|---|---|---|---|
| 1975 | $1,634.09 | $1,190.02 | $444.07 | 27.18 |
| 1980 | 2,941.13 | 2,108.67 | 832.46 | 28.30 |
| 1985 | 4,153.58 | 2,914.90 | 1,238.68 | 29.82 |
| 1990 | 5,107.44 | 3,764.51 | 1,342.93 | 26.29 |
| 1995 | 4,771.34 | 4,533.29 | 238.05 | 4.99 |
| 2000 | 7,264.20 | 5,941.44 | 1,322.76 | 18.21 |
| 2005 | 9,890.65 | 8,588.00 | 1,302.65 | 13.17 |

Sources: Federal Reserve System Flow of Funds data and author's calculations (see text).

cent. Farms in the Commonwealth of Massachusetts represent less than one-half of 1 percent of total land value. For the nation as a whole, the figure is $1.1 trillion, or 9.4 percent of the total.

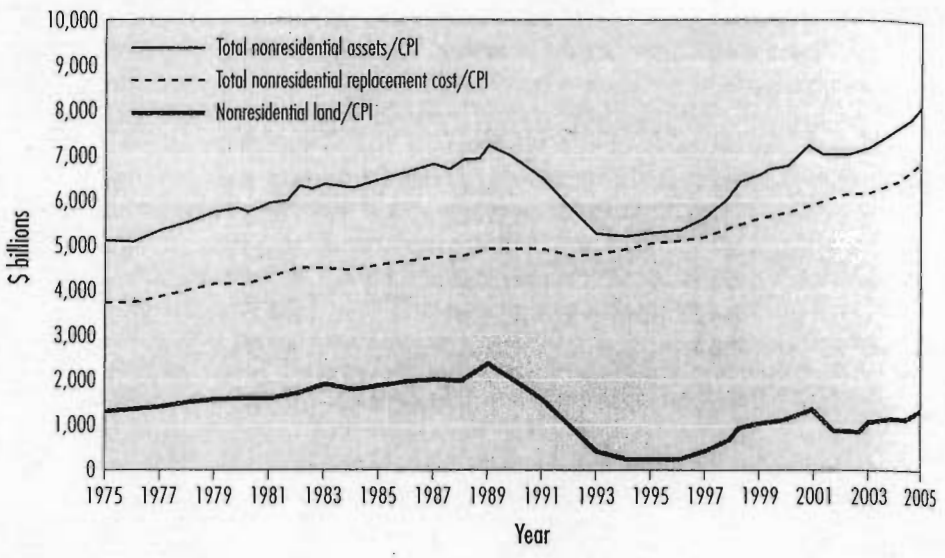
Far more consistent and comprehensive data are those drawn from the FOF accounts and described earlier. Table 6.9 and figures 6.4 and 6.5 show the pattern

**Figure 6.4**
Summary of Nonresidential Values




Source: The Federal Reserve Flow of Funds Accounts.

**Figure 6.5**
Real Nonresidential Values




Source: The Federal Reserve Flow of Funds Accounts.

of growth and decline of nonresidential real estate since 1975. Until 1990, nonresidential real estate and the value of land under nonresidential real estate grew in both nominal and real terms. The value of land under nonresidential real estate hit $1.3 trillion in 1990, which represented about 26 percent of the total of $5.1 trillion. After 1990, however, commercial real estate did not fare well. Vacancy rates rose, cap rates increased sharply, and building values fell. Replacement costs, however, did not fall; rather, they continued to rise. Because much of commercial real estate was collateral for bank loans, many banks failed, particularly in the hardest-hit areas of New England and California.

With rising replacement costs and falling building values, the value of land fell dramatically. The value of land under nonresidential structures fell from $1.3 trillion in 1990 to $238 billion in 1995, a decline of over 80 percent. This dramatic decline is seen best in figures 6.4 and 6.5. At the end of 2005, land under nonresidential real estate stood at $1.3 trillion in value.

## *Total Land and Structure Value*

Table 6.10 shows that in 2005 the value of real estate in the United States was roughly $34.7 trillion excluding farms and $35.8 trillion including farmland. The value of farm assets and land was obtained using U.S. Department of Agriculture data and subtracting the FOF number for structures on farms. In 2005 the value of land alone in the United States was $10.8 trillion excluding farmland and $11.9 trillion including farmland.

**Table 6.10**
Land and Structure Values: Total Real Estate, 1975–2005 ($ billions)

| | Total Real Estate Assets | Total Replacement Cost | Land | Land as Percentage of Total Real Estate Assets |
|---|---|---|---|---|
| 1975 | $3,653.51 | $2,917.70 | $735.81 | 20.14 |
| 1980 | 7,035.29 | 5,501.11 | 1,534.18 | 21.81 |
| 1985 | 10,491.54 | 7,336.36 | 3,155.18 | 30.07 |
| 1990 | 13,810.10 | 9,701.66 | 4,108.44 | 29.75 |
| 1995 | 15,110.46 | 12,179.62 | 2,930.84 | 19.40 |
| 2000 | 22,036.51 | 16,377.91 | 5,658.60 | 25.68 |
| 2005 | 34,737.99 | 23,974.35 | 10,763.64 | 30.99 |

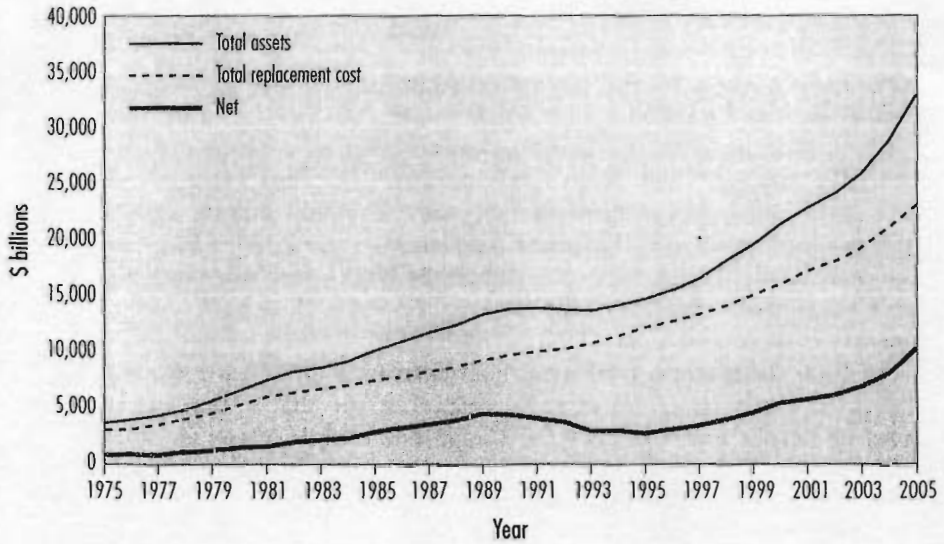
Note: This table excludes farmland. For 2005 the value of farmland was $1.116 trillion, or 933 million acres at $1,510 per acre less the replacement cost of farm buildings at $293 billion. Structures are in the Flow of Funds numbers.

Sources: Federal Reserve Flow of Funds Accounts and author's calculations (see text).

The amazing fact is that the value of real estate as a whole increased by $12.7 trillion from 2000 to 2005 (see table 6.10). Of that amount, over $5.1 trillion was an increase in land value. After 1995 just less than $20 trillion in new real estate assets was created, with land increasing by $7.8 trillion. Figures 6.6 and 6.7 show the pattern of real and nominal real estate and land values from 1975 to 2005.

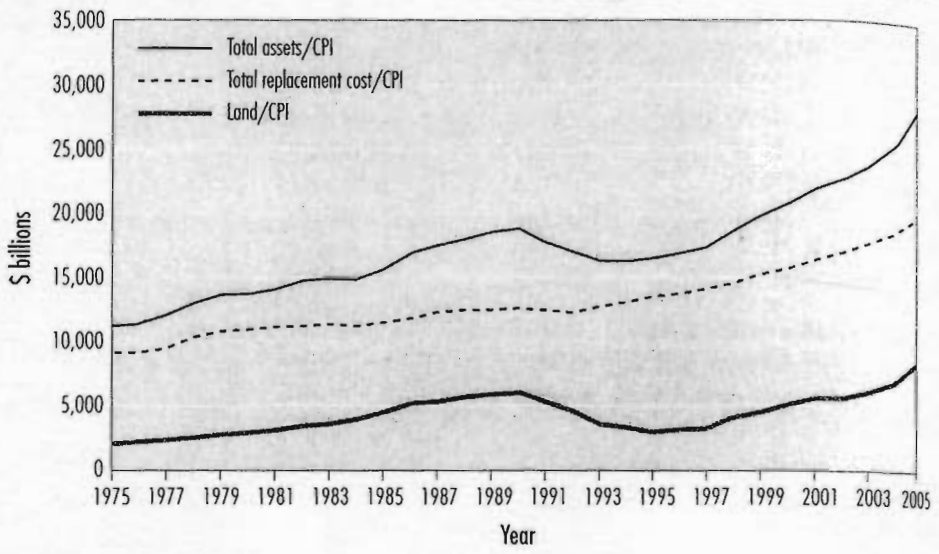
Although these results are an approximation from imperfect data sources, they are quite sufficient to reveal several things to an order of magnitude. First,

**Figure 6.6**
Summary of Residential and Nonresidential Values




Source: Federal Reserve Flow of Funds Accounts.

**Figure 6.7**
Real Values, Residential and Nonresidential




Source: Federal Reserve Flow of Funds Accounts.

$35 trillion is a very substantial portion of national wealth and a substantial asset on the household balance sheet. The financial wealth held by households is about $40 trillion. Second, the data reveal substantial upward movement on the part of land price and real estate holdings that began around 1995 and continued into 2005. Finally, the time series on total real estate and land values both show a very steady upward movement, except in the early 1990s. The aggregate data reveal little volatility, except for the substantial decline in the value of real nonresidential property during the 1990s.

Overall during the period, land value increased at a steady rate in real terms from 1975 through 1989. From 1989 through 1995, land value fell sharply as a result of the collapse of commercial real estate nationally and the softening of real estate markets in the Northeast and California. Since 2000, real estate markets, again particularly in the Northeast and on the West Coast, have seen a substantial rise in value in all segments of the market, and land values have soared. Table 6.1 summarizes the results since 1990.

In 2006 the markets were again experiencing a downward shock. This time, however, commercial values seem to be holding up—that is, building values have stayed up despite somewhat deteriorating fundamentals. Many observers point to the unprecedented worldwide liquidity in pension funds, endowments, and insurance companies. At the same time, a classic downturn seems to be developing in the housing market. Buyers are low-balling, while sellers are resisting price cuts. The result is higher inventories of unsold property and falling prices. The immediate damage to the economy will likely be from falling volumes (sales and starts),

and it will be felt in employment and income, as commissions, origination fees, and other income driven by transactions drop.

The question, of course, is where will it all settle down? Although many of the conditions in place today are similar to conditions in the 1990s, many are not. The United States is not yet experiencing a recession, and yet its financial markets have agreed to hold a lot more real estate risk than ever before.

What is known is that in view of the huge increases in the value of buildings and land, particularly residential, some sort of readjustment is both inevitable and, in a way, desirable. It is not yet known, however, just how deep or how long such a readjustment will be, or its character.

## APPENDIX

### Land in Commercial Use: Boston, 2005

**Office Space**

| | |
|---|---|
| Class A | 38.58 million square feet |
| Gross rent | $38 per square foot |
| Operating costs and tax | $15 per square foot |
| Vacancy rate | 5 percent |
| Net rent | $21.10 per square foot |
| Cap rate | 7 percent |

Land cost

Value of commercial property is $300 per square foot.
Building net of land costs $250 per square foot.
Land cost is $50 per square foot.
Floor area ratio is 6.42.
Land value is 6.42 × $50 = $321 per square foot.
6.066 million square feet × $321 = $1.96 trillion.

**Similar Analysis**

| | |
|---|---|
| Three- to nine-story office | $126 per square foot |
| | 6.34 million square feet |
| Total land cost | $798 million |
| Other office | $72 per square foot |
| | 10.5 million square feet |
| Total land cost | $756 million |
| Total office | $3.52 billion |
| Rental housing | $1.83 billion |
| Parking | $2.40 billion |
| Hotel | $0.71 billion |
| Retail | $1.42 billion |
| Medical | $0.95 billion |
| Entertainment | $0.40 billion |
| Total commercial land | $11.24 billion |

Total Land Value: Massachusetts, 2005

| | |
|---|---|
| **Commercial Property** | |
| City of Boston | $11.24 billion |
| Suburbs | $23.49 billion |
| Rest of state | $61.60 billion |
| Total land value | $96.32 billion |
| Owner-occupied housing (see table 6.6) | $423 billion |
| Agricultural land (520,000 acres @ $4,350/acre) | $2.26 billion |
| Total (excluding vacant land) | $521.58 billion |

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