

How the Commercial Real Estate Boom Undid the Banks

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Commercial real estate is routinely cited as the primary culprit in the recent banking crisis. In metropolitan areas throughout the country, office vacancy rates commonly approach 20 percent or more. Rents have softened and property values have fallen, in some cases precipitously. And while such problems seem most severe for office space, values of retail and warehouse properties have also fallen.¹ Not only have banks failed because of losses on real estate loans, but they have also introduced more stringent credit standards in response to these difficulties, standards that are believed to have offset interest rate reductions and sapped the strength of the recovery.

This paper examines how the glut of commercial real estate space developed and how banks came to be so severely damaged. It concludes that commercial real estate construction, especially construction of office buildings, is inherently cyclical. However, the cycle of the 1980s was magnified by tax and institutional changes and by a conviction—shared by developers, banks, the academic community, and the general public—that real estate was a high-return, low-risk investment.

The paper also argues that the consequences of declining real estate values fell so heavily on banks, first, because they had moved very aggressively into real estate lending in the 1980s, and second, because

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¹ National Real Estate Index, *Market Monitor and Market History Reports: 1985–1990*, June 1991.

these loans were obligations of borrowers whose only assets were real estate. When real estate values fell, instead of deep-pocketed corporate borrowers to share the losses, there remained only individuals and partnerships whose net worth melted away.

The first section of the paper examines patterns of commercial real estate construction over time and across regions. Following very low levels of commercial construction in the late 1970s, construction activity, especially in office buildings, soared in the mid 1980s, plateaued, and then plummeted at the end of the decade. Patterns varied considerably among regions, with New England an exaggerated example of the national picture. The second section reviews various explanations for the commercial construction boom of the 1980s, focusing on the strong growth in the financial and services sectors, tax code changes, the effect of deregulation on the availability of capital, and expectations of real estate appreciation.

The following section uses regression analysis of building patterns in the nine census regions to evaluate these explanations. It finds that the commercial construction boom was driven by a combination of economic fundamentals, tax changes, and lender enthusiasm for real estate.

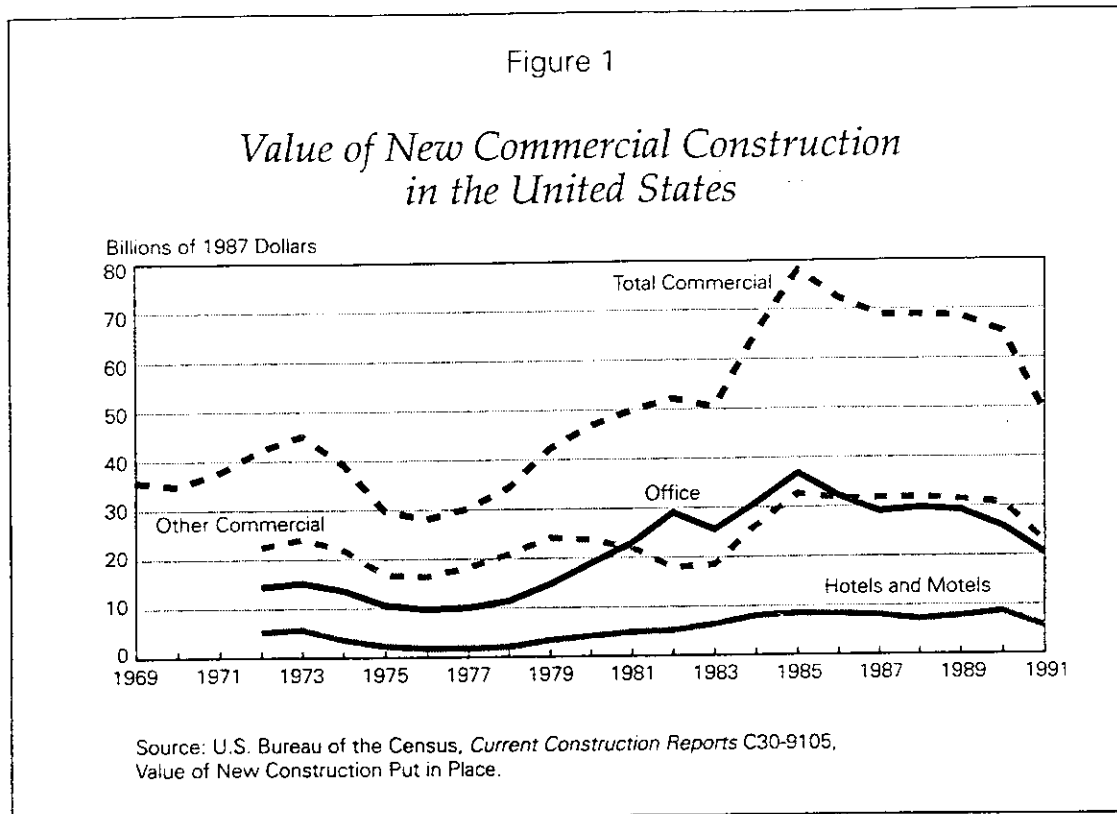
Based on this analysis, the paper then discusses the inherently cyclical nature of commercial construction. Boston is used to illustrate the sensitivity of commercial real estate values to changes in occupancy and rental rates and to demonstrate why banks were so vulnerable when real estate values declined. Conclusions follow.

Commercial Construction Patterns

An excess of commercial building space could arise because of too much building or because of an unexpected falloff in the demand for space. The latter certainly played a role in the real estate difficulties of Texas and other Southwestern states, where declining oil prices produced a dramatic reversal of economic fortunes in the mid 1980s. But while unanticipated declines in demand may have contributed to the present nationwide commercial real estate glut, much of the blame lies with overbuilding.

As can be seen in Figure 1, construction of commercial buildings ballooned in the first half of the 1980s. In just the two years between 1983 and 1985, the constant dollar value of commercial construction increased 50 percent. As a consequence, about 14 percent of total nonresidential investment was devoted to commercial construction in the mid 1980s, compared to 8 percent in the second half of the 1970s and 12 percent in the early 1970s.

Office buildings, hotels and motels, and stores and other commer-

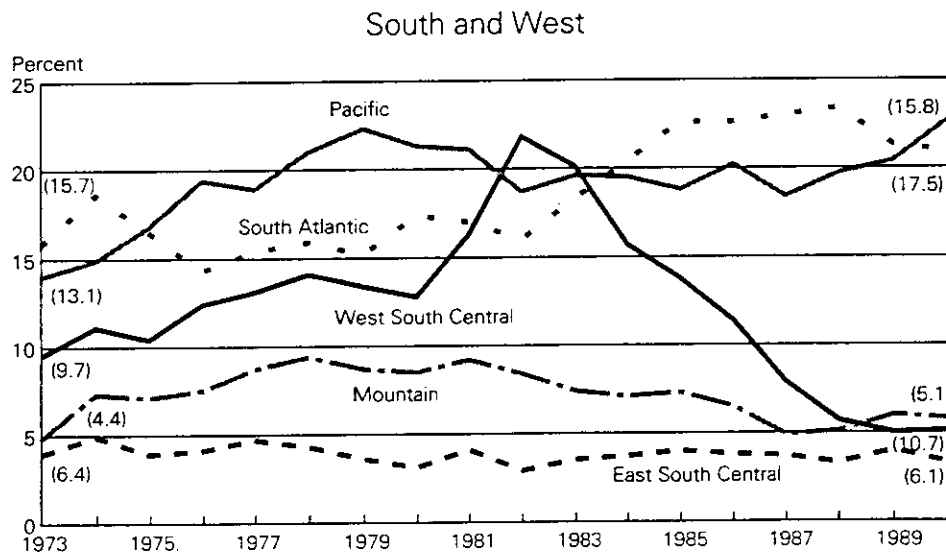
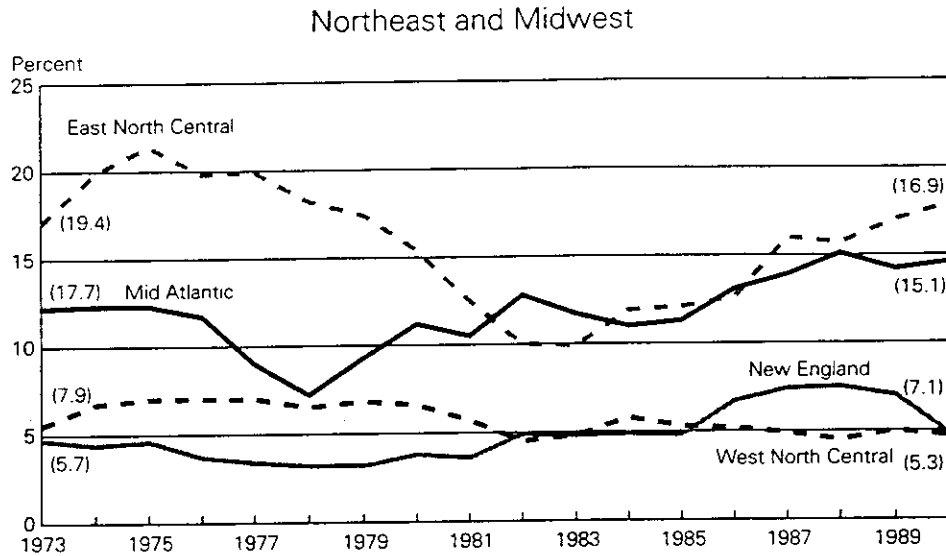


cial buildings all contributed to the increase.² However, the increase was more pronounced for offices than for other commercial buildings; the timing was also a little different. In contrast to the commercial sector, construction of industrial or manufacturing buildings was subdued through the 1980s.

While most parts of the country saw increases in commercial construction in the 1980s, the differences were striking. Figure 2 shows the shares of U.S. commercial construction in the nine census regions. The construction boom was particularly pronounced along the East Coast; New England, the Mid Atlantic, and South Atlantic regions all accounted for higher shares of the nation's commercial construction in the 1980s than they had in the second half of the 1970s. In the West South Central states, in contrast, commercial construction soared at the start of the 1980s, but then fell precipitously in the second half of the decade.

² The three major categories of commercial construction are office, hotels and motels, and "other commercial." The last consists of "buildings and structures which are intended for use by wholesale, retail, or service trade establishments." Shopping malls, stores, restaurants, auto service stations, and warehouses and storage facilities that are not part of industrial facilities are all considered "other commercial" buildings. Not included are educational and religious buildings and hospitals. Source: U.S. Bureau of the Census, *Current Construction Reports C30-9105*, *Value of New Construction Put in Place*.

Figure 2

Regional Shares of U.S. Commercial Construction

Note: Regional population shares at beginning and at end of period are shown in parentheses.
Source: See Figure 1.

Causes of the Boom

Some increase in commercial construction in the 1980s was undoubtedly justified by economic fundamentals. Office vacancy rates at

Table 1
Changes in U.S. Employment in 1970s and 1980s, Selected Industries
Percent

| Industry | 1969-74 | 1974-79 | 1979-84 | 1984-89 |
|--|---------|---------|---------|---------|
| Total Employment | 10.1 | 13.3 | 7.0 | 13.3 |
| Commercial Tenant Industries: | | | | |
| Wholesale and Retail Trade | 14.0 | 17.6 | 8.6 | 15.2 |
| Finance, Insurance, and Real Estate | 25.1 | 23.9 | 18.3 | 17.2 |
| Services | 18.6 | 22.0 | 22.7 | 25.0 |
| Other | 4.6 | 7.4 | -1.5 | 5.8 |

Note: The calculations in Table 1 are based on U.S. data, which are, in effect, a weighted average of the states. Calculations in Table 2 are based on the average of the 50 states (simple mean).

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Information System, computer tape and authors' calculations.

the start of the decade were low, presumably the result of the relatively low rates of construction in the second half of the 1970s, coupled with strong growth in industries that occupy office space. Regional variations in construction patterns also suggest a tie to underlying economic conditions. In particular, the timing of the construction boom and bust in the West South Central states reflects the rise and fall in oil prices.

While economic fundamentals had some role, however, the Economic Recovery Tax Act (ERTA) of 1981 and financial deregulation are thought to have boosted construction beyond what could be supported by the underlying demand for commercial space. The effects of ERTA were magnified by new investment vehicles that brought more owners into the market to take advantage of tax benefits; not only did this encourage more building, but it also had implications for the incidence of the losses that eventually resulted. In addition, the rise in real estate values in the 1970s appears to have resulted in a widespread perception that real estate was a low-risk, high-return investment, thus creating a climate conducive to overbuilding.

Demand Fundamentals

While Figure 1 shows a surge in commercial building in the mid 1980s, it also shows unusually low rates of construction in the late 1970s. Employment growth in the late 1970s, in contrast, was robust. As can be seen from Table 1, employment growth was especially strong in those sectors that occupy commercial space: finance, insurance, and real estate; services; and wholesale and retail trade. As a result, the 1980s started with a substantial pent-up demand for commercial space. In the office market, vacancy rates in downtown areas averaged only 4 percent

Table 2
Variation in State Employment Growth in the 1970s and 1980s
Percent Change

| Interval | Standard Deviation | Mean | Coefficient of Variation |
|------------|--------------------|------|--------------------------|
| All States | | | |
| 1969-74 | 7.9 | 13.4 | 58.6 |
| 1974-79 | 8.7 | 15.9 | 54.6 |
| 1979-84 | 7.9 | 7.0 | 112.6 |
| 1984-89 | 7.6 | 12.7 | 59.8 |

Source: See Table 1.

in 1980. In some markets, such as Denver, Los Angeles, and San Francisco, vacancy rates were less than 1 percent.³

The recessions of 1980 and 1981-82 sent overall employment plummeting. However, the impact of the recessions was very uneven. Manufacturing bore the brunt. Services and finance, insurance, and real estate held up relatively well in the recessions and then grew strongly as the recovery took hold. Thus, the industries that occupy commercial space fared much better in the early 1980s than the overall economy.

If space were completely fungible, these sectoral differences would be irrelevant. But despite the rather nondescript nature of many modern manufacturing buildings and office complexes, facilities suitable to manufacturers are not ideally situated or designed for the needs of the financial or services industries. Accordingly, surplus space in declining industries was of limited value to those that were expanding.

In a similar vein, the uneven pattern of regional growth in the early 1980s may have contributed to a higher level of construction nationwide. Even given the modest rate of U.S. growth, the variation among states was greater from 1979 to 1984 than it had been in the 1970s (Table 2). Buildings are not mobile, and a surplus of space in one area does nothing to relieve the demand for space elsewhere. Therefore, even when employment growth at the national level is slow, pressure to build in some states and localities may be quite strong.

Changes in the Tax Code

While a pickup in commercial construction may have been justified by underlying demand, it received added impetus from the Economic Recovery Tax Act of 1981 (ERTA). A major goal of ERTA was to

³ Vacancy rates averaged 10 percent over the 1970s; they were low at the start of the decade, high in the middle, and low at the end. Source: CB Commercial/Torto Wheaton Research.

stimulate investment. High rates of inflation in the late 1970s had reduced the value of depreciation deductions, thereby increasing the cost of capital. ERTA attempted to offset this by reducing asset lives and permitting more accelerated depreciation schedules. Building lives were shortened from about 40 years to 15 years.⁴

ERTA also expanded the investment tax credit for equipment and preserved the 60 percent capital gains exclusion for individuals. The effect of the capital gains exclusion was somewhat offset, however, by cuts in personal income tax rates. In particular, the top individual rate was reduced from 70 percent to 50 percent.

Although ERTA was originally thought to be biased towards investment in equipment, primarily because the investment tax credit did not apply to structures, over time it became apparent that ERTA actually favored real estate over other forms of investment.⁵ Bosworth (1985) pointed out that commercial buildings were more amenable to debt financing than most investments and that the greater use of debt conferred additional tax advantages. Hines (1987) focused on the tax shelter opportunities ERTA created for high-income individuals. Commercial properties offered particularly attractive opportunities to shelter income, as they could be financed largely by debt, depreciated at accelerated rates, and then sold for a capital gain to others who hoped to repeat the process. The fact that properties could be resold and depreciated several times ("churned") increased the impact of ERTA's depreciation provisions on the incentive to invest in real estate.⁶

Internal Revenue Service data show a sharp rise in limited partnership investment in real property following ERTA (Hines 1987). And a survey of the downtown Boston office market in the mid 1980s highlights the importance of the individual investor to the commercial real estate market: "about 85 percent of the office buildings" were owned by individuals and partnerships (McClure 1986). The pattern of commercial mortgage obligations, discussed in the next section, provides further confirmation of the importance of noncorporate investors in the real estate market.

The boom in real estate tax shelters led Congress to scale back the depreciation rules allowed for real estate in 1984. Then, the Tax Reform

⁴ ERTA introduced the Accelerated Cost Recovery System (ACRS) that replaced the former Asset Depreciation Range tables with a simple system that classified all property into one of four categories according to asset life: 3-, 5-, 10-, and 15-year property.

⁵ For examples of early analysis see Gravelle (1982 and 1983), Auerbach (1983) and Fullerton and Henderson (1984).

⁶ In addition, Summers (1987) argued that a very low real discount rate should be used in calculating the present value of depreciation deductions because the pattern is known with virtual certainty once the asset is put in place. A low discount rate sharply increases the present value of future tax benefits. However, Summers also found that businesses do not actually apply a lower discount rate to tax benefits than to riskier income streams when making investment decisions.

Table 3
Present Value of Depreciation Provisions per \$1000 of Building Value
Based on 9 Percent Discount Rate

| | Pre-ERTA | 1982-84 | 1984-86 | Post-1986 |
|-------------|----------|----------|----------|-----------|
| No Churning | \$ 75.20 | \$105.80 | \$ 88.20 | \$12.60 |
| Churning | \$138.80 | \$195.30 | \$162.20 | \$23.30 |

Note: No churning assumes that the building is depreciated for six years using the optimal method and asset life, and then is sold in the seventh year. Churning assumes that the building is depreciated for six years and sold in the seventh year, then depreciated again and sold in years 14 and 21.

Source: Calculations described in detail in Appendix A.

Act of 1986 wiped out virtually all tax provisions favorable to commercial real estate investment by individuals. Depreciation schedules for structures were lengthened. The top marginal tax rate for individuals was cut from 50 percent to 28 percent. The 60 percent exclusion for long-term capital gains was eliminated, as was the ability to shelter ordinary income from taxation by using "passive" losses on real estate investments.⁷

Appendix A and Appendix Table A-1 describe in detail how changes in marginal rates, depreciation rules, and the capital gains exclusion changed the attractiveness of real estate investment for high-income individuals during four periods: pre-ERTA, from 1982 to 1984, from 1984 to 1986, and post-1986. The results are summarized in Table 3. It seems clear that ERTA should have been a powerful stimulus to individual real estate investment and the Tax Reform Act of 1986 an even more powerful depressant.

The opportunities created by ERTA for individuals to deduct passive real estate losses from ordinary income led syndicators to devise still other ways to use the tax code to the advantage of real estate investments. A number of private placement memoranda for limited partnerships investing in office buildings were analyzed for this paper. While no two deals were the same, they shared some characteristics. Key provisions are illustrated in the box that follows, which presents a simplified typical tax shelter based on a conservative syndication done on an actual office building in 1984.

All the deals examined took full advantage of the depreciation rules and capital gains provisions discussed above. All were able to secure virtually 100 percent debt financing. The new office buildings were

⁷ Passive losses are losses incurred on investments in which the investor does not "materially participate" in the management of the project. Most real estate investments are considered passive. Costs associated with passive investments can only be charged against income from passive investments. Prior to the Tax Reform Act of 1986, real estate losses could be set against "active" ordinary income.

Hypothetical Shelter

OFFICE BUILDING: Class A 800,000 sq. ft. 1984

TOTAL PROJECT COST: \$120 million (\$150 per sq. ft.)
 Building \$90 million; land \$30 million

FINANCING ASSUMPTIONS: \$100 million first mortgage (insurance company), 14.4 percent interest. Balloon payable in eight years. Interest only.

\$20 million second mortgage from general partner at 16 percent interest accrued plus \$1.6 million annually in fees accrued.

Annual cash interest: \$14.4 million on first mortgage.

Annual accrued interest and fees: \$4.8 million.

Building and land sold at the end of year 8 for \$120 million.

LIMITED PARTNERS: 200 shares sold at \$140,000 each (private offering). \$20,000 payable up front plus \$15,000 annually for eight years.

CAPITAL COST RECOVERY: 15-year straight line; no recapture.

ANNUAL INCOME AND EXPENSES (Years 1-8):

| | |
|---|----------------------|
| Gross Rent (\$30/sq. ft. no vacancy) | \$ 24.0 million |
| - Taxes and operating expenses (\$10/sq. ft.) | <u>-8.0 million</u> |
| Net effective rent | \$ 16.0 million |
| - Cash debt service | <u>-14.4 million</u> |
| Net cash flow | \$ 1.6 million |
| | |
| - Accrued interest and fees | -4.8 million |
| - Depreciation (15-year SL/Bldg. only) | <u>-6.0 million</u> |
| Net partnership income/loss | \$-9.2 million |

Limited Partner Gains and Costs (\$000)

| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8 |
|-------------------|-----|------|------|------|------|------|------|------|------|------|
| Cash due | -20 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -15 |
| Share of loss | | (46) | (46) | (46) | (46) | (46) | (46) | (46) | (46) | (46) |
| Tax saving | | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| Capital gains tax | | | | | | | | | | -48 |
| Partner cash flow | -20 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8-48 |

Assumes: marginal tax rate 50%; share of capital gains tax calculated from depreciated book value of building = \$42 million.

Gain = (\$48 million/200) × .4 included × .50 marginal tax rate = \$48,000

General Partner/Syndicator Cash Flow (\$ millions)

| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8 |
|------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Construction and land | -120.0 | | | | | | | | | |
| Loan proceeds | 100.0 | | | | | | | | | |
| Building net cash flow | | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | |
| From partners | | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Sale proceeds | | | | | | | | | | 120 |
| Pay loan | | | | | | | | | | -100 |
| "Net cash" flow | -16.0 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 20 |

Rates of Return:

| | |
|-------------------------------|-------|
| 1st Mortgagor | 14.4% |
| Limited Partners ^a | 15.0% |
| General Partner ^a | 30.0% |

^aReturns to partners are those at which discounted net cash flow equals 0.

financed with first and second mortgages, as well as direct loans and working capital loans from the general partner or development company to the limited partners. These loans from the general partner frequently carried high rates of interest that accrued until the building was sold. The accrued interest was, in essence, a way of transferring part of the ultimate gain upon sale to the developer/syndicator, while allowing the limited partners to deduct interest costs before they were actually paid.

Without appreciation in the value of the buildings, the rates of return to limited partners implied by the syndicates' pricing policies were good but not extraordinary. Since they were highly leveraged, however, limited partners earned extraordinary returns if building values were rising. But leverage is extremely dangerous when asset values fall. With a 10 percent down payment, a 10 percent decline in value eliminates a partnership's equity; and as will be shown in a later section, real estate values are very sensitive to changes in assumptions about vacancy rates and rent levels.

Credit Availability

The financial deregulation of the early 1980s is also thought to have fueled investment in commercial real estate, by making financing more available. The Depository Institutions Deregulation and Monetary Control Act of 1980 began a phase-out of interest ceilings on deposits of banks and thrift institutions and broadened the lending powers of federally chartered thrifts. But while the ability to offer higher interest rates enabled banks and thrifts to compete more effectively for deposits with money market funds and other financial intermediaries, it also increased the cost of funds and created pressure to generate higher rates of return on their investments. To pay more they had to earn more.

Thrifts have been castigated for using the expanded powers given them by both federal and state authorities to plunge into high-risk areas with which they were unfamiliar. Whatever the thrifts' failings, commercial banks, not thrifts, were the major suppliers of funds for commercial construction.⁸ As can be seen from Table 4, commercial banks' share of all commercial mortgages outstanding rose from just over 30 percent in 1980 to almost 45 percent by the end of the decade,

⁸ Thrifts may have contributed to the commercial real estate boom indirectly. To the extent that they competed aggressively for funds by offering higher rates, they would have forced banks to do the same and increased the pressure on bank earnings.

Table 4
Commercial Mortgages as Assets

A. Share of Commercial Mortgages Outstanding Held by Major Lenders
Percent

| | 1980 | 1984 | 1988 | 1990 |
|--------------------------|------|------|------|------|
| Commercial Banks | 31.6 | 36.6 | 43.7 | 44.5 |
| Thrifts | 24.1 | 24.8 | 19.8 | 14.4 |
| Life Insurance Companies | 31.6 | 26.6 | 26.4 | 28.4 |
| Others | 12.7 | 12.0 | 10.1 | 12.6 |

B. Major Lenders' Concentrations in Commercial Mortgages
Percent

| | 1980 | 1984 | 1988 | 1990 |
|--------------------------------------|------|------|------|------|
| Commercial Banks | | | | |
| Commercial Mortgages/Total Assets | 5.4 | 7.2 | 10.3 | 10.1 |
| Commercial Mortgages/Total Mortgages | 30.8 | 40.2 | 45.4 | 39.5 |
| Thrifts | | | | |
| Commercial Mortgages/Total Assets | 7.2 | 8.0 | 7.5 | 6.9 |
| Commercial Mortgages/Total Mortgages | 10.3 | 14.4 | 14.4 | 12.5 |
| Life Insurance Companies | | | | |
| Commercial Mortgages/Total Assets | 17.4 | 15.9 | 16.3 | 15.7 |
| Commercial Mortgages/Total Mortgages | 61.6 | 71.0 | 79.1 | 80.3 |

Source: Board of Governors of the Federal Reserve System, *Flow of Funds Accounts, Financial Assets and Liabilities* 2.1, March 12, 1992 and *Balance Sheets for the U.S. Economy 1960-91*, March 1992.

and their concentration in commercial mortgages rose from 5 percent of total assets to more than 10 percent.⁹

The nature of commercial mortgage borrowers contributed to the difficulties that banks subsequently experienced. Roughly 70 percent of commercial mortgages are obligations of partnerships and other noncorporate businesses (Table 5). Corporations and nonprofit organizations, such as churches, hospitals, and universities, make up the balance.

The dominant role played by noncorporate businesses is significant in several respects. First, much of the noncorporate sector is in the business of real estate. Some 80 percent of noncorporate assets are in real estate.¹⁰ While banks are usually thought to lend against a business's general prospects, in the case of commercial mortgages they were lending against the value of the asset. Had commercial mortgages been

⁹ Commercial mortgages in the Flow of Funds Accounts include all nonfarm nonresidential mortgages.

¹⁰ Since some noncorporate businesses have nothing to do with real estate, the share of total assets in real estate would be even higher for those in this industry.

Table 5
Commercial Mortgages as Liabilities

A. Share of Outstanding Commercial Mortgages Owed by Major Borrowers
Percent

| | 1980 | 1984 | 1988 | 1990 |
|---|------|------|------|------|
| Nonfarm Noncorporate Businesses | 71.4 | 84.5 | 72.4 | 69.9 |
| Nonfinancial Corporations | 15.8 | 5.2 | 11.7 | 12.0 |
| Households, Trusts, and Nonprofit Organizations | 12.3 | 9.9 | 15.6 | 17.7 |
| Real Estate Investment Trusts (REITS) | .5 | .4 | .3 | .4 |

B. Extent of Noncorporate and Corporate Commercial Mortgage Liabilities
Percent

| | 1980 | 1984 | 1988 | 1990 |
|--|------|------|------|------|
| Nonfarm Noncorporate Businesses | | | | |
| Commercial Mortgages/ Nonresidential Real Estate ^a | 54.8 | 68.5 | 66.7 | 62.4 |
| All Mortgages/All Real Estate | 23.6 | 31.7 | 35.7 | 33.9 |
| Real Estate/Total Assets | 80.1 | 78.5 | 78.1 | 78.2 |
| Mortgages and Bank Loans/ Total Liabilities | 70.9 | 70.9 | 70.6 | 68.7 |
| Total Liabilities/Total Assets | 33.6 | 40.9 | 44.6 | 44.1 |
| Nonfinancial Corporations | | | | |
| Commercial Mortgages/ Nonresidential Real Estate ^a | 2.6 | 1.0 | 3.2 | 3.5 |
| All Mortgages/All Real Estate | 5.3 | 2.5 | 4.4 | 4.6 |
| Real Estate/Total Assets | 36.0 | 37.2 | 36.2 | 34.4 |
| Mortgages and Bank Loans/ Total Liabilities | 23.7 | 22.9 | 21.3 | 20.1 |
| Total Liabilities/Total Assets | 29.7 | 33.8 | 41.3 | 44.0 |

Note: Assets include financial assets and the current cost of tangible assets.

^aNonresidential real estate was estimated by allocating land in proportion to the values of residential and nonresidential structures.

Source: See Table 4.

obligations of the corporate sector, other resources would have been available to tap when real estate values fell. Most of the corporate sector derives its earnings from other, unrelated activities; real estate is only a means to an end. For much of the noncorporate sector, real estate is the end.¹¹

¹¹ In this regard, commercial mortgages are fundamentally different from residential mortgages. Residential mortgages are generally approved based on the homeowner's income from activities unrelated to the value of the property. The property is a backup, something to draw upon if the ability to service the loan is unexpectedly interrupted. However, for most commercial mortgages, the ability to pay is inextricably tied to the

In addition, noncorporate businesses can be structured in very complex ways and they are not subject to the financial disclosure requirements imposed on public corporations. Banks should hold borrowers to stricter information standards than the general requirements of the Securities and Exchange Commission, but they may not always have done so. The limited partnership agreements reviewed for this paper were dauntingly complicated. Thus, a lack of readily comprehensible financial information on commercial mortgage borrowers may have obscured potential problems.

Banks' shift into commercial real estate is frequently attributed to their unfavorable experience in other lending areas. The early 1980s saw first loans to less developed nations and then energy loans sour. At the same time, banks were encountering competition in lending to their traditional large corporate customers from the commercial paper market, finance companies, and foreign sources. But the movement into commercial real estate was not simply a retreat from other areas. Real estate investments were seen as offering very attractive returns by academics and the general public, as well as by banks.

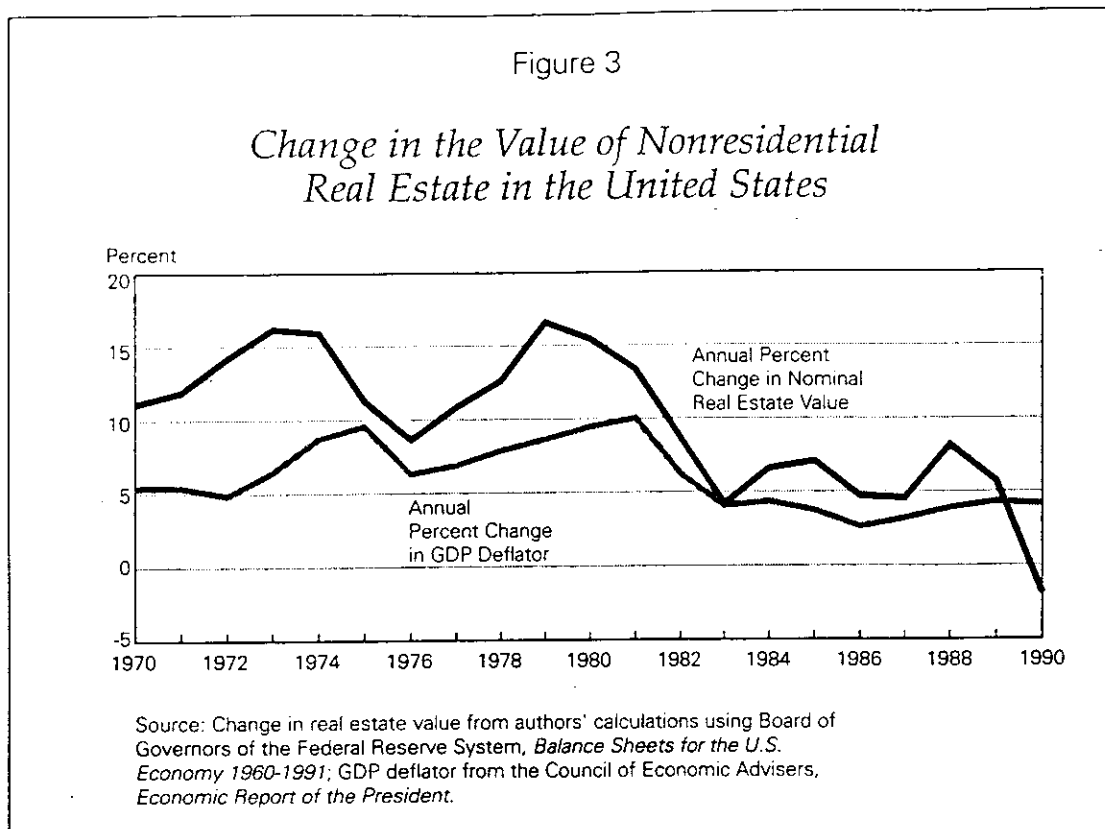
The Appeal of Real Estate

In the late 1970s and early 1980s a number of articles appeared in scholarly journals comparing returns generated by real estate with those from common stocks, bonds, and government securities. The findings were generally quite favorable to real estate. As one survey of the literature noted, "More than half the studies find that absolute returns on real estate have been higher than returns on either stocks, bonds, or other assets" and "most of the studies indicate that real estate earned a higher return per unit of risk than common stocks and the other assets included in the studies" (Sirmans and Sirmans 1987, p. 22).

These results were qualified by acknowledgement that the measurement of the returns to real estate involved many assumptions. A lack of data on prices and earnings plagues research on nonresidential real estate. With hindsight, it seems that the approximations used in many of these studies understated the risks associated with real estate.¹² At

value of the collateral. If the ability to pay suffers because vacancy rates increase and rents decline, the value of the collateral also falls. Reinforcing this lack of diversification is the fact that real estate owners' properties are likely to be regionally, or even locally, concentrated. Thus, if a weakening economy causes problems for one, it is likely to mean problems for all. Moreover, while lenders may require borrowers to provide personal guarantees, a borrower who owns a few large properties may appear to have great personal wealth while remaining vulnerable to problems at just one or two projects.

¹² In a number of cases, returns were calculated using appraised values rather than actual transactions. This approach has been criticized for smoothing out returns on the grounds that appraisals are based on long-run values rather than short-run market



the time, however, the overall message was that real estate compared favorably with other forms of investment.

It seems probable that ownership of nonresidential real estate did indeed generate attractive returns in the 1970s. Construction costs rose rapidly, surpassing the rate of inflation in a number of years. This increase in the cost of new buildings should have pushed up the values of existing structures that were close substitutes. And for building owners who had financed their property in times of lower inflation and lower interest rates, this appreciation would have resulted in real as well as nominal increases in the value of their equity. Land prices also increased rapidly.

Real estate values appear to have increased much more slowly in the 1980s than they did in the 1970s. Figure 3 shows the year-over-year percentage change in the current dollar value of nonresidential real

conditions. Some in New England have asserted that in the very weak market of recent years appraisals have been closer to liquidation values than to long-run values; but in more normal circumstances, it seems plausible that use of appraisals to measure returns could reduce volatility. This point is made in Hendershott and Kane (1992b). In other studies, returns were not measured for individual properties but based on the returns generated by real estate investment trusts and commingled real estate funds. While this may impart more sensitivity to changing market conditions, the investment funds' portfolios may be more diverse than those of the typical real estate investor.

estate held by nonfarm corporations and noncorporate businesses, as estimated by the Board of Governors of the Federal Reserve System and the U.S. Bureau of Economic Analysis (BEA).¹³ Because the value of land and the existing stock of buildings and other structures is so large relative to new construction, the pattern depicted in Figure 3 is driven primarily by changing land prices and by the appreciation in the value of existing structures, and not by investment.¹⁴ As can be seen, the value of nonresidential real estate grew at double-digit rates in the 1970s, and less than half as fast in the 1980s.

While the rapid growth in real estate values in the 1970s is consistent with the conventional wisdom that real estate was a superior investment, the much slower rate of increase in the 1980s does not square with investors' enthusiasm for real estate in that decade. Did the escalation in property values really moderate so rapidly? The BEA estimates of the value of existing structures, upon which these figures are based, do not reflect prices recorded in actual sales transactions (as these are not available) but the replacement cost of the stock.¹⁵ Such an estimation approach assumes, in effect, that the value of the existing stock keeps pace with rising construction costs. The abrupt slowdown in inflation after 1982 resulted in a similarly abrupt slowing in the growth of the replacement cost and, thus, in the estimated value of existing buildings.

Given the pent-up demand for commercial space that existed at the start of the decade and given the various incentives for investment created by tax changes and financial deregulation, commercial real estate values may have continued to rise rapidly in the early 1980s even though construction costs had slowed. Without further stimulus to demand, however, the appreciation in property values would eventually have to slow. If construction costs are rising more slowly than prices, more construction will take place until the increased supply dampens the rise in values. With attitudes shaped by the 1970s, however, investors may not have recognized this inevitability.¹⁶

¹³ Board of Governors of the Federal Reserve System, *Balance Sheets for the U. S. Economy 1960-91*, March 1992. The structures values in the Board data are from the BEA. In estimating nonresidential real estate for Figure 3 the land component of noncorporate real estate was allocated between residential and nonresidential purposes in proportion to the values of residential and nonresidential structures.

¹⁴ Through most of this period, the value of nonresidential construction amounted to only about 3 percent of the prior year's value of nonresidential real estate. Depreciation charges would reduce the contribution of investment even further.

¹⁵ See the BEA 1987 publication *Fixed Tangible Wealth in the United States, 1925-1985* for a description of methodology.

¹⁶ It is also possible that the conventional wisdom about the high returns to real estate in the early 1980s was wrong. In this regard, it is suggestive that housing prices grew more slowly in the 1980s than they had in the 1970s. For the nation as a whole, the price of new homes of constant quality did not keep pace with inflation. Prices of existing homes

Sorting Out the Causes of Overbuilding

Poterba (1984, 1991) and others have developed a model of the housing market that has considerable applicability to commercial properties and can be used to evaluate the various explanations for the commercial construction boom. In this model, properties are assets, the prices of which equal the discounted stream of rental income net of expenses. Construction is a function of the ratio of the price of the asset to the cost of construction. Thus,

$$I_t = f(P_t/C_t)$$

and

$$P_t = \sum_{s=t}^{\infty} \frac{[R_s - m_s - p_s P_s]}{\frac{(1 - \theta z)}{(1 - \theta)} (1 + \delta + i(1 - \theta) - \pi + a)^{s-t}}$$

where

- I is gross commercial construction,
- P is the price of commercial property,
- C is the cost of construction,
- R is the rental stream, which is a positive function of the underlying demand for space services and a negative function of the stock of property that could supply those services,
- m is maintenance and other costs of operation,
- p is property taxes,
- i is the nominal interest rate,
- a is the risk premium associated with commercial real estate,
- δ is depreciation,
- π is the expected appreciation in the value of the property,
- θ is the marginal income tax rate of the property owner, and
- z is the present value of depreciation allowances, per dollar of purchase price.

In the absence of information on prices, this model implies that investment in commercial buildings depends upon

1. construction costs,

actually sold rose faster, but at least some of this increase appears attributable to quality changes. A comparison of constant-quality homes and new homes actually sold showed that quality improvements accounted for some of the price increase for new homes. Source: U.S. Bureau of the Census, *Characteristics of New Housing: 1990* and computer printout, and National Association of Realtors, *Home Sales Yearbook*.

2. the underlying demand for space and competition for tenants from the existing stock of buildings,
3. operating costs and property taxes,
4. tax policy,
5. the cost of funds, and
6. expected appreciation.

Thus, the model incorporates most of those factors identified in the previous section of this paper as probable causes of the construction boom of the 1980s. It explicitly recognizes the influence of demand factors, tax policy, and expectations of appreciation.

Table 6 presents the results of regressions based on this model. These regressions attempt to explain the value of the two major components of commercial construction (in 1987 dollars) in the nine census divisions over the period 1977 to 1990. A regional approach was used because the pattern of commercial construction varied so much from one part of the country to another. As noted previously, surplus space can exist in one region while another region is experiencing a space shortage.¹⁷

Separate regressions were run for the two major components of commercial building, office buildings and "other commercial." The latter is composed primarily of stores and related establishments. The construction values and some of the independent variables were divided by population to adjust for regional size variations. In all cases, it was assumed that the relevant values of the explanatory variables were the values at the time of the construction go-ahead decision, which, in turn, was assumed to be two years earlier.¹⁸

Results

The equations indicate that the construction patterns of the late 1970s and 1980s had some basis in economic fundamentals. Construction of both other commercial and office buildings was positively related to population growth. In addition, construction of office buildings was spurred by the expansion of finance and insurance and those service industries that occupy office space. Rising unemployment rates were a deterrent to both categories of construction.

¹⁷ It would be preferable to go below the regional level to states or metropolitan areas; however, data on the value of commercial construction are available only for regions.

¹⁸ The choice of lag was somewhat arbitrary. For larger projects a longer lag seems plausible, while for small projects the lag could be shorter. Accordingly, equations using a three-year lag for office buildings and a one-year lag for "other commercial" are presented in Appendix Table B-1.

Table 6
Regression Results
Dependent variable = per capita value of construction put in place (1987 \$)

| Independent Variables (All lagged 2 years) | Office Buildings | Other Commercial |
|--|---------------------|---------------------|
| Constant | 67.8 (1.1) | 15.4 (.5) |
| Population growth | 23.2* (4.1) | 20.3* (5.6) |
| Employment growth in tenant industries relative to population | 3212.0 (1.9) | 59.1 (.1) |
| Change in unemployment rate | -4.1 (-1.9) | -6.4* (-4.0) |
| Past construction relative to population | .06 (1.4) | .1* (4.1) |
| Construction wage relative to overall wage | -74.6 (-1.4) | 40.4 (1.2) |
| Construction wage relative to U.S. construction wage | 52.1 (1.1) | 18.3 (.6) |
| Property taxes per capita (1987 \$) | 55.8 (1.9) | -5.5 (-.3) |
| Bank deposits per capita (1987 \$) | .005 (1.9) | -.002 (-1.4) |
| Bank "other real estate owned" (OREO) relative to real estate loans | -7.2* (-2.7) | -6.9* (-3.1) |
| Percent change in housing prices | -.04 (-.07) | -.4 (-1.0) |
| Prime rate ^a | .4 (.2) | -2.0* (-3.3) |
| Dummy for 1982-1986 tax regime ^a | 49.2* (4.6) | 38.2* (7.4) |
| Dummy for 1987-1990 tax regime ^a | 33.6* (2.4) | 20.1* (2.5) |
| National downtown office vacancy rate ^a | -4.6* (-2.7) | |
| \bar{R}^2 | .73 | .81 |

Note: Regressions are pooled time series and cross-section using data on 9 regions over the 14 years, 1977 through 1990.

^a These variables are the same for all regions.

* Significantly different from zero at the 5% level; t-statistics are shown in parentheses.

See Appendix B for definitions of variables and sources.

But while fundamentals played a role, construction also received a boost from the tax changes enacted in 1981. Three approaches to measuring the effect of federal tax policy were taken. The simplest, which is presented in Table 6, assumed three tax regimes, pre-1982, 1982 to 1986, and post-1986, and represented the latter regimes by dummy

variables.¹⁹ A second approach used the tax component of the corporate cost of capital for investments in commercial structures, as estimated by Henderson and Liebman (1992).²⁰ The third assumed that the critical tax changes were those affecting individual investors rather than corporations and used the hypothetical returns to an individual investor in a real estate syndicate from Table 3 (no churning) as an individual tax incentive variable. The regressions incorporating these approaches are compared with the results in Table 6 in Appendix Table B-2. All three approaches indicate that ERTA was a significant stimulus. For the post-1986 era they tell somewhat different stories, however, with the individual tax incentive variable implying a more pronounced deterioration in the investment climate than the other two approaches.²¹

Increased lender willingness to finance real estate projects was a further spur to construction in the 1980s. The negative relationship between bank "other real estate owned" (OREO) and construction is consistent with arguments that lenders' perceptions of the risks associated with real estate affect the availability of financing and, thus, the volume of construction. OREO includes property acquired through foreclosure, so that high ratios of OREO to real estate loans are generally indicative of past real estate problems. Unfavorable experience with real estate loans in the mid 1970s resulted in banks having high ratios of OREO to total real estate loans. This tended to depress construction in the latter part of that decade; but by the start of the 1980s OREO had fallen considerably, providing additional impetus to the pickup in construction.

¹⁹ ERTA was signed into law in August 1981; therefore, its impact was assumed to be felt in 1982.

²⁰ Henderson and Liebman (1992) estimated the cost of capital for investment by different industries in different asset categories. In estimating the cost of capital, they estimated the effect of changes in tax policy, taking into account changes in depreciation schedules and corporate tax rates. This article used their estimates of the tax component of the cost of capital for investments in commercial structures by the services industries. The estimates for finance, insurance, and real estate were virtually identical.

²¹ Because of construction lags, the equation does not provide much insight into the effect of the Tax Reform Act of 1986. Assuming a two-year lag, only construction in 1989 and 1990 would have been affected by the 1986 tax changes. The approaches are all consistent in indicating that ERTA had a substantial stimulative effect. In the tax regime dummy approach, the stimulative effect of ERTA is indicated by the positive coefficient on the dummy variable for the 1982-1986 period. The smaller positive coefficient for the 1987-1990 dummy implies that the Tax Reform Act of 1986 (TRA) reduced investment incentives but that the climate for investment was still more favorable than pre-ERTA. Henderson and Liebman's estimates of the tax component of the corporate cost of capital show ERTA causing a sharp reduction; in contrast, TRA had little effect, as changes in depreciation rules were offset by the reduction in the corporate income tax rate. As shown in Table 3, the variable representing individual investment incentives also indicates that ERTA provided a powerful investment stimulus, but these incentives were sharply diminished by TRA. The sign of the individual investment incentive variable is positive and the sign of the corporate tax effect is negative, since the former is a measure of the incentive to investment and the latter is a measure of the tax cost of investment.

Lender enthusiasm for real estate loans does not necessarily mean that financial deregulation was to blame. Indeed, favorable experience with real estate loans in the late 1970s and early 1980s, when values were appreciating, can be seen as an alternative explanation for banks' subsequent eagerness to make these loans. Bank deposits were included in the regressions because banks were major real estate lenders, particularly in the 1980s; and to the degree that bank lending is regionally concentrated, more banking activity might be associated with higher construction. No significant link was found, however.

Interest rates were a deterrent to the construction of other commercial construction but not to construction of office buildings. Referring back to Figure 1, one can see that office construction was very strong in the early 1980s, right when interest rates were at their peak. One possible explanation for the failure of high interest rates to discourage office construction is that interest on construction loans is commonly accrued until the project is completed. Thus, high interest rates do not impose an immediate cash flow constraint and if property values are expected to rise, this appreciation will enable the developer to pay the accrued interest when the completed project is sold or permanently financed. Additionally, since interest rates have both a real component and a component reflecting expectations of inflation, the interest rate may have picked up investors' hopes of appreciation. Although changes in home values were included in the equation in an attempt to capture expectations of appreciation, their effect was either negligible or negative.

The national downtown office vacancy rate was negatively associated with office construction.²² In particular, low office vacancy rates between 1979 and 1981 contributed to the surge in office construction in the early 1980s. The effect of low vacancies was undoubtedly reinforced by rising rental rates. The limited information available indicates that office rents soared in this period. In downtown Boston, for example, a vacancy rate of roughly 2 percent coincided with an increase in rents of 50 percent between 1980 and 1982.²³

While it may seem only logical that low vacancy rates would stimulate high levels of construction, vacancy rates can change very rapidly. Thus, they are not a very reliable guide to market conditions three or four years in the future. The national vacancy rate rose from less

²² Regional vacancy rates would be preferable but were unavailable. Since regional data on the stock of commercial buildings were also unavailable, the cumulative volume of commercial construction in prior years was used to represent the competition for tenants from existing buildings. The sign was positive rather than negative, however. It seems likely that this result reflects the long duration of construction projects and carryover from one year to another. Also, a region may be attractive for construction for reasons not captured in these equations.

²³ Coldwell Banker Commercial, 1990 *Forecast*, handout.

than 5 percent in 1981 to more than 15 percent in 1985. Changes in individual metropolitan areas were even more abrupt.

In summary, the construction patterns of the second half of the 1970s and 1980s reflect a combination of economic fundamentals, tax changes, and changes in lender enthusiasm for real estate. Low office vacancy rates and strong growth in finance, insurance, and various services industries contributed to an upswing in office building at the end of the 1970s. This was then reinforced by the investment incentives created by ERTA and by lenders' increased willingness to make real estate loans.

Commercial Construction Cycles

One conclusion that follows from the preceding analysis is that the construction of commercial buildings, particularly office buildings, is inherently cyclical. Although tax changes played a significant role in the commercial construction boom of the 1980s, the nature of the market makes it vulnerable to overbuilding. Lags are a critical problem. The ownership and financing of many projects is another.

Because buildings take several years to complete, economic conditions when a project comes to fruition may be quite different from those envisioned at the start. In the extreme the lags can be very long. The Federal Reserve Bank of Boston's building was originally planned in 1968, but not occupied until 1978. Boston's celebrated Fan Pier development, which was ultimately never started, had been in the planning stages for more than a decade and a half, and tens of millions of dollars had been spent on the planning process. The actual construction phase is much shorter. A review of the Boston Inspectional Service Department's files on large office buildings completed between 1978 and 1989 showed the length of time in actual construction to be between 18 months and 42 months.²⁴

The long time and considerable dollars that developers spend in planning large projects create a strong predisposition to go forward even when there is evidence that the market is weakening. Typically, developers receive no compensation for work on projects that are never built. Given the longevity of office buildings, it could be argued that economic conditions at the project's completion date should be irrelevant, that what really matters are conditions over the building's entire life. However, because many projects are highly leveraged and their owners are partners whose commitments are limited or whose business is real estate, a project that comes on line when vacancy rates are high and

rents declining may not generate sufficient cash flow to service its debt and the owners may not have the financial resources to sustain payments until conditions improve.²⁵

Apart from increasing the likelihood of mistakes, construction lags create an inherent tendency towards periodic overbuilding. This is illustrated in the diagrams in Figure 4, which represent in simplified fashion the dynamics of supply and demand in the commercial space market. The central feature of the charts is the fact that the supply of space is more elastic over time (SL) than in the short run (SS). Accordingly, an increase in the demand for space initially generates only a small supply response. Rents temporarily rise above the level that will result when additional supply is forthcoming. If developers and lenders react to these temporarily high rents, rather than anticipating the increase in supply, they will build too much and rents will be driven below what would otherwise have been the long-run equilibrium.

Further complicating and aggravating these tendencies is the duration of rental agreements. Rental agreements commonly extend over several years. Thus, when the demand for space increases, most existing tenants do not face automatic rent increases and therefore have no incentive to curtail their present space usage. Typical rental agreements contribute to the problem by prohibiting tenants from subleasing in order to take advantage of higher rents.

The result is that new and expanding tenants cannot compete for the bulk of the space occupied by existing tenants. Instead, they must bid for the small increment to space that is available in the short run, as well as any space released by expiring leases. As a consequence, the rents paid by new and expanding tenants in a rising market are even higher than the levels that would have existed if existing leases could be renegotiated and rents were increasing for all.

If developers and lenders assume these marginal rents represent the new market equilibrium, they will be disappointed. Not only will too much new space be created, but as existing leases expire, tenants will react to the higher rent levels and curtail their usage. Vacancy rates will rise, putting downward pressure on rents.²⁶

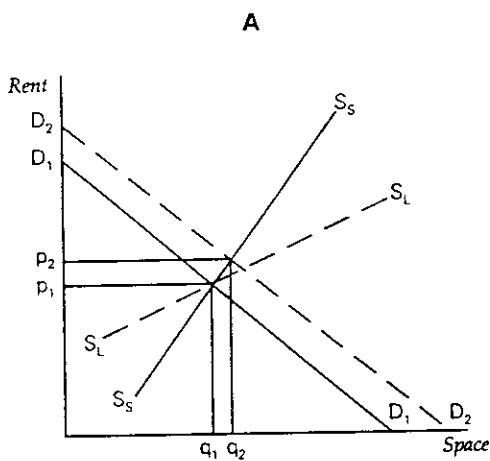
Do market participants really react to short-term marginal rents? A widely accepted method for determining the value of a commercial

²⁵ In a world of perfect foresight, the owners could borrow more to tide them over, but that does not seem to be the world of commercial real estate. Also, banks that provide construction financing, based on assurances that an insurance company or pension fund will provide the permanent financing, may find that the permanent loans fail to materialize when the economy sours, leaving them stuck with the project.

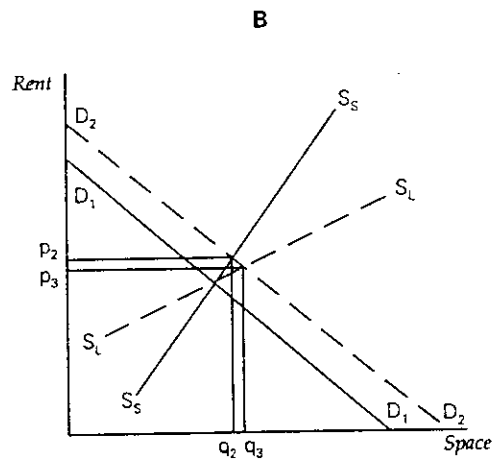
²⁶ It should be recognized that the situations in rising and declining markets are not symmetric. Because buildings do not disappear, supply cannot be contracted as readily in the long run as it can be expanded. Additionally, average rent levels will follow marginal rents down faster than they follow them up, as existing tenants will try to renegotiate their leases.

Figure 4

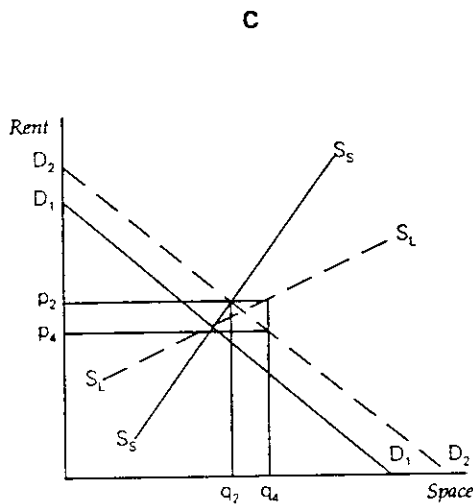
The Hog Cycle: Overbuilding Caused by an Inelastic Short-Run Supply Curve and an Elastic Long-Run Supply Curve



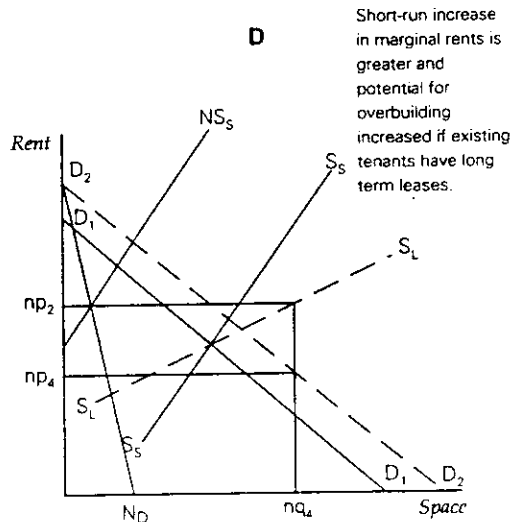
1. Prosperity causes demand curve to shift from D_1, D_1 to D_2, D_2 .
2. Short-run supply curve (S_s) is relatively inelastic. Rents rise to p_2 ; supply increases to q_2 .



3. Long-run supply is more responsive (S_L) as new space can be built. An increase in supply to q_3 will result in an equilibrium rent of p_3 .



4. But suppliers assume that p_2 is the long-term rent level and build out to q_4 .
5. Demand will not absorb q_4 at a rent of p_2 . With q_4 supplied, rent falls to p_4 .



Short-run increase in marginal rents is greater and potential for overbuilding increased if existing tenants have long term leases.

- a. In the short run, existing tenants (with space q_1) have multi-year leases with rents fixed at p_1 . Thus, q_1 is not available to new tenants
- b. Rent level for new tenants is determined by new tenants' demand curve (N_D) and the short-run supply minus the space occupied by existing tenants (NS_S). The rent level for new tenants is np_2 - above p_2 .
- c. If suppliers assume that np_2 represents the equilibrium rent level, they will supply nq_4 .
- d. With space of nq_4 supplied, demand will support a rent of only np_4 .

property is the "income approach," which is based on a forecast of future rents and vacancy rates. Commonly, appraisers use current leases (corrected for tenant improvements and free rental periods) to estimate the current "level" of rents and then project these into the future based on recent "trends." During periods of rising rents, marginal rents are above average rents and projecting a continuation of past upward trends will, if anything, exacerbate the tendency towards overbuilding depicted in Figure 4. In a period of declining rents, marginal rents are below average rents and an appraisal based on marginal rents may be overly pessimistic; when tenants renew their leases, the more favorable terms will encourage expansion and moderate the decline in rents.²⁷

An examination of a number of "private placement memoranda" (the legal equivalent of a prospectus for a public offering) for office developments between 1984 and 1986 shows that marginal rents and optimistic assumptions about rates of increase were used in appraisal reports to attract investors and to support debt financing. The public sector also uses marginal rents and assumptions about growth rates to influence investor and developer behavior. For example, an analysis of the Boston market made by the Boston Redevelopment Authority in 1986 predicted that "By 1990 asking rents may be in the \$37-46 range, 17 percent to 47 percent above the \$31 level seen in 1986" (BRA 1986 p. 41).

Lender attitudes towards real estate loans also contribute to overshooting by prolonging the construction buildup or contraction. Other things equal, construction levels tend to be higher if lenders' past experience with real estate loans was positive. This suggests that following a period in which conditions favored new construction and lenders achieved good results, lenders may remain receptive to real estate lending even if the underlying economic conditions and investment incentives have changed. Similarly, unfortunate experiences with past real estate loans cause lenders to shy away from lending even though current conditions might justify increased construction.

Yet a further complication arises from the fact that the finance and insurance industries that supply much of the real estate financing and generate substantial revenues from this lending are also major tenants of office buildings. Their rapid expansion creates a demand for office space, but their growth depends, in part, on revenues from construction and real estate lending. Thus, the construction boom fueled the growth

²⁷ Hendershott and Kane (1992b) present evidence that in the early stages of decline, appraisals tend to be based on average rents, not marginal rents. Thus, during a "turn" in the cycle, the data used in decision-making may lag actual market conditions. Once a downturn is well established, however, assumptions about longer-run average rents that are based on current marginal rents may be overly pessimistic.

of these industries and was, in turn, fueled by their growth (Browne 1992). In similar fashion, the real estate bust has fed back to these same sectors and their difficulties have, in turn, reduced the demand for office space.

Extent and Incidence of the Problem

With rising vacancies and falling rents in many parts of the country, building values deteriorated and cash flows were insufficient to carry contract debt service. Because many buildings were owned by limited partners, whose obligations ended once their equity was lost, and by general partners, whose personal guarantees were backed by real estate, buildings frequently ended up in default to banks and, more recently, to insurance companies and pension funds.²⁸

Although high leverage was an important part of the problem, deals with low leverage and high initial equity went sour as well. As a recent example, a major pension fund held a second mortgage position of approximately \$70 million in a building that had been appraised at over \$200 million dollars three years earlier. The building also carried a \$90 million first mortgage. In the summer of 1992, the fund was notified that the second mortgage had no value at all, since the current value of the building had fallen below \$90 million. How could a building lose more than 60 percent of its value in such a short period?

The answer can be seen in Table 7. Since the Tax Reform Act of 1986, building values can be approximated using a simple cash flow approach. The starting point is gross rent per square foot; gross rent takes into account all tenant improvements paid for by the landlord, any free rent offered to the tenant, as well as the likely pattern of lease renegotiations and/or rollovers. Gross rent is then adjusted for the expected vacancy rate to obtain effective gross rent.²⁹ Net effective rent is obtained by subtracting taxes and operating costs.

The building's value can be approximated by dividing net effective rent by the appropriate "cap rate" and multiplying by the number of

²⁸ Lenders frequently did not require general partners to provide personal guarantees. Projects are often structured so that the general partners' obligations are compartmentalized.

²⁹ Calculating effective gross rent can be a daunting task in a falling market. An examination of actual office leases in Boston over the past two years reveals an infinite variety of devices that lower effective rents without lowering face rents. One recent negotiation led to a ten-year lease on 70,000 square feet of class A office space. The face rent on the lease was \$35 per foot per year, rising to \$42 after five years. However, the first two years and five months are free (the five months was added as a \$1,000,000 "signing bonus" to the tenant). The landlord also agreed to finance improvements costing \$40 per square foot. Over the ten-year period, these concessions reduce effective gross rent to a flat

Table 7
Sensitivity of Real Estate Values to Rent Levels, Vacancy Rates, and Cap Rates

| Item | (1) Starting values | (2) 14 percent decrease in gross rent | (3) Further decrease in gross rent | (4) Vacancy rate of 10 percent | (5) Increase in cap rate |
|--|---------------------------|--|---|---|--------------------------------|
| Gross Rent (per square foot) | \$ 35 | \$ 30 | \$ 20 | \$ 20 | \$ 20 |
| Vacancy Rate | 0 | 0 | 0 | 10% | 10% |
| Effective Gross Rent | \$ 35 | \$ 30 | \$ 20 | \$ 18 | \$ 18 |
| – Taxes | 5 | 5 | 5 | 5 | 5 |
| – Operating Expenses | 5 | 5 | 5 | 5 | 5 |
| Net Effective Rent | \$ 25 | \$ 20 | \$ 10 | \$ 8 | \$ 8 |
| “Cap” Rate | 9% | 9% | 9% | 9% | 12% |
| Present discounted value of 100,000 square feet | \$ 27.8m | \$ 22.2m | \$ 11.1m | \$ 8.9m | \$ 6.7m |
| Loss from (1) | | –20.1% | –60.1% | –68.0% | –75.9% |

Source: Authors' calculations.

square feet in the building. The cap rate is essentially the rate of return that a buyer would require to justify purchasing the building. Cap rates move positively with interest rates and other rates of return and also with the perceived risk in real estate.

Column (1) in Table 7 shows these calculations for an office building renting for \$35 per foot with a zero vacancy rate. Subtracting taxes and operating costs of \$10 per square foot leaves a net effective rent of \$25. A cap rate of 9 percent produces a value of \$27.8 million for each 100,000 square feet.

Column (2) shows the result of a 14 percent decrease in gross rent, from \$35 to \$30. Value falls by more than 14 percent because value depends on *net* rents; and since taxes and operating costs have not changed, the net rent and building value have fallen by 20 percent. This same point is illustrated in column (3). Now gross rents have fallen by just over 40 percent, but building value drops by 60 percent from the original value.

Recent rent declines have been accompanied by increases in vacancy rates. Column (4) assumes a 10 percent vacancy rate, which is equivalent to a 10 percent (\$2) drop in gross rent. This reduces building value by 20 percent because, with no change in taxes and operating costs, net rent falls by 20 percent. Finally, column (5) shows the impact of a modest rise in the cap rate that might occur in a period of rising vacancies and falling rent. Putting all this together, a value of \$27.8 million is reduced to \$6.7 million, a drop of more than 75 percent. Many buildings in the United States have experienced decreases of this magnitude in the past few years.

Table 8
Estimated Value of the Office Stock in the Boston Metropolitan Area,
1987 and 1992

| Item | Downtown | | Suburban | | Total | |
|-----------------------------------|----------|---------|----------|---------|---------|--------|
| | 1987 | 1992 | 1987 | 1992 | 1987 | 1992 |
| Gross Rent ^a | \$35.00 | \$23.00 | \$24.00 | \$15.00 | | |
| Vacancy Rate ^b | 9% | 20% | 18% | 22% | | |
| Effective Gross Rent | \$31.85 | \$18.40 | \$19.68 | \$11.70 | | |
| – Taxes ^c | 5.00 | 5.00 | 3.50 | 4.00 | | |
| – Operating Expenses ^c | 5.00 | 5.00 | 3.50 | 4.00 | | |
| Net Effective Rent | \$21.85 | \$8.40 | \$12.68 | \$3.70 | | |
| “Cap” Rate ^d | 9% | 11% | 9% | 11% | | |
| Value/Square Foot | \$243.00 | \$76.00 | \$141.00 | \$34.00 | | |
| Total Square Feet ^e | 50m | 50m | 60m | 60m | | |
| Total Value | \$12.1b | \$3.8b | \$8.5b | \$2.0b | \$20.6b | \$5.8b |

^a 1987 figure based on *National Real Estate Index* and verified by interviews with Boston property owners and operators. 1992 figure based on analysis of 20 leases signed during 1991 and 1992. Gross rent is the current average marginal rent charged per square foot, adjusted for free rent and tenant improvements.

^b Coldwell Banker Commercial/Torto Wheaton Research, Office Vacancy Index.

^c Based on a review of 50 leases signed between 1987 and 1991 as well as interviews with property owners and managers.

^d *National Real Estate Index* as well as interviews with real estate portfolio managers.

^e Figures are approximate based on annual market reports from Whittier Partners, Spaulding and Slye, Grubb and Ellis, and Hunneman. Between 1987 and 1992, approximately 10 million square feet of space was added to the metropolitan area stock. To show the change in value of the stock, however, reported total square feet is the 1987 figure in both years.

Building valuations should not simply reflect today's rents, but the stream of net rents expected over the building's life. Most property was not recorded on balance sheets at peak rents and values and many would argue that calculations based on 1992's depressed rents understate true valuations. Nevertheless, even those who think that values based on today's rents are too low base decisions on these values. It is one thing to think a value is too low; it is another to risk money that the true value is higher.

Table 8 shows the decline in value that seems to have occurred in the Boston office market when values are based on current rental agreements. The downtown market in Boston contains approximately 50 million square feet of office space. At the peak of the cycle, leases were being closed at an average of \$35 per square foot per year. An examination of recent lease negotiations revealed a very high variance but suggested a figure of \$23 for 1992.³⁰ Operating costs and taxes have

³⁰ Effective gross rents in many cases are well below \$20. Although marginal effective rents are probably below \$20, many buildings still have leases in effect at the old, higher rates.

Table 9
Estimated Value of the Office Stock in the United States, 1987 and 1992

| Item | 1987 | 1992 |
|-----------------------------------|-------------------|-------------------|
| Gross Rent ^a | \$ 22.00 | \$17.00 |
| Vacancy Rate ^b | 15% | 19% |
| Effective Gross Rent | \$ 18.70 | \$13.77 |
| – Taxes ^c | 4.00 | 4.50 |
| – Operating Expenses ^c | 4.00 | 4.50 |
| Net Effective Rent | \$ 10.70 | \$ 4.77 |
| Cap Rate ^d | 9% | 11% |
| Value/Square Foot | \$119.00 | \$43.00 |
| Total Square Feet ^e | 5–6 billion | 5–6 billion |
| Total Value | \$594–713 billion | \$217–260 billion |

^aGross marginal rents based on the *National Real Estate Index* for 1987 and interviews with real estate portfolio managers for 1992.

^bColdwell Banker Commercial/Torto Wheaton Research, Office Vacancy Index.

^cBased on interviews with property managers and real estate portfolio investors.

^d*National Real Estate Index* and interviews with real estate portfolio investors.

^eRough approximation based on several sources including National Association of Industrial and Office Parks, and Laing (1992). The figures were assumed to be the same in both years, in order to capture the rough change in the value of the existing stock.

stayed at about \$10 per square foot since 1987. Finally, while interest rates have fallen, the perceived risk of commercial real estate has risen. Knowledgeable investors suggested that the cap rate had increased from 9 percent in 1987 to 11 or 12 percent. The table also presents calculations for the 60 million square foot suburban market. The conclusion: since 1987, the value of the Boston metropolitan area office stock, downtown and suburban, appears to have fallen more than 70 percent, from over \$20 billion to less than \$6 billion.³¹ Again, it must be emphasized that, while values are commonly calculated in this manner, assuming current rents in perpetuity is very pessimistic.

Table 9 makes a similar approximation for the United States as a whole. The U.S. office market contains between 5 billion and 6 billion square feet of space. At the peak of the market, that space was probably worth between \$600 and \$700 billion. In aggregate, it has lost between \$350 and \$450 billion of that value.

³¹ It is interesting to note that the average owner-occupied housing unit has lost about 20 percent of its value since 1987. The value of the 700,000 owner-occupied units in the Boston metropolitan area was approximately \$130 billion at the peak of the cycle. A decline of 20 percent means a drop of about \$26 billion in household net worth in the Boston area. This is about twice the size of the decline in the value of the office stock. If retail, industrial, and R&D space were added, the decline in the value of nonresidential property is likely of the same order of magnitude and the total decline in real estate values is probably closer to \$50 billion.

To put these figures in perspective, a decline of \$300 billion is roughly equivalent to a drop in the aggregate value of the U.S. stock market of about 7 percent. Of course, these calculations do not include declines in the value of retail or industrial space. Retail space represents another 4 billion to 5 billion square feet. Moreover, the distribution of real estate losses differs from that of a drop in the stock market. While some buildings back mortgages held by pension funds and insurance companies, many were standing behind the portfolio investments of banks operating on thin capital requirements. Thus, the impact of the decline in commercial real estate values on the banking industry has been much greater than that of a similar decline in the value of the stock market.

Summary and Conclusions

The United States is suffering the aftermath of a boom in commercial construction. The upswing in office construction was particularly pronounced, with the real value of office construction more than tripling between the late 1970s and the mid 1980s. So much building was too much. By 1985, the national downtown office vacancy rate had surpassed 15 percent; and by the end of the decade it was close to 20 percent, and rents and property values were falling.

A number of factors contributed to the boom. Commercial construction levels in the late 1970s were low, while those industries that occupy commercial space, especially office space, grew strongly. As a consequence, office vacancy rates were low at the end of the 1970s and rents were moving up rapidly. A recovery in office construction was already under way when the Economic Recovery Tax Act of 1981 created additional investment incentives. ERTA both encouraged corporate investment and created substantial tax shelter opportunities for individuals investing in commercial real estate.

Further reinforcing these trends was lender enthusiasm for real estate loans. Lenders' experience with real estate loans in the second half of the 1970s was favorable, as real estate values rose rapidly. Nor were lenders alone in thinking that real estate was an attractive investment; a number of scholarly articles appeared in the late 1970s and early 1980s showing how real estate had outperformed alternative investments.

But while the boom had multiple origins, it was not pure chance that these forces came together. Commercial construction, especially office construction, appears inherently vulnerable to overshooting. Time lags and key determinants tend to reinforce one another. Even the 1981 tax incentives were magnified by other developments. In particular, expectations of rising property values and the prospect of capital gains made the returns to investors in real estate syndicates all the more attractive.

Because the supply of office space is relatively fixed in the short run

and because rental agreements extend over several years, an unexpectedly tight market can send rent levels for new tenants and renewals skyrocketing. If developers and lenders assume that these rents represent the new market equilibrium, too much building will occur—with the result that rents will be driven lower and vacancy rates pushed higher than would otherwise be the case.

Before that happens, however, the overbuilding may feed on itself. Real estate valuations that are based on short-term rents and vacancy rates will soar. Lenders will experience very good results with real estate loans: with rising valuations, plenty of eager buyers and lenders will rescue any property in difficulty. Good results with real estate loans will make lenders more willing to lend in the future. In addition, good earnings will encourage lenders' own expansion, increasing the demand for office space.

At some point, the boom comes to an end. An unexpected disruption to the demand for space, such as occurred in the Southwest following the decline in oil prices or in New York City after the stock market crash, may be the precipitating factor. Or the increase in construction may simply push up vacancy rates and rent levels begin to soften, as happened in much of the country in the latter part of the 1980s. But once the boom starts to unwind, it does so with surprising speed. Rents fall, values fall even more, lenders suffer losses and become increasingly cautious. As potential buyers are unable to obtain financing, property values fall even more. And lender-tenants' efforts to bolster earnings by cutting costs further increase the surplus office space.

While office construction seems inherently cyclical, the fallout of the 1980s construction boom was particularly severe for the banking industry, for several reasons. First, banks moved very aggressively into commercial mortgages. Second, borrowers in the 1980s were frequently partnerships and individuals whose assets were either protected from the banks' reach or concentrated in real estate, the value of which collapsed in the bust. Third, commercial real estate values are extraordinarily sensitive to the assumptions made about vacancy rates and rent levels. The difference between the assumptions made in rising and in declining markets can easily wipe out the owners' equity and drop property values below loan amounts.

It is also clear that the recent real estate cycle has created conditions that are a drag on the macroeconomy. Because of overbuilding, commercial construction cannot itself contribute to the recovery. In addition, commercial real estate losses and the resulting poor condition of bank balance sheets appear to have made banks more cautious and pushed them more towards holding government securities and away from making loans.³²

³² This shift also reflects "spreads" between short and long rates that make long Treasuries look very attractive. However, without the weakened balance sheets from bad

Looking forward, it seems probable that commercial construction will remain in the doldrums for some years. Space is now abundant and even when market conditions improve, lenders will initially be reluctant to finance new projects. Eventually, however, as the economy expands, vacancy rates will fall and rent levels will move up. Property values will start to rise. The stage will be set for another swing of the pendulum. Will those making the building and lending decisions in that future time remember the experience of the 1980s?

Appendix A: The Effects of Tax Changes on the Attractiveness of Real Estate Investments for High-Income Individuals

The essence of a real estate tax shelter is the use of depreciation deductions to create paper losses during the time a building is owned. When the building is sold, a tax must be paid on the difference between the selling price and the depreciated book value, but until 1986, 60 percent of such gains were excluded from the tax base as long as the holding period was more than six months. In essence, as long as real estate held its value or appreciated, the tax rules provided individual owners an opportunity to convert ordinary income into capital gains and to defer paying taxes.

The pre-1981 tax code provided significant benefits to investing in real estate. The most important features of the pre-1981 code were the very high marginal tax rate of 70 percent and the preferential treatment of capital gains. The depreciation period was 41 years, but properties could be depreciated using a 150 percent declining balance method. An investment of \$1000 made in year 0 and sold in year 7 for \$1000 generated tax benefits of \$75.20. If we allow for "churning" by assuming that the \$1000 asset is sold for \$1000 in years 7, 14 and 21, the benefits jump to \$138.80.

The 1981 Act reduced the top marginal rate from 70 percent to 50 percent but reduced the depreciation period for buildings from 41 years to 15 years. Buildings could be depreciated using the 175 percent declining balance method; if accelerated methods were chosen, subsequent capital gains were "recaptured" as ordinary income. If, however, straight line depreciation were used, later capital gains were subject to the 60 percent exclusion. Appendix Table A-1 shows that for a holding period of 7 years, straight line methods with no recapture generated almost twice the benefits of accelerated methods.

For this paper, a number of private and public syndicated limited partnerships were examined. All of them opted for straight line depreciation. The straight line method is preferable only if the plan is to resell after a few years; any partnership that intended to hold a building over an extended period of time would choose accelerated methods. Hines (1987) cited the fact that the vast majority of limited partnerships chose straight line depreciation methods as strong evidence of the intent to "churn."

While the lower marginal tax rate after 1981 reduced the tax saving from each dollar of deduction, the shorter life dramatically increased the size of the deductions. As a result, the present value of depreciation deductions on a \$1000 asset using a 9 percent discount rate and 7 years to sale increased over 40 percent, from \$75.20 to \$105.80. If the building were resold in years 14 and 21, the value jumped to \$195.30. In 1984, real estate was reclassified as 18-year property, and in 1985 its life was further increased to 19 years. The 1984 changes reduced the present value of tax benefits by about 17 percent.

Then came the Tax Reform Act of 1986; TRA86 extended the depreciation period to 31.5 years, cut the top marginal rate for individuals to 33 percent, and eliminated preferential treatment of capital gains. This combination wiped out essentially the entire tax incentive to own commercial real estate.

real estate, financial institutions would probably be playing a more active role in stimulating a recovery.

Appendix Table A-1

Tax Shelter Provisions: Value of Tax Deferral and Conversion of Ordinary Income into Capital Gains for Real Property (Per \$1000 in Building Value)
Property is sold in year 7 for its original value

Pre-ERTA (150% Declining Balance; 41-Year Life)

| Year | Depreciation | Marginal Tax Rate | Tax Saving | Present Discounted Value (9%) |
|---------------|--------------------------------|-------------------|------------|-------------------------------|
| 1 | \$ 36.58 | .70 | \$ 25.62 | \$ 23.50 |
| 2 | 35.24 | .70 | 24.67 | 20.76 |
| 3 | 33.95 | .70 | 23.77 | 18.35 |
| 4 | 32.71 | .70 | 22.90 | 16.22 |
| 5 | 31.51 | .70 | 22.06 | 14.34 |
| 6 | 30.36 | .70 | 21.25 | 12.68 |
| 7 | Capital Gains Tax ^a | | (56.10) | (30.69) |
| Total Benefit | | | | \$ 75.17 |

^a Accumulated depreciation $(\$200.35) \times (1 - .6) \times .7 = \56.10

1982-1984 (Accelerated 175% Declining Balance/Full Recapture; 15-Year Life)

| Year | Depreciation | Marginal Tax Rate | Tax Saving | Present Discounted Value (9%) |
|---------------|--------------------------------|-------------------|------------|-------------------------------|
| 1 | \$120.00 | .50 | \$ 60.00 | \$ 55.05 |
| 2 | 100.00 | .50 | 50.00 | 42.08 |
| 3 | 90.00 | .50 | 45.00 | 34.75 |
| 4 | 80.00 | .50 | 40.00 | 28.34 |
| 5 | 70.00 | .50 | 35.00 | 22.75 |
| 6 | 60.00 | .50 | 30.00 | 17.89 |
| 7 | Capital Gains Tax ^b | | (260.00) | (142.23) |
| Total Benefit | | | | \$ 58.62 |

^b Accumulated depreciation $(\$520.00) \times .5 = \260.00

1982-1984 (Straight Line/No Recapture; 15-Year Life)

| Year | Depreciation | Marginal Tax Rate | Tax Saving | Present Discounted Value (9%) |
|---------------|--------------------------------|-------------------|------------|-------------------------------|
| 1 | \$ 66.67 | .50 | \$ 33.33 | \$ 30.58 |
| 2 | 66.67 | .50 | 33.33 | 28.06 |
| 3 | 66.67 | .50 | 33.33 | 25.74 |
| 4 | 66.67 | .50 | 33.33 | 23.61 |
| 5 | 66.67 | .50 | 33.33 | 21.66 |
| 6 | 66.67 | .50 | 33.33 | 19.88 |
| 7 | Capital Gains Tax ^c | | (80.00) | (43.76) |
| Total Benefit | | | | \$ 105.77 |

^c Accumulated depreciation $(\$400.00) \times (1 - .6) \times .5 = \80.00

Appendix Table A-1 *continued*

Tax Shelter Provisions: Value of Tax Deferral and Conversion of Ordinary Income into Capital Gains for Real Property (Per \$1000 in Building Value) Property is sold in year 7 for its original value

1985–1986 (Straight Line/No Recapture; 18-Year Life)

| Year | Depreciation | Marginal Tax Rate | Tax Saving | Present Discounted Value (9%) |
|---------------|--------------------------------|-------------------|------------|-------------------------------|
| 1 | \$ 55.56 | .50 | \$ 27.78 | \$ 25.48 |
| 2 | 55.56 | .50 | 27.78 | 23.38 |
| 3 | 55.56 | .50 | 27.78 | 21.45 |
| 4 | 55.56 | .50 | 27.78 | 19.68 |
| 5 | 55.56 | .50 | 27.78 | 18.05 |
| 6 | 55.56 | .50 | 27.78 | 16.56 |
| 7 | Capital Gains Tax ^d | | (66.67) | (36.47) |
| Total Benefit | | | | \$ 88.14 |

^d Accumulated depreciation (\$333.33) × (1 - .6) × .5 = \$66.67

Post-1986 (Straight Line; 31.5-Year Life)

| Year | Depreciation | Marginal Tax Rate | Tax Saving | Present Discounted Value (9%) |
|---------------|--------------------------------|-------------------|------------|-------------------------------|
| 1 | \$ 31.75 | .33 | \$ 10.48 | \$ 9.61 |
| 2 | 31.75 | .33 | 10.48 | 8.82 |
| 3 | 31.75 | .33 | 10.48 | 8.09 |
| 4 | 31.75 | .33 | 10.48 | 7.42 |
| 5 | 31.75 | .33 | 10.48 | 6.81 |
| 6 | 31.75 | .33 | 10.48 | 6.25 |
| 7 | Capital Gains Tax ^e | | (62.85) | (34.38) |
| Total Benefit | | | | \$ 12.63 |

^e Accumulated depreciation (\$190.50) × .33 = \$62.85

Appendix B: Definitions of Variables and Sources of Regression Variables

All variables refer to the nine census regions except where noted. Census regions:

New England (NE): CT, ME, MA, NH, RI, VT.
 Mid Atlantic (MA): NY, NJ, PA.
 East North Central (ENC): IL, IN, MI, OH, WI.
 West North Central (WNC): IA, KS, MN, MO, ND, NE, SD.
 South Atlantic (SAT): DC, DE, FL, GA, MD, NC, SC, VA, WV.
 East South Central (ESC): AL, KY, MS, TN.
 West South Central (WSC): AR, LA, OK, TX.
 Mountain (MT): AZ, CO, ID, MT, NM, NV, UT, WY.
 Pacific (PAC): AK, CA, HI, OR, WA.

Dependent Variables

Value of construction put in place per capita: Separate regressions were run for office construction and other commercial construction. Regional current dollar values were converted to constant dollars by dividing by the national deflator (calculated by dividing U.S. current dollar construction put in place by U.S. constant dollar construction).

Source: U.S. Bureau of the Census, *Current Construction Reports—Value of New Construction Put in Place*.

Explanatory Variables

Explanatory variables were lagged two years in the regressions reported in Table 6.

Population Growth: Percent change in population.

Source: U.S. Bureau of Economic Analysis (BEA), *Total Personal Income by Major Source and Earnings by Industry*, computer tape.

Employment Growth in Tenant Industries Relative to Population: Office—Office tenant industries were defined as including Banking and Credit Agencies, Securities and Commodities Brokers and Services, Insurance Carriers, Business Services, Legal Services, Engineering and Management Services, and Miscellaneous Services. The change in employment from year $t-3$ to year t was divided by the population in year t .

Other Commercial—Other commercial tenant industries were defined as including Wholesale Trade, Retail Trade, and Services, and excluding Hotels and Other Lodging Places, Private Households, Educational Services, and one-half of Health Services. The change in employment from year $t-3$ to year t was divided by the population in year t .

Source: U.S. Bureau of Economic Analysis, *Total Full-Time and Part-Time Employment by Industry*, computer tape.

Change in Unemployment Rate:

Source: U.S. Bureau of Labor Statistics, *Geographic Profile of Employment and Unemployment*, various issues. Data for 1978–1981 were obtained from unpublished tabulations supplied by the BLS.

Per Capita Income: Per capita income was deflated by the U.S. Consumer Price Index.

Source: Income and population figures from BEA. CPI from *Economic Report of the President*, February 1992.

Past Construction Relative to Population: Cumulative constant dollar construction in years t , $t-1$, and $t-2$ was divided by population in year t . (As for all explanatory variables, this was lagged two years.) Past office construction was used in the office equations and other commercial in those equations.

Source: as described above for dependent variables.

Construction Wage Relative to Overall Wage and Construction Wage Relative to U.S. Construction Wage: The regional construction wage was calculated by dividing regional construction earnings by regional construction employment and the overall wage by dividing total regional earnings by total regional employment. The U.S. construction wage was calculated by dividing U.S. construction earnings by U.S. construction employment.

Source: BEA.

Property Taxes per Capita: State and local property tax revenues per capita were deflated by the U.S. CPI.

Source: U.S. Bureau of the Census, *State Government Finances and Governmental Finances*, obtained through DRI/McGraw-Hill.

Bank Deposits per Capita: Commercial banks' total deposits per capita were deflated by the U.S. CPI.

Source: Federal Deposit Insurance Corporation; call report data, obtained from Board of Governors of the Federal Reserve System.

Bank OREO Relative to Real Estate Loans: Calculated as other real estate owned divided by loans secured by real estate.

Source: Federal Deposit Insurance Corporation, call report data, obtained from Board of Governors of the Federal Reserve System.

Percent Changes in Housing Prices: State figures on prices of homes purchased with conventional mortgages were weighted according to the 1980 stock of owner-occupied homes to create regional home price figures.

Source: Federal Housing Finance Board, *Rates and Terms on Conventional Mortgages 1991*, and U.S. Bureau of the Census, *1980 Census of Housing*.

The following variables were the same for all regions:

Prime Rate: Prime rate charged by banks.

Source: *Economic Report of the President*, February 1992.

Dummy for 1982–1986 tax regime: This variable had a value of 1 for the years 1982 through 1986 and zero for all other years.

Dummy for 1987–1990 tax regime: This variable had a value of 1 for the years 1987 through 1990 and zero for all other years.

Tax on Corporate Investment: Tax component of cost of capital estimates developed by Henderson and Liebman (1992). The tax effects included both changes in corporate tax rates and changes in the value of depreciation deductions. The authors made separate estimates for investments by different industries in different assets. The figures for services investment in commercial structures were used in the regression.

Effect of tax incentives on individual investors: The "no churning" estimates from Table 3 of the text were used.

National Downtown Office Vacancy Rate:

Source: CB Commercial/Torto Wheaton Research, private communication.

| dependent Variables | Office Buildings—Lagged 3 Years | | | Other Commercial—Lagged 1 Year | | |
|---|---------------------------------|----------------------|---------------------------------|--------------------------------|----------------------|---------------------------------|
| | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive |
| constant | 95.6 (1.4) | 544.1* (4.3) | 58.1 (.8) | -18.1 (-.7) | 118.6* (2.2) | -.04 (-.002) |
| population growth | 34.9* (5.3) | 25.5* (4.1) | 24.7* (3.8) | 8.1* (2.7) | 6.3* (2.0) | 4.1 (1.4) |
| employment growth in tenant industries relative to population | 1627.3 (.8) | 5325.9* (2.7) | 4765.8* (2.4) | 1263.4* (3.2) | 1612.8* (3.9) | 1838.3* (4.7) |
| change in unemployment rate | -3.6 (-1.5) | -1.2 (-.5) | -3.1 (-1.2) | -7.4* (-5.5) | -6.6* (-4.3) | -7.2* (-5.2) |
| fast construction relative to population | -.04 (-.8) | -.02 (-.4) | .007 (.1) | .2* (8.7) | .2* (7.5) | .2* (9.1) |
| construction wage relative to overall wage | -131.5* (-2.2) | -121.7* (-2.0) | -160.5* (-2.5) | 33.6 (1.2) | 20.9 (.8) | -20.6 (-.8) |
| construction wage, relative to U.S. construction wage | 82.8 (1.5) | 86.0 (1.6) | 110.2 (1.9) | 6.5 (.2) | 35.6 (1.3) | 47.3 (1.9) |
| property taxes per capita (1987 \$) | 113.8* (3.3) | 70.7* (2.1) | 66.4 (1.9) | -21.0 (-1.2) | -44.8* (-2.5) | -37.7* (-2.3) |
| bank deposits per capita (1987 \$) | .005 (1.8) | .004 (1.4) | .003 (1.1) | .00005 (.04) | -.0007 (-.5) | -.00007 (-.05) |
| bank OREO relative to real estate loans | -10.6* (-2.8) | -8.8* (-2.3) | -8.0* (-2.0) | -3.2* (-2.2) | -2.6 (-1.7) | -1.8 (-1.2) |

Appendix Table B-1 *continued*
 Regression Results: Alternative Lags
 Dependent variable = per capita value of construction put in place (1987 \$)

| Independent Variables | Office Buildings—Lagged 3 Years | | | Other Commercial—Lagged 1 Year | | |
|---|---------------------------------|----------------------|---------------------------------|--------------------------------|----------------------|---------------------------------|
| | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive |
| Percent change in housing prices | .2 (.3) | -.5 (-.6) | -.3 (-.4) | -.5 (-1.4) | -.7 (-1.9) | -1.0* (-2.9) |
| Prime rate ^a | 1.8 (.8) | .6 (.3) | 2.5 1.0 | -.9 (-1.8) | -1.2* (-2.1) | -1.3* (-2.6) |
| Dummy for 1982–1986 tax regime ^a | 57.3* (4.8) | | | 20.5* (4.7) | | |
| Dummy for 1987–1990 tax regime ^a | 30.2* (2.2) | | | 2.8 (.4) | | |
| Tax on corporate investments ^a | | -332.2* (-4.5) | | | -93.0* (-2.3) | |
| Effect of tax incentives on individual investors ^a | | | 4.4* (3.2) | | | 2.8* (5.1) |
| National downtown office vacancy rate ^a | -4.3* (-2.3) | -2.9 (-1.6) | -1.3 (-.7) | | | |
| R ² | .66 | .65 | .62 | .86 | .82 | .85 |

Note: Regressions are pooled time series and cross-section using data on 9 regions. Office regression ran over 13 years (1978 to 1990), other commercial over 15 years. See Appendix B for definitions of variables and sources.

^aThese variables are the same for all regions.

*Significantly different from zero at the 5% level; t-statistics are shown in parentheses.

Appendix Table B-2
 Regression Results: Alternative Tax Approaches
 Dependent variable = per capita value of construction put in place (1987 \$)

| Independent Variables (All lagged 2 years) | Office Buildings | | | Other Commercial | | |
|--|-----------------------|-------------------------|---------------------------------------|-----------------------|-------------------------|---------------------------------------|
| | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive |
| Constant | 67.8 (1.1) | 250.1* (2.1) | 29.4 (.5) | 15.4 (.5) | 382.8* (6.1) | 69.7* (2.2) |
| Population growth | 23.2* (4.1) | 13.4* (2.4) | 16.2* (2.9) | 20.3* (5.6) | 15.3* (4.0) | 12.7* (3.2) |
| Employment growth in tenant industries relative to population | 3212.0 (1.9) | 5598.9* (3.1) | 5840.3* (3.4) | 59.1 (.1) | 1117.6* (2.2) | 1140.9* (2.2) |
| Change in unemployment rate | -4.1 (-1.9) | -3.1 (-1.3) | -3.9 (-1.7) | -6.4* (-4.0) | -4.2* (-2.3) | -6.0* (-3.3) |
| Past construction relative to population | .06 (1.4) | .1* (2.4) | .09* (2.0) | .1* (4.1) | .1* (3.3) | .2* (4.5) |
| Construction wage relative to overall wage | -74.6 (-1.4) | -60.3 (-1.1) | -105.4 (-1.9) | 40.4 (1.2) | -.6 (-.02) | -70.7* (-2.1) |
| Construction wage relative to U.S. construction wage | 52.1 (1.1) | 56.9 (1.1) | 77.1 (1.6) | 18.3 (.6) | 71.2* (2.1) | 102.0* (3.1) |
| Property taxes per capita (1987 \$) | 55.8 (1.9) | 12.7 (.4) | 20.7 (.7) | -5.5 (-3) | -40.9 (-1.9) | -38.7 (-1.7) |
| Bank deposits per capita (1987 \$) | .005 (1.9) | .003 (1.2) | .004 (1.5) | -.002 (-1.4) | -.003 (-1.8) | -.003 (-1.3) |
| Bank OREO relative to real estate loans | -7.2* (-2.7) | -6.4* (-2.3) | -5.3 (-1.9) | -6.9* (-3.1) | -4.2 (-1.7) | -4.2 (-1.7) |

Appendix Table B-2 continued
 Regression Results: Alternative Tax Approaches
 Dependent variable = per capita value of construction put in place (1987 \$)

| Independent Variables (All lagged 2 years) | Office Buildings | | | Other Commercial | | |
|--|-----------------------|-------------------------|---------------------------------------|-----------------------|-------------------------|---------------------------------------|
| | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive | Tax Regime Dummies | Corporate Tax Effect | Individual Investment Incentive |
| Percent change in housing prices | -.04 (-.07) | -.6 (-.8) | -.6 (-1.0) | -.4 (-1.0) | -1.0* (-2.2) | -1.5* (-3.2) |
| Prime rate ^a | .4 (.2) | .4 (.2) | 1.6 (.8) | -2.0* (-3.3) | -2.7* (-4.2) | -2.9* (-4.2) |
| Dummy for 1982-1986 tax regime ^a | 49.2* (4.6) | | | 38.2* (7.4) | | |
| Dummy for 1987-1990 tax regime ^a | 33.6* (2.4) | | | 20.1* (2.5) | | |
| Tax on corporate investments ^a | | -145.4* (-2.1) | | | -249.5* (-5.4) | |
| Effect of tax incentives on individual investors ^a | | | 3.4* (3.5) | | | 3.8* (4.9) |
| National downtown office vacancy rate ^a | -4.6* (-2.7) | -3.0 (-1.8) | -1.5 (-.9) | | | |
| R ² | .73 | .69 | .70 | .81 | .76 | .75 |

Note: Regressions are pooled time series and cross-section using data on 9 regions over the 14 years, 1977 through 1990.

See Appendix B for definitions of variables and sources.

^aThese variables are the same for all regions.

*Significantly different from zero at the 5% level; t-statistics are shown in parentheses.

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