The Evolution of Securitization in Multifamily Mortgage Markets and Its Effect on Lending Rates

Authors

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Abstract

Loan purchase and securitization by Freddie Mac, Fannie Mae and private-label commercial mortgage-backed securities (CMBS) grew rapidly during the 1990s and accounted for more than one-half of the net growth in multifamily debt over the decade. By facilitating the integration of the multifamily mortgage market into the broader capital markets, securitization helped to create new sources of credit as some traditional portfolio investors—savings institutions and life insurers—reduced their share of loan holdings. A model of commercial mortgage rates at life insurers, expressed relative to a comparable-term Treasury yield, was estimated over a twenty-two-year period. The parameter estimates supported an option-based pricing model of rate determination; proxies for CMBS activity showed no significant effect.

A wide variety of financial markets have been characterized by the growth in securitization during the past twenty years as numerous advantages accrue from holding financial assets in securitized rather than whole loan form. Risk-based capital rules, the flexibility to tailor cash flows and risks to the preferences of specific investors, liquidity and access to new groups of investors are some of the reasons for the growth of securitization.

Securitization developed first with single-family mortgage loans but was slow in coming to multifamily and nonresidential mortgage markets. During the 1970s, Ginnie Mae guaranteed multifamily mortgage-backed securities backed by FHA-insured project loans and Fannie Mae purchased FHA-insured multifamily loans for its retained portfolio. Freddie Mac introduced the first secondary market plan for conventional multifamily loans in the early 1970s and commingled a limited volume of multifamily loans with single-family loans in its Mortgage Participation Certificates (multifamily made up no more than 5% of the dollar volume of a pool). Secondary market sales remained small and less than 1% of conventional multifamily mortgage debt had been securitized by the end of 1979.

Both Fannie Mae (in 1983) and Freddie Mac (in 1984) began to issue mortgage pass-through securities backed exclusively by multifamily loans. However, their

efforts were muted when the market softened in the late 1980s and early 1990s, resulting in credit losses. By the end of 1989, 13% of multifamily debt was held in portfolios by Freddie Mac and Fannie Mae or had been securitized, compared with 41% of single-family debt. The limited scope of those early efforts reflected the nature of the underlying multifamily loans: mortgage contracts were not standardized, the collateral rental properties were heterogeneous and the geographic concentration of properties made multifamily lending a more risky undertaking.

Multifamily loans were included in the pioneering efforts of the Resolution Trust Corporation in securitizing mortgages collateralized by income-producing properties in the early 1990s. An important change took place in the mid-1990s, as secondary market activity involving multifamily mortgages picked up sharply. The growth was spurred by Freddie Mac and Fannie Mae and by the issuance of private-label, commercial mortgage-backed securities (CMBS), which included a substantial volume of multifamily debt. By the end of 1999, 33% of multifamily debt had been securitized or was held in the retained portfolios of Freddie Mac and Fannie Mae, compared with 60% of single-family debt.

A good deal of literature exists on the effects of securitization in the single-family mortgage market. Securitization has facilitated the integration of the single-family mortgage market into the broader capital markets and thereby reduced the severity of business cycle troughs, and has led to lower mortgage rates.[1] The effect of securitization on commercial mortgage markets has received less attention. Several efforts have studied commercial mortgages as a whole. For instance, Haney, Epley and Liano (1997) examined the integration of the income-property mortgage market with the overall capital markets. They concluded that Treasury yields led commercial mortgage market yields during the 1980s, but more recently the yields moved virtually in tandem. Sa-Aadu, Shilling and Wang (2000) modeled yields for income-property mortgages as a whole and concluded that the emergence of securitization during the 1990s was a ''market-integrating force'' between commercial mortgage markets and broader capital markets. More recently, Maris and Segal (2002) studied the determinants of CMBS spreads. However, these studies did not examine multifamily mortgage markets except as an embedded component of the larger commercial mortgage market.

This article examines the determinants of multifamily mortgage rates—general market forces, risk factors specific to multifamily and securitization—with an aim of identifying whether effects relating to broader commercial mortgage markets also hold for multifamily mortgages. An overview of particular developments in multifamily markets is presented to provide an understanding of the environment in which this development took place. The article also discusses the institutional reasons for the rapid emergence of private-label securitization as well as the post-1998 slowdown in securitization. Finally, the determinants of multifamily-to-Treasury yield spreads are modeled to explore the effects of securitization on multifamily mortgage rates.

Multifamily Mortgage Markets in the 1990s

The increase in importance of securitization in multifamily mortgage markets in the 1990s was facilitated by low interest rates, strong credit demand and significant changes on the supply side of the market.

The Interest Rate Environment

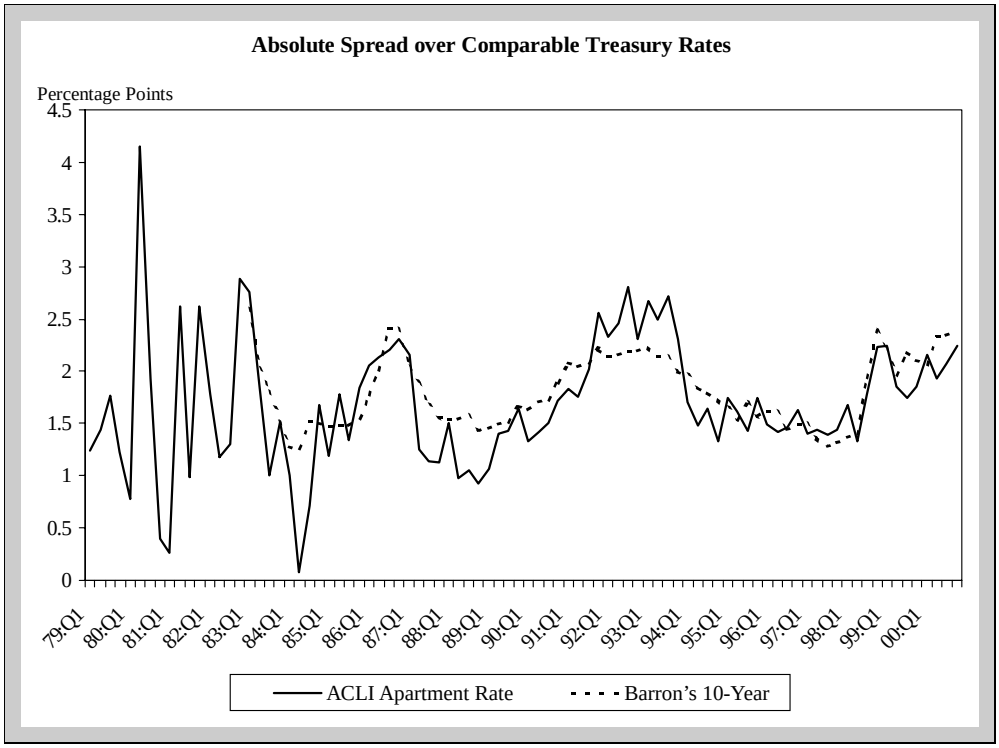
The favorable interest rate environment in the multifamily mortgage market during the 1990s was driven in large part by broader capital market trends. The general level of interest rates was quite low during much of the decade. For the decade of the 1990s as a whole, the ten-year Treasury (the underlying risk-free rate) averaged 6.5%—considerably lower than the 10.5% average of the 1980s. In addition, credit quality spreads in all financial markets declined to relatively low levels, especially during mid-decade.

Commercial mortgage markets saw similar developments. The *Barron's*/John B. Levy & Company National Mortgage Survey of mortgage rates for all types of income-producing properties (which traces interest rate quotes of the same maturity over time) indicates that between late 1997 and late 1998, rates had fallen to the 7% range for ten-year, commercial real estate loans—the lowest level since the survey began in 1983. A direct measure of multifamily mortgage rates is the data collected by the American Council of Life Insurers (ACLI) on mortgage commitments at life insurance companies. These data measure all commitments and, thus, will be affected by changes in loan terms over time. Nonetheless, this measure tells the same story; multifamily mortgage rates declined for most of the decade of the 1990s before heading back up in 1999 and 2000.

Like corporate bond markets, risk premia in both multifamily and general commercial mortgage markets showed a marked decline during the mid-1990s when securitization was emerging as a serious market force. Exhibit 1 shows the decline in spreads relative to comparable-term Treasury yields for both the ACLI multifamily mortgage rate and the *Barron's* commercial mortgage rate survey. After a sharp increase in spreads starting with the period of financial turmoil in 1998, spreads on mortgage commitments rose to levels close to, or somewhat above, 200 basis points.

Demand for Funds. Demand for multifamily mortgage credit was strong throughout most of the 1990s. One force driving that demand was the need to finance additions to the multifamily rental housing stock through new construction. During the overbuilding era of the mid-1980s, starts of multifamily rental units (5 or more) peaked in 1985 at 451,000 units. After an eight-year correction, activity bottomed out at only 99,000 units in 1993. Multifamily apartment starts have increased considerably since 1993. After jumping by 86% in 1994 to 207,000

Exhibit 1 | Multifamily and Commercial Income-Property Spreads: 1979–2000



units, solid gains were also registered during the next two years. Since 1997, new construction stabilized in the 250,000 unit range.[2]

Another source of demand for multifamily mortgage credit was a by-product of rising prices of existing multifamily rental structures. Many properties were purchased at low prices earlier in the decade, and by the mid-1990s many owners had built up considerable equity. Thus, borrowers could not only refinance mortgages in a low rate environment, but they could ''cash out'' by borrowing against the equity gains.

The Supply of Multifamily Credit. A remarkable surge of capital flowed into the multifamily mortgage market during the second half of the 1990s, allowing the growth in demand for funds to be accommodated without driving up interest rates or stretching out settlement timelines. Between year-end 1994 and year-end 2001, total multifamily mortgage debt outstanding grew by $187 billion. During the prior five-year period, multifamily debt outstanding actually fell by $21 billion. Exhibit 2 shows the annual net change in aggregate multifamily debt outstanding as well as the net change in holdings of major financial sectors.

The demand for funds was not met by traditional sources of funds, however. Portfolio lenders—primarily federally insured depositories and life insurance companies—had been major players in the multifamily mortgage market. As late as 1989, the combination of savings institutions and commercial banks held almost half of all multifamily mortgage debt outstanding in their portfolios with another 10% held by life insurance companies. A decade later this total was down to 34% for depositories and 8% for life insurers.[3] Savings institutions led the retreat: their share of the total market fell from 37% to just 15% during the decade of the 1990s. Commercial banks helped absorb some of that decline, with their share of holdings of multifamily mortgages outstanding rising to 19% at the end of 2000 from 13% a decade earlier.[4]

Also of note is the role of the federal government as a net seller of multifamily mortgages during the mid-1990s. Much of the large volume of multifamily mortgages accumulated by the RTC and the Federal Deposit Insurance Corporation during the closing of problem institutions in the late 1980s and early 1990s were sold or extinguished, contributing to a net decline in overall federal government holdings of nearly $15 billion during the 1991–1996 period.

The loss of market share by the federal government, thrifts and to some extent life insurance companies during the mid- to late 1990s was offset by the growing importance of secondary market activity. Between year-end 1995 and year-end 2001, the surge in multifamily mortgage holdings by Freddie Mac, Fannie Mae and private-label MBS represented over half of the overall net increase in multifamily mortgage lending, as shown in Exhibit 2.

Freddie Mac and Fannie Mae have increased their presence in multifamily markets significantly since the early 1990s, adding over $55 billion during the four-year period ending 2001.[5]

By far the most notable development in the multifamily mortgage market during the upswing in activity starting in the mid-1990s was the surge in private-label securitization of multifamily mortgage loans within mixed pools of commercial real estate loans.

As shown in Exhibit 2, after averaging less than $2 billion a year over 1989 to 1995, the net increase in multifamily loans that were funded through private-label conduits rose to $4 billion in 1996, to $5 billion in 1997, and during the first half of 1998 net multifamily debt packaged within CMBS reached a $16 billion annual rate. The financial turmoil during the third quarter of 1998 sharply reduced new activity by private label conduits and, for the year as a whole, CMBS issuance financed a record of $12.9 billion in net multifamily debt. The popularity of this finance vehicle has waned somewhat since its peak in the first half of 1998. Nonetheless, securitization of multifamily mortgages clearly was established as an important force in multifamily mortgage markets during the second half of the 1990s.

Exhibit 2 | Sources of Multifamily Mortgage Funds: Change in Multifamily Mortgage Debt Outstanding
(Billions of dollars)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Financial Institutions													
Commercial Banks	4.7	−2.3	−0.5	1.1	0.8	0.9	4.6	2.9	5.3	3.5	13.5	10.2	7.2
Savings Institutions	−4.7	−14.2	−11.9	−10.1	−2.4	−3.0	−2.4	−0.4	−2.0	−2.7	2.3	1.9	3.2
Life Insurance Companies	2.3	2.1	0.4	−2.1	0.3	0.3	0.9	2.0	−0.3	1.1	1.3	0.9	0.8
Federal Agencies	1.4	12.5	6.4	−4.9	−2.7	−2.0	−3.2	−1.5	0.6	1.0	2.1	2.2	2.8
Freddie Mac and Fannie Mae	5.6	2.4	0.9	0.0	0.0	0.3	4.0	3.8	2.6	9.9	11.7	11.6	22.4
Private-Label MBS	0.0	−0.1	2.3	3.4	1.8	1.4	2.1	4.0	5.0	12.9	8.5	6.5	8.1
REITs	−0.1	−0.2	−0.1	0.0	−0.3	0.2	−0.6	−0.4	0.9	0.1	−0.6	−0.2	−0.3
Others	1.2	−2.3	−1.3	0.2	−0.3	2.2	0.8	5.2	1.6	4.7	−0.2	2.0	3.0
Total	10.5	−2.1	−3.9	−12.4	−2.9	0.3	6.3	15.7	13.5	30.4	38.6	34.9	47.2

Source: Flow of Funds Accounts, Board of Governors of the Federal Reserve System; change computed yearend-to-yearend.

Whence Multifamily Securitization?

Given the success of securitization in the single-family mortgage market, could one expect a similar model would evolve in the multifamily sector? In the single-family market, Freddie Mac and Fannie Mae are able to achieve economies of scale in both the production process and in raising debt. Perhaps most important, their securities form a deep market that provides a substantial degree of liquidity. While private label securitization exists, it is only important in certain ''niche'' markets like that for ''jumbo'' loans.

Emergence of Multifamily Securitization in the mid-1990s

The difficulties faced by the multifamily and commercial mortgage market in the late 1980s and early 1990s highlighted a major weakness in that market. Not unlike the disrupting effect that disintermediation had on single-family lending in the 1960s and the 1970s, the early 1990s demonstrated that reliance on a relatively narrow set of portfolio lenders could result in disorderly market conditions when those lenders experienced difficulties. Multifamily mortgage rates were relatively high, and borrowers reportedly faced difficulties in obtaining loans.

These problems created opportune conditions for the growth in multifamily mortgage securitization, and a confluence of several economic and financial developments converted that potential into reality. First, the rapid growth in the secondary mortgage market for single-family loans during the 1980s demonstrated that securitization is an efficient method of linking mortgage markets to capital markets in general. The embryonic efforts by Freddie Mac and Fannie Mae in the 1980s and by the RTC in the early 1990s also showed the feasibility of the concept. Second, the cyclical recovery in commercial real estate markets—with an especially healthy economic environment in the multifamily sector—reinforced general market acceptance of income-property loans and, thus, encouraged innovation. Third, significant progress was made in standardization of loan contracts. Freddie Mac began using uniform mortgage instruments in electronic form in every state, and yield maintenance features that protect lenders against prepayment risk became the industry standard. Finally, the explosion in information and analytical technology made information easier and less costly to process. This is important in income-property mortgage lending, as the risks of lending depend on a fairly complex analysis of a complicated income stream.

By the mid-1990s, Freddie Mac and Fannie Mae had increased their activity both through direct securitization and by buying loans for their retained portfolios and issuing corporate debt to finance them.[6] However, it was the phenomenal growth of CMBS issuance that was most surprising.

Some market observers, however, wondered how the investors in these securities would react when the underlying real estate markets hit a bump and losses

occurred. This was a particularly relevant question for the buyers of the lowest-rated tranches of the CMBS who faced the first-loss position. By mid-1998 the spreads being paid for the considerable risks inherent in first-loss positions had come in considerably from the early CMBS issuances. This question was answered in the third quarter of 1998. While no credit event occurred in the commercial real estate markets, the market turmoil surrounding the international crises in Asia and Russia was a watershed event for the CMBS market. Not only did risk spreads widen for CMBS (as they did for most financial instruments), but new issuance fell off markedly in the CMBS market in general and for multifamily loans in CMBS issues in particular. This retreat took place in a market in which the demand for loans remained quite strong. Fortunately, credit access for multifamily borrowers remained largely intact due to the continued loan-purchase activity of Freddie Mac and Fannie Mae.

The sharp fall off in CMBS issuance is consistent with several theories. When borrowers are tied to open credit markets, they must compete directly with other investments and, thus, are subject to market volatility associated with shifting assessments of relative returns. As experience with ''Wall Street'' in the 1980s and 1990s clearly demonstrated, ''hot money'' can shift in, or out, of a particular sector quickly. This is particularly true if investors do not have a long investment history in a particular instrument or are not ''specialists'' in a sector.

Other possible influences on the abrupt turn around in private-label securitization of multifamily mortgages are specific to the sector and the instrument themselves. For instance, during the financial crisis of late 1998, many of the institutions that were putting together CMBS issues were caught with commitments to borrowers that were difficult to fulfill. Thus, loans were ''retraded.'' Thus, borrowers had the choice of paying higher interest rates than agreed upon or having their loans fall through. In an industry where ''relationship'' lending long had been a tradition, the situation likely soured many borrowers from going to conduits for the funds. Also, the supply of lenders for the high-risk tranches narrowed radically, presumably reflecting a general flight to quality in financial markets. In particular, some so-called ''B piece'' buyers just evaporated—CRIMIE MAE being the case in point. Without a buyer of the high-risk tranches, a CMBS issue will not go off.

Finally, the retreat of the CMBS market may reflect systemic weaknesses in the private-label securitization of multifamily (and other commercial mortgage loans) that were masked by the euphoria of the surge in CMBS issuance that culminated in early 1998. In particular, the appropriateness and effectiveness of the evaluation of credit risks may have provided a shaky foundation for the securitization boom. Like other income-producing properties, the credit risk on a loan to a multifamily rental property depends heavily on project-specific cash flows. The prospects for rental income—along with the depth of the borrower's pockets and non-mortgage expenses—determine the ability to meet debt service payments and form the basis for the economic value of the collateral if the mortgage were to default.

The income stream for a property will depend on national, regional and area economic trends. However, it has long been a tenet of commercial real estate

underwriting that submarket, building-specific and individual lender performance also are important determinants of future income prospects. Local, specialized portfolio lenders are in an excellent position and have strong incentives to analyze these local risks. Clearly, this position has not been a sufficient condition for good underwriting, but a case can be made that a strong base of local knowledge is a necessary condition.

The private-label securitization process relies on another model for underwriting. The originator of the loan—a mortgage banker, a depository or a Wall Street house itself—does not necessarily intend to keep the loan (or an interest in it) on a permanent basis. While many of the players have local knowledge, they can have only long-term, relational incentives to underwrite carefully. To the extent that, say, a depository originates, sells and retains mortgages, there is also an adverse selection issue regarding which loans it chooses to keep and which loans it sells for inclusion in a security pool.

Other players in the private-label securitization process—the rating agencies and the firm doing the securitization but not keeping any interest—are fee-based in their compensation. They typically are quite sophisticated and provide a multilevel review of underwriting that provides valuable quality control. However, as the role of appraisers in the commercial real estate debacle of the 1980s demonstrated, fee-based parties without direct financial interest in the outcome of the investment can render cursory reviews or produce analysis that will ''make the deal work'' in order to continue to maximize profits in the short run. Unless the private-label securitizing agent retains a financial risk in the transaction (typically through holding the lower-rated tranches), the incentives for quality underwriting are lower than for portfolio lenders or for Freddie Mac and Fannie Mae, which provide pool guarantees.

Finally, the ultimate investors in CMBS are, by definition, less familiar with the credit (and interest rate) risks than a specialized portfolio lender in commercial real estate. This removed position entails the most risk when the underlying investment is not a standardized product and has a number of moving parts, as is the case with many multifamily mortgage loans. In the securitization process, ultimate investor judgments on credit risks and the compensation they require are often derivative and done on a mass production basis (many loans at one time).

While this system is not inferior a priori and has some benefits as noted above, the potential for problems may be higher than for an institutional investor doing its own research and due diligence on an individual loan. Thus, a systemic loss of confidence in the face of market adversity would seem to be a potential problem in a world of derivative knowledge.

The Effects of Securitization on Mortgage Yields

An expansion in the supply of credit in a financial market should lower interest rates. The salutary effect of Freddie Mac and Fannie Mae's securitization activity

on single-family mortgage rates has been much discussed (see Hendershott and Shilling, 1989; and Cotterman and Pearce, 1996). The remainder of this article will explore, based on available data, what influence the recent increase in securitization has had on the cost of credit to finance multifamily properties.

The following discussion examines the effect of securitization on income-property mortgage rates by studying their spread to Treasury yields. The only source of data on multifamily mortgage rates available on a time series basis is the ACLI data on loan commitments made by life insurers. These data are far from perfect; in particular, they are not standardized for changes in terms and maturities. Moreover, the data are limited to insurance company lending—a small segment of the overall market—and are quarterly averages. Thus, as a check on the ACLI results, the model was also applied to the *Barron's*/Levy data for all income-property lending discussed above; these data do hold term constant and reflect pricing at all major institutional lenders. They, however, are only a survey of price quotes—not necessarily actual transactions.

The Basic Model

Observed spreads on multifamily loans over Treasury rates can be explained at times by idiosyncratic factors. For example, in the mid-1990s, it was often observed that multifamily mortgages were in especially strong demand because they were used to quality-enhance the pool of mixed commercial mortgages and, therefore, yields on multifamily loans were driven down. However, the basic determinants of such spreads are generally based on more fundamental factors. Research on the pricing of mortgage loans has emphasized the value of the put (*i.e.*, default) and call (prepayment) options imbedded within the interest rate (see Hendershott and Van Order, 1987; Titman and Torous, 1989; and Kau, Keenan, Muller and Epperson, 1990). This literature suggests that the spread between apartment mortgage rates and Treasury yields are to be determined by a few key factors:

- First, lenders must be compensated for *credit risk*. Treasuries are free of credit risk; income-property mortgages are backed by uncertain future income flows, marked by a long history of default problems.
- The *costs of execution* also require a higher yield for income-property mortgages than Treasuries. The additional costs associated with such mortgages include substantial origination and servicing expenses. Origination costs are incurred to underwrite the loan and cover other expenses, such as ''brick and mortar'' expenses for traditional portfolio lenders or multiple layers of fee income to the various participants in a securitization. Further, mortgage servicing costs are higher, as the properties producing the cash flows need continual monitoring and payments must be processed monthly. In contrast, Treasury bonds are risk-free and payments are semi-annual.

- Investors also require compensation for *prepayment* risks. In the case of multifamily mortgages, prepayment risk is often minimized by the contractual terms of the instrument. In the 1980s, ''lock out'' provisions were common, and in the 1990s, market practice required a ''yield maintenance'' premium to make the lender whole if a performing mortgage were to prepay. In essence, this feature substantially reduces the value of the call option, although the ability to prepay remains.
- The less the *liquidity* of the market in which a financial instrument trades, the higher the compensatory premium that one would expect to find in its yield. Multifamily and nonresidential mortgages have historically been relatively illiquid. The activities of Freddie Mac, Fannie Mae and private-label securitizations have been important factors in increasing liquidity for multifamily mortgages. CMBS are generally more liquid than a whole loan, but are still traded in a market with considerable less depth and breadth than for Freddie Mac and Fannie Mae securities. In short, the ''liquidity premium'' embedded in multifamily mortgage rates relative to Treasuries should have been reduced by the growth in securitization during the 1990s.

Determinants of Income-Property Mortgage Rate Spreads

Following Rothberg, Nothaft and Gabriel (1989), the basic model tested here expresses the multifamily mortgage spread as a function of variables measuring prepayment and credit risks as well as the level of private-label, Freddie Mac and Fannie Mae activity; a similar equation is estimated for nonresidential mortgage spreads. No other research has separately examined multifamily and nonresidential mortgage spreads to Treasury yields. For instance, Corcoran (1989) modeled the difference in returns between a portfolio of commercial mortgages and one containing only Baa-rated industrial and utility bonds, and Sa-Aadu, Shilling and Wang (2000) analyze the relationship between income-property mortgage rates and 10-year Treasuries.[7]

The rate data discussed above were used as the basis for the dependent variables. The ACLI data are available quarterly; the sample period used here begins with the first quarter of 1979. At that time the ACLI expanded its survey to include a larger number of companies, thus expanding the number of mortgage commitments included and improving the quality of the averages reported.[8] The *Barron's* data captures rates on all income-producing properties; the results in this study are reported for ten-year term mortgages.[9] These data are available from January 1983. All mortgage rate series were converted to bond-equivalent yields for the analysis.

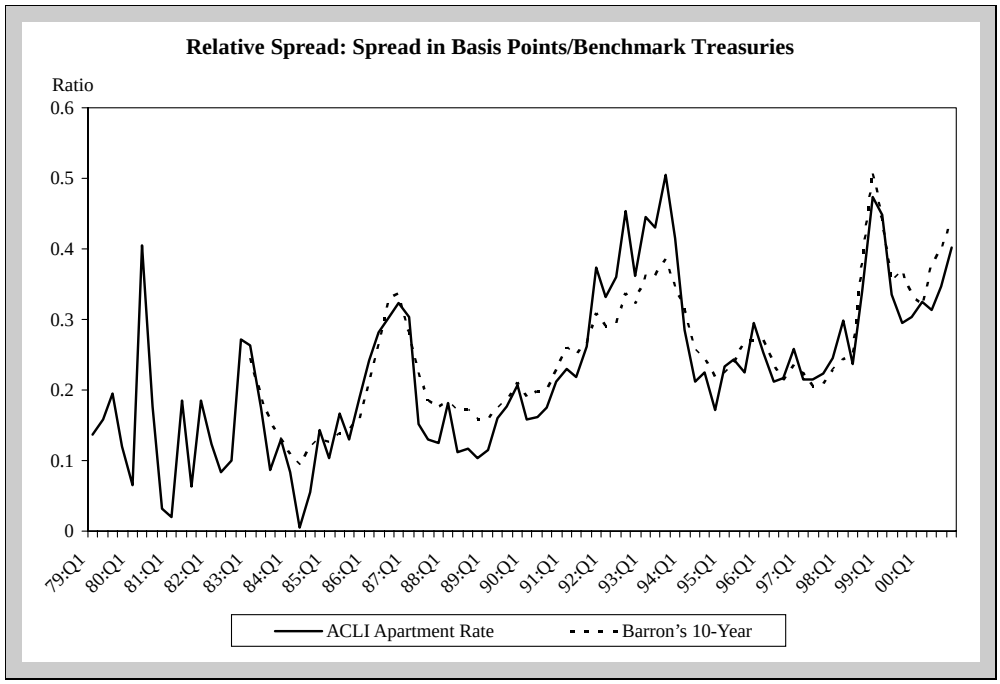
Two alternative forms of the dependent variable are modeled. One is the absolute spread, measured as the mortgage rate less the comparable-term Treasury.[10] This

measure is generally used by practitioners for lending and profitability decisions. The other is the relative spread, in which the absolute spread is taken as a ratio to the comparable-term Treasury, as in Rothberg, Nothaft and Gabriel (1989). This measure is appropriate if risk and illiquidity premia were viewed by the market as a proportional add on to current rates rather than an absolute one. The relative measure also may better control for differences in spread reflecting tax differences, as income-property mortgage rates provide income to investors that is generally subject to federal, state and local taxation. The absolute spread series are shown in Exhibit 1 and the relative spread series in Exhibit 3. The independent variables included are:

Credit Risk:

- The difference in the composite yields on corporate bonds rated A and AAA by Moody's, available from the Federal Reserve Board, was used to capture the general capital market trends in evaluating credit risk.
- Several variables were tested as a measure of risks specific to multifamily and/or commercial real estate. The most successful were variables measuring the price of the underlying collateral asset: the one-year (current quarter relative to one year ago) appreciation rate of commercial properties or of apartment buildings. Both are available from NCREIF

Exhibit 3 | Multifamily and Commercial Income-Property Spreads: 1979–2000



starting in 1979.[11] Other variables, like the vacancy rate for apartments, were tested as a measure of specific market risk, but they were not successful.

Prepayment Risk:

- Notwithstanding the fact that multifamily mortgages often had lock out or yield maintenance provisions to discourage prepayments, variables were included to test to see if prepayment premiums affected overall multifamily spreads. The primary variable in this regard was a measure of historical volatility, measured as the standard deviation of daily ten-year constant-maturity Treasury yields during the current and past three quarters, derived from yield data available from the Federal Reserve Board. Also tested, but not successful, was a dummy variable for periods when nominal rates were unusually high. Both variables were meant to capture the likelihood that significantly lower rates during the term of the mortgage could trigger early prepayment.

Mortgage Terms:

- The average loan-to-value ratio on loan commitments made by life insurance companies, as reported by the ACLI, was tried to correct for changes in the origination loan-to-value that could affect the dependent variable. Term-to-maturity was also included to capture any shifts that would affect reported rates.

Effect of Securitization:

- To measure the aggregate supply effect of securitization, a variable was constructed measuring the quarterly net change in overall multifamily mortgage debt held by Freddie Mac, Fannie Mae and private-label pools taken together. It was expressed as a ratio to the amount of multifamily mortgage debt outstanding, available from the Federal Reserve Board. The variables are entered as a one quarter ''lead'' variable, as the loans in a CMBS are typically priced, originated and warehoused months before the security issuance. A second variable was tested, measuring CMBS activity alone in the same manner.

Regime Shift Dummy Variable:

- The second half of 1998 was a watershed period in financial markets in general. The ''irrational exuberance'' with respect to credit quality spreads that investors had before that period rapidly dissipated, and overall market volatility increased. Moreover, commercial real estate markets had recovered sufficiently that the premium being paid for putting the relatively safer multifamily mortgages in mixed pools likely had abated by the late 1990s. For these reasons, a dummy variable was included taking the value of one starting in the third quarter of 1998 and a value of zero before that quarter.

Application of ordinary least squares (OLS) to model the ACLI relative and absolute multifamily-to-Treasury spread series was found to have a heteroscedastic error structure related to the number of observations used by the ACLI to compute the quarterly average data.[12] Thus, weighted least squares (WLS) model estimation was used with the square root of the number of loans surveyed by the ACLI as the weight. Furthermore, all models initially had low Durbin-Watson statistics indicating positive serial correlation of the disturbances at a 95% confidence level. WLS estimates for the ACLI relative and absolute multifamily spread series are shown in Exhibits 4 and 5, respectively, and for the ACLI nonresidential spread series in Exhibit 6; all models are estimated from the first quarter of 1979 to the fourth quarter of 2000. The results of OLS estimation of the *Barron's* commercial real estate mortgage spread series from the first quarter of 1983 to the fourth quarter of 2000 are shown in Exhibit 7. The estimated first-order autoregressive parameter, shown as rho in the exhibits, was significantly negative in all models.

Exhibit 4 shows the results of various regressions explaining relative spreads. The results indicate that multifamily mortgage spreads clearly are dependent on general capital market assessments of risk as measured by the quality spreads on corporate bonds. Market volatility that would influence prepayment premia was not statistically significant, perhaps reflecting the widespread use of lockout and yield maintenance provisions. The average loan-to-value ratio—entered to account for changes in loan terms over time—was the correct sign but only marginally significant; the variable entered to control for term-to-maturity variation was not significant and was dropped. The variable capturing apartment market lending risk—the rate of appreciation of apartment properties—has the expected negative sign but was not significant at the 90% confidence level. However, the broader measure of lending risk as captured by the appreciation rate of all commercial properties was significant and had the expected negative effect. Those measures of the volume of securitization—both private-label and the combined measure—were not statistically different from zero.[13] The regime shift dummy variable was consistently significant, showing the expected upward shift in spreads, ceteris paribus.

The results were quite similar when the independent variable was measured as an absolute spread (Exhibit 5). The lending risk and loan-to-value variables were a bit more effective. However, the variable measuring the net growth in securitized debt was insignificant.

As suggested above, similar tests were run on overall commercial mortgage rates to validate the findings for multifamily mortgages. The results were quite similar. The estimates using the ACLI nonresidential data are reported in Exhibit 6. The A-AAA yield spread again proved to be the key driving force for commercial mortgage spreads. Interestingly, the yield spread between A-rated and AAA-rated bonds had a consistently larger coefficient in the nonresidential models, perhaps reflecting the greater correspondence of credit risk of corporate real estate with the financial health of the corporate occupants. Like the multifamily mortgage rates, overall commercial mortgage spreads exhibited an upward shift subsequent

Exhibit 4 | Determinants of Conventional Multifamily Mortgage Rate Spreads

	1	2	3	4	5	6
Intercept	0.12	−0.09	−0.16	−0.16	−0.16	−0.15
	(2.22)	(0.57)	(0.96)	(0.93)	(0.89)	(0.82)
A-AAA Corporate Bond Spread	2.08	2.05	1.94	1.94	2.16	2.16
	(4.78)	(4.71)	(4.39)	(4.37)	(4.78)	(4.78)
Market Volatility: Standard Deviation of 10-year Treasuries	−0.28	−0.12	−0.04	−0.05	−0.13	−0.15
	(0.80)	(0.33)	(0.11)	(0.12)	(0.35)	(0.38)
Appreciation Rate of All Commercial Properties	−0.77	−0.76	−0.75	−0.75		
	(2.39)	(2.09)	(2.40)	(2.34)		
Appreciation Rate of Apartment Properties					−0.41	−0.40
					(1.52)	(1.46)
Average Loan-to-Value Ratio		0.28	0.37	0.37	0.35	0.34
		(1.37)	(1.75)	(1.71)	(1.65)	(1.56)
Average Term to Maturity		0.00				
		(0.14)				
Change in Private-Label Multifamily Securitization			1.53		1.16	
			(0.71)		(0.54)	
Change in Private-Label, Freddie Mac and Fannie Mae Securitization				0.49		0.12
				(0.45)		(0.12)
Post–1998 Dummy Variable	0.11	0.10	0.09	0.09	0.08	0.08
	(3.04)	(2.87)	(2.47)	(2.44)	(2.18)	(2.19)
Rho	−0.68	−0.61	−0.43	−0.55	−0.62	−0.71
	(8.45)	(6.86)	(4.26)	(5.78)	(7.02)	(9.03)
R^2	.88	.88	.88	.88	.88	.88
Durbin-Watson	1.99	1.97	2.01	2.00	2.06	2.05

Notes: The dependent variable is ACLI Absolute Spread to Comparable-Term Treasury. Models estimated with quarterly data from the first quarter of 1979 to the fourth quarter of 2000. Absolute value of the *t*-Statistic is reported in parentheses under estimated coefficient.

Exhibit 5 | Determinants of Conventional Multifamily Mortgage Rate Spreads

	1	2	3	4	5	6
Intercept	1.49	−0.29	−0.94	−0.81	−0.62	−0.51
	(5.64)	(0.26)	(0.77)	(0.66)	(0.49)	(0.40)
A-AAA Corporate Bond Spread	0.70	0.73	0.73	0.71	0.72	0.71
	(3.57)	(3.99)	(3.87)	(3.65)	(3.07)	(2.98)
Market Volatility: Standard Deviation of 10-year Treasuries	−1.49	0.18	0.16	0.02	−0.47	−0.53
	(0.80)	(0.09)	(0.08)	(0.01)	(0.20)	(0.23)
Appreciation Rate of All Commercial Properties	−5.66	−6.70	−5.58	−5.65		
	(4.63)	(4.95)	(4.90)	(4.69)		
Appreciation Rate of Apartment Properties					−3.54	−3.45
					(2.47)	(2.36)
Average Loan-to-Value Ratio		1.79	3.06	2.91	2.81	2.69
		(1.27)	(1.98)	(1.89)	(1.80)	(1.71)
Average Term to Maturity		0.00				
		(1.44)				
Change in Private-Label Multifamily Securitization			21.06		12.99	
			(1.48)		(0.86)	
Change in Private Label, Freddie Mac and Fannie Mae Securitization				8.86		3.69
				(1.16)		(0.48)
Post-1998 Dummy Variable	0.61	0.65	0.51	0.50	0.37	0.38
	(3.41)	(3.85)	(2.72)	(2.57)	(1.71)	(1.69)
Rho	−0.49	−0.40	−0.36	−0.44	−0.54	−0.57
	(5.05)	(3.92)	(3.48)	(4.34)	(5.67)	(6.24)
R^2	.83	.83	.83	.83	.81	.81
Durbin-Watson	1.94	1.91	1.96	1.96	2.05	2.05

Notes: The dependent variable is ACLI Absolute Spread to Comparable-Term Treasury. Models estimated with quarterly data from the first quarter of 1979 to the fourth quarter of 2000. Absolute value of *t*-Statistic is reported in parentheses under estimated coefficient.

Exhibit 6 | Determinants of Nonresidential Mortgage Rate Spreads

	Absolute Spread			Relative Spread		
	1	2	3	4	5	6
Intercept	1.39	0.93	0.91	0.06	−0.04	−0.01
	(4.83)	(0.65)	(0.62)	(1.01)	(0.17)	(0.04)
A-AAA Corporate Bond Spread	0.86	0.82	0.83	2.52	2.53	2.45
	(3.90)	(3.82)	(3.71)	(6.60)	(6.54)	(6.19)
Market Volatility: Standard Deviation of 10-year Treasuries	−1.34	−0.82	−1.01	0.01	0.03	0.02
	(0.69)	(0.42)	(0.51)	(0.02)	(0.10)	(0.05)
Appreciation Rate of All Commercial Properties	−6.74	−7.86	−6.69	−0.43	−0.50	−0.44
	(4.14)	(4.10)	(4.17)	(1.15)	(1.16)	(1.15)
Average Loan-to- Value Ratio		0.26	0.62		0.10	0.09
		(0.14)	(0.32)		(0.35)	(0.31)
Average Term to Maturity		0.00			0.00	
		(0.93)			(0.33)	
Change in Private-Label Nonresidential Securitization			5.62			0.02
			(0.48)			(0.01)
Post-1998 Dummy Variable	0.72	0.81	0.65	0.08	0.08	0.07
	(3.79)	(4.25)	(2.91)	(2.24)	(2.24)	(1.85)
Rho	−0.50	−0.46	−0.41	−0.62	−0.57	−0.36
	(5.27)	(4.60)	(4.02)	(7.22)	(6.23)	(3.39)
R^2	.77	.77	.75	.88	.88	.87
Durbin-Watson	1.98	1.96	1.99	2.13	2.13	2.14

Notes: The dependent variable is ACLI Nonresidential Mortgage Spread to Comparable-Term Treasury. Models estimated with quarterly data from the first quarter of 1979 to the fourth quarter of 2000. Absolute value of *t*-Statistic is reported in parenthesis under estimated coefficient.

Exhibit 7 | Determinants of Ten-Year Spreads

	Absolute Spread			Relative Spread		
	1	2	3	4	5	6
Intercept	0.98	1.00	0.97	0.09	0.09	0.08
	(6.31)	(6.12)	(5.92)	(2.11)	(2.04)	(1.92)
A-AAA Corporate Bond Spread	0.58	0.56	0.58	1.02	0.96	0.94
	(5.74)	(5.39)	(5.57)	(3.50)	(3.19)	(3.16)
Market Volatility: Standard Deviation of 10-year Treasuries	3.08	3.07	3.13	0.57	0.59	0.63
	(2.92)	(2.86)	(2.92)	(2.10)	(2.16)	(2.29)
Appreciation Rate of All Commercial Properties	−5.00	−4.98	−5.03	−0.70	−0.71	−0.74
	(7.45)	(7.35)	(7.46)	(2.94)	(2.99)	(3.20)
Change in Private-Label Securitization (Multifamily & Nonresidential)		−2.70			0.28	
		(0.43)			(0.20)	
Change in Private-Label, Freddie Mac & Fannie Mae Securitization			0.66			0.96
			(0.11)			(0.75)
Post-1998 Dummy Variable	0.62	0.63	0.61	0.15	0.14	0.14
	(6.82)	(6.05)	(5.83)	(5.66)	(4.94)	(4.87)
Rho	−0.57	−0.54	−0.54	−0.74	−0.48	−0.48
	(5.64)	(5.12)	(5.15)	(8.84)	(4.43)	(4.35)
R^2	.87	.87	.87	.90	.90	.90
Durbin-Watson	1.70	1.67	1.68	1.51	1.53	1.55

Notes: The dependent variable is the spread of *Barron's* 10-year income-property mortgage rates to 10-year Treasury yields. Models estimated with quarterly data from the first quarter of 1983 to the fourth quarter of 2000. Absolute value of *t*-Statistic is reported in parentheses under the estimated coefficient.

to the widespread turmoil in financial markets in the second half of 1998. The commercial property appreciation rate significantly affected absolute spreads, but not relative ones. The finding that increased securitization did not narrow spreads was reaffirmed.

A second confirmation test was conducted using the *Barron's* series on all income-property mortgages with ten-year maturities. The model actually fit quite well for these data for both relative and absolute spreads. The market credit spread and volatility variables were significant and of the correct sign. The two variables capturing developments in the commercial mortgage market itself—the commercial property appreciation rate and the post-1998 regime shift variable—also were highly significant. True to form, the empirical evidence once again was not consistent with the hypothesis that increased securitization in commercial mortgage markets have lowered credit costs.

Conclusion

The distinguishing characteristic of the multifamily mortgage market during the past several years has been the phenomenal growth of securitization. Taken together, the securitization efforts of Freddie Mac, Fannie Mae and CMBS issuers account for about two-thirds of net growth in multifamily conventional mortgage debt outstanding since 1993. If the effects of securitization in the single-family sector were a guide, one might expect integration of the income-property mortgage market into the broader capital markets, a deepening of the investor base, a more stable spread relative to a benchmark security and a lower level of mortgage rates.

A formal test of the hypothesis that securitization has had a narrowing effect on multifamily and nonresidential mortgage rates was conducted. A reduced-form model was estimated in which the spread over Treasury yields over time was explained by general capital market forces—quality spreads and market volatility—as well as by specific credit risks in commercial markets. These basic variables went a long way in explaining variation in spreads over the 1980s and 1990s.

In contrast, a variety of tests could not establish any additional effect due to the net growth in securitized mortgage debt. Additional research, beyond the scope of this initial inquiry, is necessary to identify the dynamics at work. Fully specified demand and supply equations for multifamily mortgage credit may show that the influx of new investors through securitization offset the decreased supply from traditional portfolio investors. Without these new funding sources during the 1990s, income-property mortgage rates may well have been much higher and more volatile relative to benchmark Treasuries than actually occurred.

Based on these preliminary results, one may conclude that the multifamily and nonresidential mortgage market was already well integrated into general capital markets before the recent surge in securitization and, thus, the mid-1990s tightening in spreads would have taken place anyway. This conclusion is also

consistent with earlier work that showed a fairly high level of integration. Haney, Epley and Liano (1997) used the three *Barron's* series to examine the integration of the income-property mortgage market with the overall capital markets and concluded that Treasury yields led commercial mortgage market yields during the 1980s but today the yields move virtually in tandem, evidence of integration of the markets having been accomplished during the 1990s. Sa-Aadu, Shilling and Wang (2000) model the ACLI income-property mortgage yields and arrive at a similar conclusion, namely that the market is well integrated into the broader capital markets in more recent times.

Endnotes

[1] See Black, Garbade and Silber (1981), Hendershott and Van Order (1989), Rothberg, Nothaft and Gabriel (1989), Hendershott and Shilling (1989) and Cotterman and Pearce (1996).

[2] The demand for mortgage credit has been bolstered in recent years by low-income, tax credit projects. Private construction in this segment of the market traditionally has been difficult, but the successful tax credit program has stimulated a good deal of new construction and the concomitant demand for mortgage financing.

[3] It is worth noting that, while life insurance companies have not been aggressive purchases of whole multifamily mortgage loans, they have added substantial volumes of CMBS containing such loans. For instance, according to ACLI Investment Bulletin No. IB00-013, a sample of life insurers (representing just under 60% of the industry's assets) reported acquiring almost $10 billion of CMBS in 1999 alone.

[4] These figures reflect commercial banks' acquisitions of thrifts and their assets during this period. Mechanically, such a transaction increased the reported commercial bank holdings as a whole.

[5] It is worth noting that not all of this activity involved ''pure'' securitization. Since the mid-1990s, Freddie Mac and Fannie Mae have pursued different acquisition strategies in their purchases of multifamily loans. Fannie Mae primarily pools their loan purchases into mortgage-backed securities. Freddie Mac primarily purchases loans for its own portfolio, funding those purchases through corporate debt.

[6] The establishment of affordable housing goals for Freddie Mac and Fannie Mae created additional incentive for them to increase multifamily purchases in the mid-1990s. The Federal Housing Enterprises Financial Safety and Soundness Act of 1992 set interim targets effective January 1, 1993; by regulation, HUD promulgated permanent goals effective January 1, 1996.

[7] Sa-Aadu, Shilling and Wang concatenate the ACLI's average income-property commitment rates for 1965–1990 with the *Barron's* survey data for 1991 to 1998, and conduct unit root tests on the mortgage rate spread to 10-year Treasury yields. They reject the null hypothesis that the spread series has a unit root over January 1980 to December 1998, a period roughly comparable to the one studied here; thus, their analysis indicates that the spread time series is stationary, that is, the mean and variance of the series is independent of time.

[8] The ACLI expanded its sample from fifteen to twenty life insurance companies beginning with the first quarter of 1979. Even with the larger sample, sample sizes were

small during the high-rate period of 1980 and 1981 and the ACLI did not report quarterly averages for every quarter. However, one can obtain the averages from other data released by the ACLI. For example, data for the second quarter of 1980 were not published for apartment loans, but averages for the other three quarters and the year as a whole were, allowing calculation of the missing quarter. Similar methods were used to obtain averages for other quarters that were lacking data.

[9] *Barron's* data reports five-, seven- and ten-year spreads. Tests using shorter maturities differed little from those of the ten-year spread reported, and are available from the authors upon request.

[11] For the *Barron's* data, 10-year constant-maturity Treasury yields were the point of reference. For the ACLI data, a weighted average of constant-maturity Treasury yields was computed each quarter with average term equal to the average term of the ACLI mortgage commitments for that quarter.

[11] The NCREIF total return indexes for both income properties and apartments were also tried. The total return measures also were significant with the expected sign, but a better overall fit was obtained by using the appreciation rates.

[12] If the error term in a regression using the individual loan-level commitment data is homoscedastic, then grouping the data into quarterly averages where the group sizes are unequal will result in heteroscedasticity. A direct test is to estimate the model with grouped data by OLS and regress the square of the OLS residuals on the inverse of group size. ACLI reports the number of loans commitments made each quarter along with the quarterly loan averages. The resulting estimates showed heteroscedasticity in all models in Exhibits 4–6, usually at a 99% confidence level, although a couple of models in Exhibit 6 were at a 90% level. Examples of the estimated coefficient on one-over-group size are the following (the corresponding *t*-Statistic is in parenthesis): Exhibit 4, column 1: 0.032 (8.57); Exhibit 5, column 1: 4.937 (16.27); Exhibit 6, column 1: 42.28 (3.68); and Exhibit 6, column 4: 0.315 (1.91).

[13] When lagged two quarters, both the private-label securitization and the variable combined with Freddie Mac and Fannie Mae activity were still insignificant, although the signs were negative in seven of the eight models. Other measures of the market share of multifamily mortgages being securitized were tested without significantly different results. One measure was the ratio of amount of debt in CMBS to total multifamily debt outstanding (and the comparable measure inclusive of Freddie Mac and Fannie Mae). An alternative measure was the ratio of quarterly net change in debt held in private-label pools to the quarterly net change in multifamily debt outstanding (and the comparable measure inclusive of Freddie Mac and Fannie Mae).

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