# A STUDY OF DEFAULT RISK FOR SMALL COMMERCIAL REAL ESTATE LOANS AND ITS IMPACT AND IMPLICATIONS FOR SECURITIZATION

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Submitted to the Department of Urban Studies and Planning
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## ABSTRACT

A statistical analysis of a pool of small commercial real estate loans (loans under $1.0 million) held in portfolio by a regional commercial bank was conducted to examine the impact of commercial mortgage default. The results of the study are used to create a default model which relates timing and volume of ensuing default occurrence to origination criteria, property specific and macroeconomic conditions. A Cox proportional hazard model is used to estimate the contribution of explanatory variables to the conditional probability of default for commercial mortgages. A second analysis uses a probit model to determine the maximum likelihood of default for a commercial mortgage given a series of loan origination variables.

The development of the commercial mortgage-backed securities market, while evolutionary and not revolutionary in nature, has widespread and significant implications for commercial real estate finance. This paper will provide a description of the development of commercial mortgage securities, an overview of the growth in the market for commercial mortgage-backed securities in the United States, a discussion of default risk, and the ratings process for these instruments. The results of the analysis confirm many expected default relationships; in particular, the importance of the loan origination terms and property value trends over time in affecting default.

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# ACKNOWLEDGMENTS

# I. Introduction

## i   Commercial Mortgage Securitization

The term securitization is commonly utilized to describe "the formation of any security that has fragmented ownership and can be freely traded."[1] It is the process by which loans and other receivables are pooled, warehoused, packaged and ultimately marketed to investors in the form of equity, bonds or other debt instruments. At present, the most prevalent forms of these instruments are backed by consumer receivables (credit card debt, auto loans, home equity loans, etc.) and residential mortgage loans. The practice of securitization has grown significantly as the relevant structures and analytical systems have become increasingly standardized, thereby reducing the relative cost of the process. Furthermore, investors have increased their knowledge and acceptance of these financial instruments backed by asset cash flow or asset value. The developments and competitive pressures that have facilitated the expansion and possible future growth of securitization of U.S. debt markets are relatively new and their impact on many types of financial institutions and the economy generally have only recently come to light.

The development of a market for securities backed by commercial mortgage loans, however, has evolved at a far slower pace than other asset types for reasons including the lack of standard documentation for loan origination and underwriting criteria. Additionally, there exists minimal public information regarding commercial loan delinquencies and defaults. The potential for commercial real estate securities is significant, however, as it may be collateralized by a variety of property types, including shopping centers, office buildings, multifamily apartments (for the purposes of this paper commercial mortgages include multifamily mortgages except where specified), industrial facilities, motels and hotels,

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[1] Jan Nicholson, "Securitization," *National Real Estate Investor* (August 1989), p.56.

health care facilities and even land. Individual properties and pool financings are candidates for commercial real estate securitization. Additionally, properties need not be of 'investment' quality and those of 'lesser' quality ("B" and "C") are considered and often used for securitization.

The securitization of commercial mortgages has important ramifications for the real estate capital markets by augmenting the available lending community and utilizing more efficient primary and secondary capital sources. Financial institutions could, in many instances, securitize their commercial mortgage portfolios, remove these mortgages from their books and, subsequently, reduce their real estate loan exposure. Securitization could serve to broaden the source of funds, increase their liquidity, and/or raise capital for refinancing existing loans or originating new loans. Similarly, commercial mortgage backed securities could be used to reduce the capital requisite to meet regulatory minimums as dictated by The Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) of August 1989.[2] Given the importance of the generation of 'fee based income', securitization also presents an opportunity for financial institutions to produce fee income by originating and servicing mortgages that collateralize securities offerings.

The prospect of securitization offers significant benefits to both property owners and developers. Those seeking to ameliorate their financial position could securitize their real estate assets in order to raise capital to refinance their borrowings as well as to finance additional property acquisitions. Securitization should make the capital markets operate more efficiently and thereby allow property owners and developers to reduce their financing costs and accordingly strengthen their balance sheets. The development of securities backed by

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2 James R. Stillman, "FIRREA Two Years Later," *The Real Estate Finance Journal* (Winter 1992), p.11.

commercial mortgages, nevertheless, requires a "fundamental shift not only in the sources of capital but in the mechanics of the lending process."[3]

ii      Summary of Findings

The commercial mortgage-backed securities market continues to grow in the non-agency sector and, while it is perhaps improper to compare it to the residential mortgage-backed market in its infancy, there remain many similar opportunities for expansion in the future.

Commercial mortgage backed securities differ from residential mortgage backed securities in that the incidence of default, rather than interest rate fluctuations or mortgage prepayment, is the primary risk feature. The impact of default risk, however, remains relatively understudied despite a rising level of commercial mortgage delinquencies from 1988 to 1993 according to the American Council of Life Insurance Companies (ACLI). A study of commercial mortgage default by Snyderman utilizes this data for analysis, while Vandell, Barnes, Kraft and Wendt use data from a major insurance company for a proportional hazards estimation of commercial mortgage default. Both sets of data, however, reflect the trends of commercial real estate loans over $1.0 million. This study will focus on commercial real estate loans under $1.0 million (the average loan for the data set studied was $249,848).

The results of both the probit and proportional hazards models estimation procedure yielded coefficients displaying expected signs regarding debt service coverage ratio and loan to value ratios. Higher loan to value and lower debt service coverage ratios increase the hazard rate and probability of default and these variables were proven statistically significant.

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[3] Carl Kane, "Fundamentals of Commercial Mortgages," *Mortgage Banking* (July 1992), p.24.

The terms of the loans were studied and it was determined in the probit model that variable interest rates decrease the likelihood of default. The proportional hazards model assigns fixed interest rate loans a positive coefficient, and therefore a relatively higher hazard rate than for variable rate loans, however, this coefficient was statistically insignificant. The relative interest rate coefficient too is insignificant, however, it is important to note the sign is positive. The insignificance may be due to multicollinearity of this variable with the debt service coverage ratio. The year of loan origination, while often having coefficients varying considerably from zero, were found to be statistically insignificant in the determination of default risk.

The probit analysis indicated that (using retail properties as base) office properties are relatively less likely to default whereas apartments, industrial properties and 'other' properties have a higher likelihood of default. These results were confirmed in the proportional hazard model.

Ownership entities were examined, and corporations appeared to exhibit the greatest default risk (using trusts as base), whereas individuals and partnerships were found to have relatively lower hazard rates.

The results of the statistical analysis corroborate many expected default relationships, in particular the importance of loan origination terms, economic and property value trends over time in affecting default. The ability of the models to evaluate default risk is examined and related to mortgage origination practices by financial institutions. Lastly, suggestions are made for further study to develop a risk adjusted pricing model for commercial mortgage backed securities.

## II.    The Residential and Commercial Mortgage Markets

i    Overview of the Residential and Commercial Mortgage Markets

The residential mortgage market consists of lending to the housing finance sector for properties comprised of one to four family units.  The housing industry, because of its social and economic importance, has been the target of numerous governmental and private initiatives.  High and fluctuating interest rates and disintermediation have resulted in considerable public policy to increase and stabilize residential mortgage credit availability.  As it has historically proven to be a predictor of foreclosure rates, the loan to value ratio (LTV), the ratio of mortgage debt divided by the lower of the purchase price or appraised value, is considered the most important lending criterion for residential financing.

The classification of real estate known as commercial property can be defined as that real estate conceived, built and operated for the purpose of producing income.  Commercial property can be divided into general use, such as a retail center or an office building, or special use, such as a hospital or chemical plant.  General use properties have typically been preferred to specific purpose/use properties by mortgage lenders since the alternate use potential provides greater security if an occupying tenant vacates or if the lender has to foreclose.  This means the income producing capacity of the real estate is more critical in establishing the loanable value than an appraised value or the income stability of the borrower.  Thus, the debt service coverage ratio of the property is deemed by many to be the most important lending criterion.

ii    Market Development

The housing finance market (combined one to four family and multifamily) totaled approximately $3.438 trillion at the third quarter of 1993, far exceeding the U.S. government

securities market and the corporate bond markets.[4]  Real estate loans (one to four family,

multifamily and commercial) accelerated dramatically as a proportion of total domestic loans

and securities beginning in 1986 and leveled off in 1990 and 1991 (Exhibit I).  By 1988, real estate

loans had supplanted commercial and industrial (C & I) loans as the largest component of total

domestic loans and securities.

### Exhibit I

#### Government Securities, C & I Loans, and Real Estate Loans
#### as a Share of Total Loans and Securities in the United States: 1973-93



Source: Federal Reserve[5]

From 1987 to the third quarter of 1993, one to four family outstanding mortgage debt rose from

$1.962 trillion to $3.146 trillion, representing an average annual increase of 8.18%.  This

increase is depicted in Exhibit II and illustrates the relative growth of the one to four family

mortgage market at a time when both the commercial and multifamily mortgage markets

remained stagnant.  Commercial mortgage debt outstanding increased from $657.0 billion in 1987

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4  Federal Reserve, *Federal Reserve Bulletin* (Washington, D.C.: Federal Reserve, May 1994), p.A38.

5  Federal Reserve, *Economic Review* (Cleveland, OH: Federal Reserve Bank of Cleveland, 1993
   Quarter 3), p.4.

to $699.5 billion in 1993 (an average annual increase of 1.05%) while multifamily mortgage debt increased from $278.9 billion to $292.1 billion over the same period (an average annual increase of 0.77%).

**Exhibit II**

**Total Mortgage Debt Outstanding: 1987-1993 Q3**
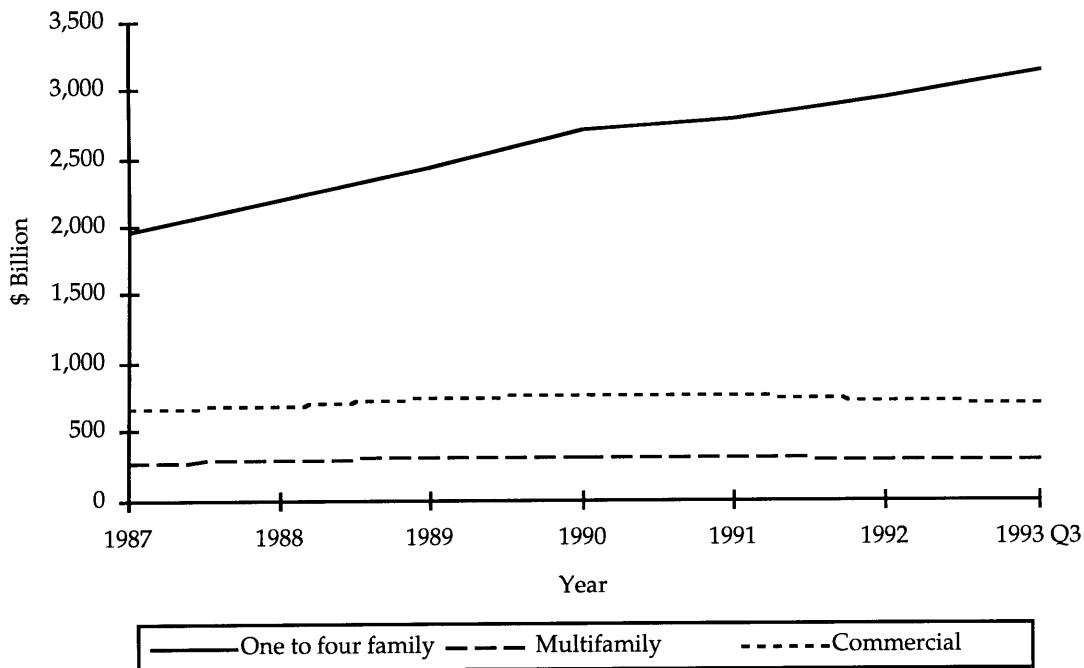


Source: Federal Reserve[6]

Over the longer term, from 1983 to 1993, commercial mortgage debt increased from $350.4 billion to $699.5 billion, while multifamily mortgage debt increased from $158.8 billion to $292.1 billion (Exhibit III). Commercial mortgage debt, thus, doubled over the aforementioned period, but, it reached its apex in 1990 and began to fall slowly thereafter. Similarly, multifamily mortgage debt increased in total by approximately 83.9% over the decade concluding in 1993, but peaked in 1990 and declined thereafter. Commercial mortgages outstanding decreased by $45.5 billion in 1992 and a further $19.8 billion through the third quarter of 1993. Multifamily mortgage debt fell by $11.1 billion and $4.0 billion over the same periods. The distinct pattern of flows of capital in both the commercial and multifamily mortgage markets are illustrated

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[6] Op. Cit., *Federal Reserve Bulletin*, p.A38.

## Exhibit III

## Total Multifamily and Commercial Mortgage Debt Outstanding: 1983-1993 Q4



Legend: Multifamily — — — Commercial - - - - -Total (Mult. & Com.)
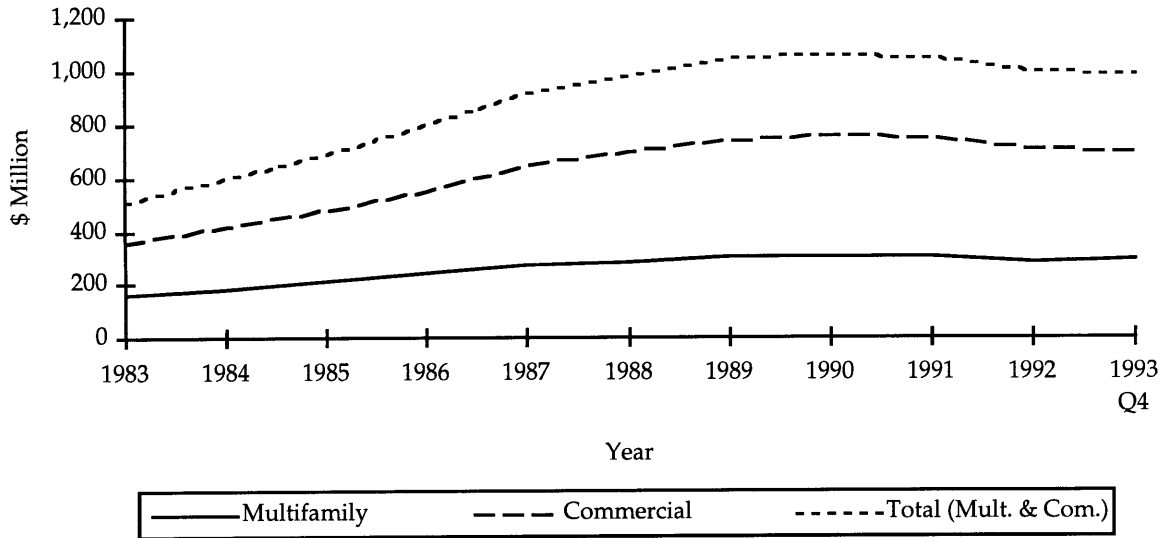
in Exhibit IV. The changes in commercial and multifamily mortgage flows reflect the difficulties experienced by the real estate industry generally.

## Exhibit IV

## Commercial and Multifamily Mortgage Flows: 1983-1993



Legend: ■ Multifamily ⊠ Commercial
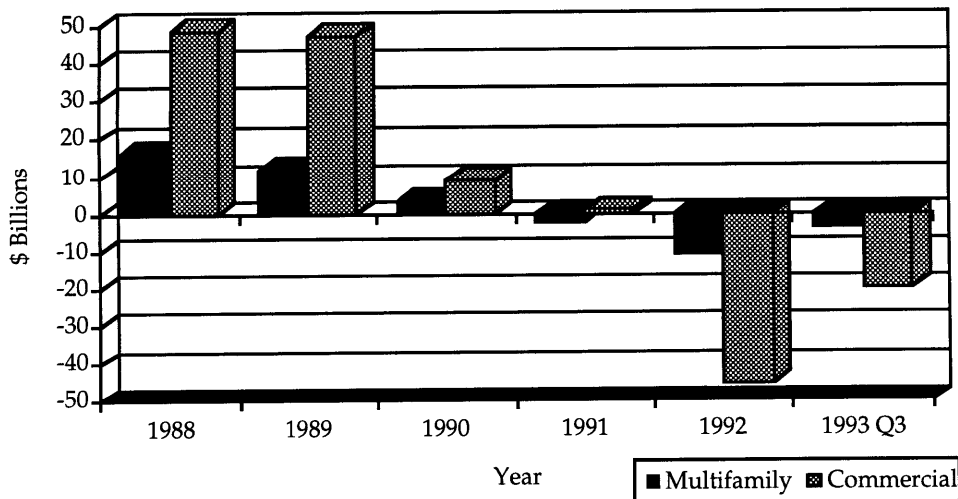
[7] Op. Cit., *Federal Reserve Bulletin*, p.A38.
[8] Ibid., p.A40.

iii    The Residential Mortgage Backed Securities Market and the Development of Mortgage
       Backed Securities Products


The growth of securities backed by residential mortgage loans in the United States has resulted

in the development of an extensive and highly liquid market. The growth of this market since

1980, in terms of total volume and turnover (trading), has been substantial. As of the fourth

quarter of 1993, more than $1.490 trillion of mortgage pools or trusts were outstanding (Exhibit

V), while the volume of trading of Government National Mortgage Association (GNMA) pass-

throughs alone in 1989 amounted to more than $1.522 trillion.[9]

## Exhibit V
## One to Four Family Mortgage Pools or Trusts Outstanding: 1990-1993 Q4
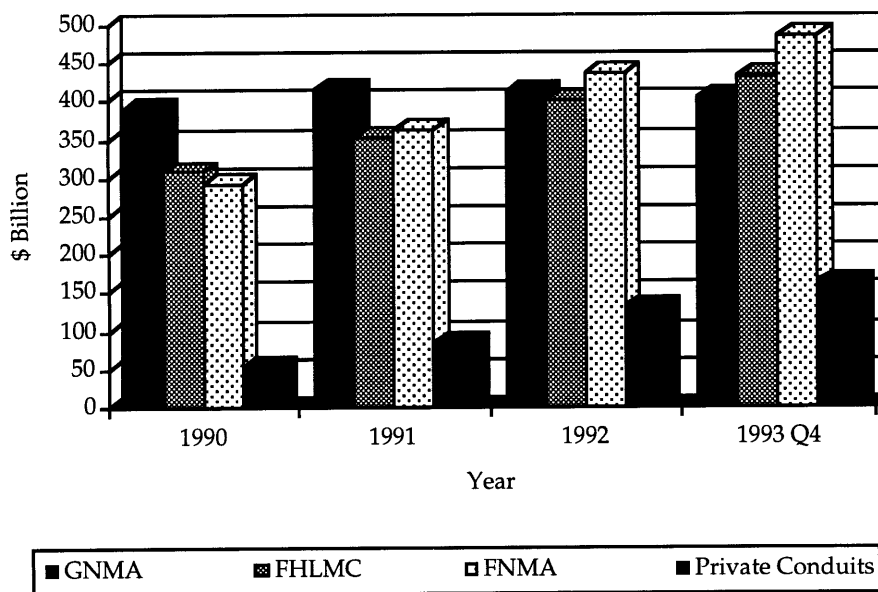


Source: Federal Reserve[10]

The process of securitization converts illiquid real estate assets into marketable securities that

can be sold to a broad range of investors including commercial banks, pension funds, insurance

companies, savings and thrift institutions, mutual funds and foreign investors. In the case of

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[9] Frank J., Fabozzi and Franco Modigliani, *Mortgage & Mortgage Backed Securities Markets*
    (Cambridge: Harvard Business School Press, 1992), p.27.
[10] Op. Cit., *Federal Reserve Bulletin* , p.A38.

residential mortgage-backed securities, these instruments are backed by pools of home mortgage loans. The cash flows of the underlying mortgages are segmented to produce classes of securities that vary by risk profile, maturity and other characteristics in order to suit the requirements of specific investor groups. This 'carving up' of the cash flows from a pool of mortgages results in investors having an extensive selection of securities to meet their investment objectives.

The basis of the growth of the residential secondary mortgage markets can primarily be traced to the standardization of pools of mortgages resulting from policy initiated by four government agencies: the Federal Housing Administration (FHA), the Federal National Mortgage Association (FNMA), the Federal Home Loan Mortgage Corporation (FHLMC) and the Government National Mortgage Association (GNMA). The latter three agencies are deemed 'quasi-federal' as, to differing degrees, they have evolved into privately owned companies with a federal mandate, support and authority. The foundations for the development and expansion of the residential mortgage-backed securities can be attributed to government actions and legislation enacted to counter the constricting and detrimental effects of the Great Depression.

The Federal Housing Administration (FHA) was created as part of the National Housing Act of 1934 to provide programs to foster the building, acquisition and or rehabilitation of both single family and multifamily properties.[11] The FHA achieved its objectives by offering insurance against residential mortgage defaults, thereby reducing credit risk. To benefit from the mortgage default insurance, however, the mortgage applicant was required to meet the underwriting criteria established by the FHA. This was the first instance in which a government agency demanded standardized documentation in the mortgage lending process.[12] The requisite of the mortgage applicant's having to satisfy the FHA underwriting standards

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11 William B. Brueggeman and Jeffrey D. Fisher, *Real Estate Finance and Investments* (Homewood, IL: Richard D. Irwin, Inc., 1993), p.715.

12 Op. Cit., Fabozzi and Modigliani, p.19.

had, albeit unintentionally, far reaching and critical implications for the development of a secondary residential mortgage market.

The second strategy employed by the FHA to attain its objectives was to reduce the incidence of default in residential mortgages. To accomplish this task the FHA, in the operation of insuring mortgages, developed a mortgage design that would reduce default risk and be more attractive to borrowers. Until the inception of the FHA, residential mortgages had a balloon repayment feature, whereby the homeowner would be obliged to meet only the interest payments over the life of the mortgage and make no contribution toward principal repayments. At the conclusion of the mortgage term (typically no more than ten years) the entire original loan balance was to be repaid, generally through the mortgagor obtaining funds from another loan. This type of mortgage increased the risk of default as the ability of the borrower to extinguish the initial mortgage was dependent on his/her capability to raise capital to meet the payment due. In a period of deteriorating economic conditions, as during the 1930's, this was often difficult if not impossible. To counter this, the FHA was responsible for the development of the long-term (typically over thirty years), level, self-amortizing mortgage loan.[13] This mortgage design required constant monthly repayments over the term of the loan, with each payment including a portion of the principal in addition to the interest. The payment schedule is designed so that the final payment extinguishes the remaining balance of the loan, thereby making the balloon payment unnecessary. The FHA, therefore, devised and implemented programs which facilitated the development of a national residential mortgage market with the inception of mortgage underwriting standards and mortgage default insurance.

The FNMA was established in 1938 as a government sponsored agency with the objective of creating a liquid secondary market for residential mortgages.[14] This goal was to be achieved

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[13] Ibid., p.82.
[14] Jess Lederman, ed., *The Handbook of Asset-Backed Securities* (New York: New York Institute of Finance, 1990), p.361.

largely by purchasing and holding FHA mortgages in portfolio. The FNMA operated by selling

agency securities in the market and using the funds to purchase FHA mortgages directly. The

debt instruments issued by the FNMA were primarily short term in duration and hence it

assumed considerable the interest rate risk as the mortgages were of a greater maturity. This

function, nevertheless, was extremely important during periods of tight credit when deposit

rate ceilings curtailed the abilities of savings and loans to raise funds.[15] The FNMA was,

therefore, an important counter-cyclical source of funds in the residential mortgage industry.


The Housing and Urban Development Act of 1968 resulted in the FNMA's moving 'off budget'

and its assets, liabilities and management of secondary residential market operations were

transferred to a wholly private corporation.[16] While it remained a government sponsored

organization, the FNMA was to receive no further government funding and became entirely

owned by private investors. The Act also provided for the creation of the Government National

Mortgage Association (GNMA) to perform various functions, which included management of

former FNMA policy-related tasks and support to the FHA mortgage market as well as the

market for mortgage loans insured by two further government institutions, the Veterans

Administration (VA) and the Farmers Home Administration (FmHA). The support for the

FHA, VA and FmHA included the provision of a guarantee for pools of these mortgages which

would thus implicitly guarantee mortgage-backed securities. The GNMA is on the federal

budget as a part of the U.S. Department of Housing and Urban Development and can use the

"full faith and credit of the United States government" to guarantee instruments. GNMA was,

thus, designed to supply funds to the FHA, VA and FmHA insured mortgage market and to

provide an active secondary market.

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[15] Robert Van Order, "Secondary Mortgage Markets in the United States: Their Evolution and Some Management Issues" (November 1993), p.3.

[16] Op. Cit., Fabozzi and Modigliani, p.20.

The Federal Home Loan Mortgage Corporation (FHLMC) was formed under Title III of the Emergency Home Finance Act of 1970 to provide support for conventional (non agency) and FHA/VA/FmHA mortgage loans. Additionally, this Act of Congress authorized FNMA to acquire conventional mortgage loans. The FHLMC, like the FNMA, is a private, government sponsored corporation and is "off budget". These 'agencies' are corporate instrumentalities of the U.S. government. The equity of both the FNMA and FHLMC trades on the New York Stock Exchange; therefore, they are effectively quasi-private corporations. Neither the FNMA nor the FHLMC receive government subsidies or appropriations, and both are taxed as would be any other corporation. The Emergency Home Finance Act of 1970 thus provided for both the FNMA and FHLMC to compete for all types of residential loans.

GNMA was able successfully to provide funds for the housing finance market through support of the FHA, VA and FmHA mortgage markets by guaranteeing securities issued by private entities that pooled these mortgages together, using the mortgages as collateral for the issuance of a security. This innovation was the result of the ability of GNMA, "to guarantee the timely payments of principal and interest on securities backed or secured by pools."[17] A mortgage-backed security is a "pass through" security, and while GNMA guarantees timely payment of these pass-throughs, it does not issue them. A pass through is structured to provide for the passing through of all of the payments from a pool of mortgages to the investors who usually receive pro rata shares of principal and interest payments. In the case of agency securities, typically the issuer of the security guarantees the payment of interest and principal even if the borrower defaults. GNMA deals only in federally insured mortgages, of the FHA and the VA and its guarantee (in addition to that of the existing federal insurance) mainly amount to a guarantee of timely payment. The importance of the guarantee of timely payment to investors, however, should not be understated. By guaranteeing the securities issued by

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[17] Op. Cit., Brueggeman and Fisher, p.719.

approved lenders, GNMA thus achieves its objectives by permitting these lenders to convert illiquid individual mortgages into liquid securities backed by the U.S. government.

The FHLMC initiated the first mortgage backed security program for conventional (i.e. non agency) loans in the 1970's, while the FNMA began its conventional mortgage backed securities program in the 1980's.[18] Today, the FHLMC and FNMA purchase and pool primarily conventional mortgages and then issue pass through securities collateralized by pools of mortgages . Neither FNMA or FHLMC does more than a negligible amount of federally-insured mortgages, which almost always go into GNMA pools. Because FNMA and FHLMC are private corporations, they both have an obscure, "implicit" guarantee and are both regulated by the Department of Housing and Urban Development. FNMA and FHLMC are now, except for details, quite similar and compete intensely in the conventional mortgage market as buyers of mortgages and in the securities markets as sellers of mortgage backed securities.

The secondary mortgage markets in the United States have developed beyond the issuance of "plain vanilla" mortgage backed securities and have resulted in numerous financial innovations, both in the design of mortgages and in the securities that are derived from them. These innovations are the product of financial engineering and the redirection of cash flows from a pool of underlying assets to suit the asset/liability requirements of institutional investors. The standard thirty-year fixed rate mortgage is not suitable for all investors, and therefore new instruments had to be created to widen the potential investor base. Agency issued residential mortgage backed securities have little credit risk, they have two types of interest rate risk: the risk of holding any long term security is that its value will fall when rates rise, and the re-investment risk associated with mortgage prepayment. The latter is the risk akin to that of the holder of callable bonds, as  borrowers have the option to refinance (i.e. call the

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[18] John F. Tierney, David Quint and Chris Ames, "Introduction to Nonagency Residential MBS" (New York: Lehman Brothers, November 1993), p.1.

bond). This call risk is very difficult to quantify and evaluate because borrowers' prepayment

behavior is difficult to predict.

The factors contributing to the massive growth and trading of secondary mortgage market

instruments differ from the reasons of the federal government for commencing the secondary

**Exhibit VI**

**One to Four Family Mortgage-Related Securities in 1993 (total outstanding $1.522 trillion)**

PRIVATE
13%

FHLMC
28%

GNMA
27%

FNMA
32%
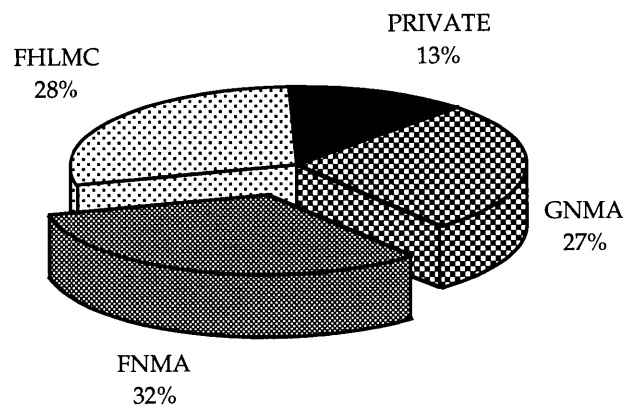
Source: Federal Reserve Bulletin[19]

market. A major goal of U.S. public policy is to provide adequate and affordable housing. The

secondary mortgage market has evolved largely because of government policy and financial

innovation which were a function of historical changes. The credit crunches which restricted

the ability of financial institutions to raise money for mortgage loans and the imbalances in the

United States primary mortgage lending market were major factors in the rising importance of

agencies in the 1960's and 1970's. The number and types of securities increase as mortgage

originators, investment bankers and the agencies continue to innovate and reach investor

markets that provide the ultimate source for much of the funding used in new mortgage

originations. The changes that continue in the secondary market are reflected in the growing

importance of private conduit issues which comprised 12.8% of all residential mortgage related

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[19] Op. Cit., *Federal Reserve Bulletin*, p.A38.

securities in 1993 (up from 7.6% in 1990) as illustrated in Exhibit VI. The secondary markets are a more efficient way of managing cash flows and raising money for mortgages than are the traditional portfolio lending institutions because of economies in raising funds in the capital markets, in processing the acquisition and servicing of large pools of mortgage loans, and in managing risks, through diversification.

Government policy and intervention has resulted in increasing the liquidity of all sectors of the secondary mortgage market, agency and non agency (private) mortgage-backed securities and whole loans. Combined with innovations in the design of mortgages and security structures, this increased liquidity has enabled capital market investors and institutions which are not traditionally participants in the residential secondary mortgage market to invest in these instruments. This has increased the supply of funds for the housing finance market sufficiently to keep residential mortgage interest rates competitive with other forms of long term debt. The rates in the housing finance market, therefore, have largely been determined by movements in the broader capital markets as opposed to factors particular to the primary mortgage market.

## III. The Commercial Mortgage Backed Securities Market

i    Structures and Collateral for Commercial Mortgage Backed Securities

Commercial mortgage securities are collateralized by the cash flows of an individual or pool of mortgages on commercial real estate and can be any of a number of structural and legal forms. The process of commercial mortgage backed securitization uses mortgage loans on income producing properties to create debt instruments. These instruments, while similar in nature to residential mortgage securities, have several fundamental differences which require a wide range of financial structures to attract investors, and have resulted in a slower development of the commercial secondary mortgage market. Financial institutions have several options for the securitization structures for commercial mortgages including: mortgage backed bonds, pass-throughs and collateralized mortgage obligations (CMOs). Furthermore, the provision in the Tax Reform Act of 1986 gave institutions the ability to elect the tax treatment most beneficial to individual transactions.[20]

Activity in the secondary commercial mortgage market, as in the residential mortgage market until the 1960's, was limited primarily to the purchase and sale of whole loans. The trading in the market for whole loans was confined to lenders, and typically involved a sale of the loan asset for tax purposes.[21] These 'lender to lender' transactions were regularly negotiated without the use of an intermediary and the loans were collateralized by a number of different property types and loan terms. By 1984 investment banks began to operate as intermediaries in these transactions and "established a de facto trading market."[22] Commercial banks, life insurance companies and thrifts entered the market to purchase or sell commercial mortgages

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[20] Steven D. Conlon and Mary Sue Butch, "Tax Considerations in the Securitization of Commercial Mortgage Loans," *Taxes* (November 1993), p.687.

[21] Jess Lederman, ed., *The Handbook of Asset-Backed Securities* (New York: New York Institute of Finance, 1990), p.393.

[22] Ibid., p.393.

with objectives including; for financial accounting purposes, the amelioration of liquidity or the restructuring of their asset base. The sale of whole loans between the participants in the commercial mortgage market included the assignment of all rights to principal and accrued interest payments and obligations to the purchaser. These transactions were generally without recourse, however, the vendor would often generate fee income and maintain a relationship with the mortgagee through a servicing agreement.

## Exhibit VII

### Ten Year Commercial Mortgage Yields vs. Ten Year Treasury Yields: 1988-1993 Q3
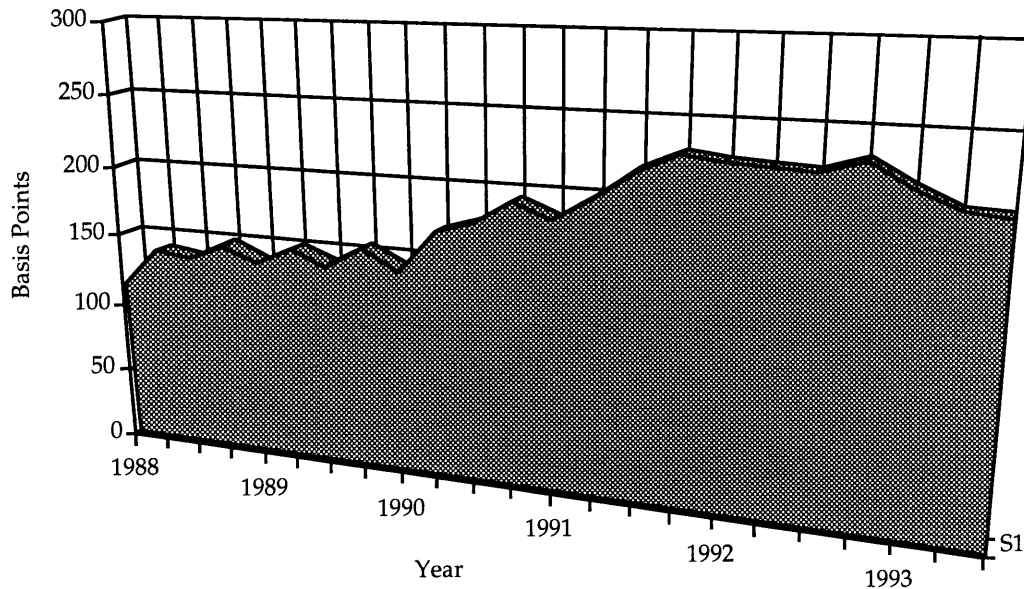


Source: John B. Levy/Barrons Mortgage Survey[23]

Investors have been attracted to whole loan commercial mortgages due to the risk adjusted return relative to comparable investment alternatives. The spread between treasuries and commercial mortgages (Exhibit VII) reflects the growing incidence of default in the late 1980's and early 1990's as lenders and investors required a higher yield to compensate for increased risk. The spread has decreased from late 1992, primarily due to decreased demand for and an increase in the supply of funds (both from the securitized debt market and the increased willingness of traditional lenders to re-enter the market).

[23] John B. Levy/Barrons Mortgage Survey

The sale of whole loans, nevertheless, is very inefficient for commercial loans because of the wide variance in origination and underwriting criteria, in addition to the unique requirements of potential investors. The whole loan market was further retarded by increased inflation and interest rate volatility in the 1970's, as the wide swings in interest rates made it difficult for both buyers and sellers to meet contractual requirements between the time the mortgage lender obtained investor commitment and the time of delivery of the loans securing the commitment.[24]

Throughout the 1970's the market for residential mortgage-backed securities expanded dramatically with mortgage lenders re-packaging residential mortgage loans for resale into the secondary market with increasing frequency. The dramatic growth in the residential mortgage market, however, was not translated to the commercial market and over the same period there was relatively little growth in the commercial mortgage secondary market. Given the size of the commercial market and the opportunities therein for all parties, the factors contributing to the formation and rapid growth of the residential mortgage-backed securities market were slow to be realized or achieved in the commercial mortgage market. Commercial real estate and financial markets behaved in a fundamentally different manner than residential mortgage markets and thus require a new and innovative securitization techniques.

Mortgage-Backed Bonds

The trading of mortgage-backed bonds originated in the 1920's.[25] Initially, these bonds did not directly tie the collateral cash flow to the investor cash flows, and the property was the sole security for the investor notes. Mortgage backed bonds are created by the pooling of mortgages and a defined collateral cash flow structure to service both interest and principal payments to

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[24] David Allan Richards, "Gradable and Tradable: The Securitization of Commercial Real Estate Mortgages," *Real Estate Law Journal* (1987, Vol. 16), p.103.

[25] Carl Kane and Robert Weinstein, "Alternate Structures for Commercial Mortgage Securities," *The Real Estate Finance Journal* (Summer 1991), p.76.

investors. These bonds are issued to investors, however the issuer maintains ownership of the mortgages. The mortgages are typically pledged as security and are placed in trust with a third party trustee whose responsibility is to ensure that the provisions of the bond issue are met. The credit of the issuer is not of primary importance as the bond is secured by pledged mortgage collateral.

Mortgage backed bonds provide security for investors by maintaining the asset value of the collateral at "a sufficiently high level to enable a market liquidation to cover all outstanding principal and accrued interest payments."[26] Issuers typically overcollateralize bond issues to insure to investors that the income from the mortgages will be adequate to meet both interest payments and the repayment of principal at maturity. The issuer of the bond deposits mortgages in the pool with outstanding loan balances exceeding the face value of the of securities being issued. Overcollateralization is necessary as fluctuations in interest rates will alter the value of the collateral and mortgagees might default or become delinquent in their payments on mortgage loans. Mortgage backed bonds usually provide for the trustee to "mark to market" the issue by periodically pricing the instruments to make sure that the market value of the collateral does not fall below the value of the bond (or some other predetermined level throughout the life of the instrument).

Overcollateralization, in addition to protecting security holders against default risk, also serves to secure investors from prepayment risk. Typically, mortgage-backed bonds pay interest semiannually at a predetermined rate and the principal is due on a specified maturity date. The issuer must therefore ensure that as prepayment occurs there will be sufficient numbers of mortgages in the pool to replace them.[27] This serves to protect the investor from reinvestment risk. In instances where the mortgage pool must be replenished through a decrease in value of

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[26] Ibid., p.76.
[27] Op. Cit., Brueggeman and Fisher, p.725.

the collateral or otherwise, the mortgages replacing those that have defaulted or prepaid must be of equal quality to those originally in the pool. Mortgage-backed bonds are ratable by the major rating firms and those pools containing agency mortgages or conventional mortgages with private mortgage insurance will lower default risk accordingly. Furthermore, non agency mortgages can collateralize mortgage backed securities and be 'rated', investment grade, securities. The issuer of the mortgage backed bonds can utilize other forms of credit enhancement, including: a letter of credit from a bank or other creditworthy third party source or some type of surety through insurance of the issue.

Mortgage-backed bonds can be collateralized by wide variety of property types and may offer investors strong credit support through overcollateralization and "mark to market" valuations. Issuers of these instruments benefit for financial accounting purposes as these bonds are given financing treatment permitting the holders of below market mortgages to defer the recognition of loss and the loss is triggered only by the sale of the residual interests.[28] Mortgage-backed bonds are a debt obligation secured by a pool of mortgages and hence the quality and arrangement of mortgages used as collateral are the main determinants of the ability of the cash flows to pay interest and principal at maturity. Investors in these instruments will thereby evaluate risk based on the structure and quality of the mortgage pool to determine the required return and price of the security.

Mortgage pay-through bonds are a hybrid security having characteristics found in both mortgage-backed bonds and pass through instruments. A mortgage pay-through bond is collateralized by a pool of mortgages with the cash flows from the pool being passed through to the security holders. This instrument differs from mortgage pass-through securities (of which a description follows) in that it is a bond and a debt obligation of the issuer. The

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[28] Op. Cit., Kane and Weinstein, p.76.

mortgage pay-through bond is, therefore, not an undivided equity ownership interest in the collateralized mortgage pool.

Mortgage Pass-Through Securities

Mortgage pass-through securities are created when one or more mortgage holders create a pool of mortgages and sell shares or participations in the pool. The pool of mortgages may be comprised of one or several thousand mortgages. The term 'pass through' is used as the servicer of the pool of mortgages collects the mortgagee's monthly payments and after deducting a servicing fee, passes them through to the security holder The title of the mortgages are held by a trustee to ensure that the mortgages in the pool are in acceptable form and that all payment schedules are met. Holders of the security receive portions of the cash flow from the pool of mortgages which are comprised of both interest and principal payments, less service costs, based on their proportional ownership. 'Pass-through certificates' represent "the beneficial ownership of a fractional undivided interest in the corpus of a passive grantor trust consisting of a fixed pool of mortgages held for the benefit of pass-through holders."[29]

The first publicly traded pass-through security was created and issued through the GNMA in 1970.[30] This instrument was entirely backed by mortgage loans that were federally insured or guaranteed by either the VA or FHA. This program was designed by the government to provide financing for home loans typically not underwritten by the traditional mortgage markets and thereby expand liquidity in the whole loan secondary market, including housing loans to low income families. The mortgage pass-through program established by GNMA set standards for underwriting criteria and provided a federally backed performance guarantee for investors. It created a homogeneous structure which was easy to replicate for lenders of FHA insured and VA

[29] Op. Cit., Richards, p.104.
[30] Zvi Bodie, Alex Kane and Alan J. Marcus, *Investments* (Homewood IL: Irwin, 1989), p.55.

guaranteed home mortgages, thereby increasing liquidity in the secondary residential mortgage market. The pass through program provided access to capital markets through the use of mortgage-backed securities that was previously unavailable to the housing finance market.

The success of the GNMA pass through program led to the creation of the FHLMC to develop an active secondary market for conventional mortgage loans. The FHLMC issued its first participation certificate (PC), backed by conventional mortgages, in 1971.[31] The PC differed from pass throughs guaranteed by GNMA in that they do not have guarantees against default risk provided by a governmental agency. The FHLMC purchases mortgages from originators and creates a mortgage pool to collateralize the issuance of its own securities. The only implicit guarantee is that of timely payment, but, this does not apply to delinquencies or defaults in mortgage principal. The PC program succeeded in expanding the investor base of mortgage pass-throughs and led to similar issuances by private financial institutions and the emergence of mortgage conduits commencing in 1977. The FNMA issued its first mortgage-backed security backed by conventional residential mortgages in 1981.[32] The innovations and changes in the secondary residential mortgage market continued throughout the 1980's, in part due to interest rate volatility and regulations imposed by the Federal Home Loan Bank Board (FHLBC) and the Comptroller of the Currency. These changes led to the expansion of the market for adjustable rate mortgages and soon thereafter securities backed by these instruments.

Pass-through securities, while similar in purpose and structure, may differ in several important ways. These variations may include: the aforementioned differences in the guarantees on the security or mortgages (agency or conventional), the nature of the underlying mortgages, or alteration in the means to distribute cash flows to security holders. As the purchaser of a pass through security acquires a share of the cash flow from the mortgages in the pool, the nature of

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[31] Op. Cit., Fabozzi and Modigliani, p.22.
[32] Lederman, ed., *The Handbook of Asset-Backed Securities*, p.362.

the mortgages is critical in the determination of the value of the instrument. The pass through

is an attractive instrument for issuers in that the security holder (and not the issuer as is the

case with a mortgage-backed bond) is subject to the prepayment behavior and risk of the

underlying mortgages. Conversely, the absence of call protection coupled with the long

weighted average life precludes many institutions, including insurance companies and pension

funds, from investing in these securities. These instruments are "unattractive to many investors,

who find them too static in response to market interest shifts in favor of lenders and too

volatile in response to interest shifts in favor of borrowers."[33]

Collateralized Mortgage Obligations

The collateralized mortgage obligation (CMO) was created to attract investors who

traditionally avoid the prepayment risk inherent in pass-through securities. The CMO is

different from the traditional mortgage pass-through in that it splits the cash flows generated

by a pool of mortgages into categories and issues securities with claims on specialized cash

flows generated by the entire mortgage pool. The CMO, therefore, was innovative in that it

allows investors to select among classes of securities bearing different interest rates and

maturities. This permits investors to divide prepayment risk according to individual

preferences for cash flows with specific maturities.

A CMO is similar to a mortgage-backed bond in that it is a debt instrument collateralized by a

pool of mortgages. The CMO differs from the pass-through mortgage security as the issuer

retains ownership of the mortgage pool and issues the bonds as debt collateralized by the

mortgage pool.[34] The CMO is similar to the mortgage pass-through security in that all interest

and principal payments (including prepayments) flow through to the investors. The investors

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[33] Op. Cit., Richards, p.106.

[34] Donald J. Smith and Mark F. D'Annolfo, "Collateralized Mortgage Obligations: An Introduction," *The Real Estate Finance Journal* (Summer 1985), p.39.

in the CMO, therefore, assume the aggregate prepayment risk for the pool; but, the CMO

defines how this risk is allocated.

The CMO prioritizes the payment of interest and principal among the various "tranches" or

classes of the securities with different maturity dates.  This financial engineering is

accomplished by dividing risk "among distinct security holders who have preferences for cash-

flows with specific maturities."[35]  The selection of the maturities of these "tranches" is

designed to meet the investment requirements of various classes of investors.  Through the use of

a CMO, therefore, the issuer effectively creates a number of instruments with a variety of

payment and maturity streams that are significantly different from the underlying mortgage

pool.  Based on this prioritization, some classes of CMO investors receive cash flows as do

investors in conventional debt securities, while others agree to defer cash flows to later periods.

Higher priority CMO securities are thus similar to short term coupon bearing bonds due to more

predictable cash flows, whereas the lower priority securities can be compared to intermediate

and long term coupon bearing bonds.  The CMO, as with the majority of innovative structuring in

the mortgage backed securities market, was created to appeal to a wider investor base,

specifically those willing to accept the risks associated with earning higher yields than those

earned on mortgage-backed bonds.

The first CMO was issued in 1983 by FHLMC in a $1.0 billion offering that was at the time the

largest single issue of mortgage-backed securities in the U.S. secondary market.  CMOs have

grown in volume since the early 1980s, particularly following the legislation enacting The

Secondary Mortgage Market Enhancement Act (SMMEA) in 1984.[36]  The CMO has evolved into

an extremely complex investment structure with a wide array of possible tranche alternatives.

The variations, both in terms of principal repayment provisions and coupon variations have

[35] Tim S. Campbell, *Money and Capital Markets* (Glenview, IL: Scott, Foresman and Company, 1988),
    p.496.
[36] Op. Cit., Fabozzi and Modigliani, p.32.

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fostered numerous investment vehicles. Principal repayment variations include: sequential pay tranches, planned amortization class (PAC) tranches and a targeted amortization class (TAC). Coupon variations for CMOs include: class Z tranches (accrual/acceleration bonds), floating rate tranches, inverted floating rate tranches and super floating rate tranches. Additional CMO derivative instruments that have grown explosively include Principal only (PO) and Interest only (IO) tranches.

Real Estate Mortgage Conduit

The creation of the real estate mortgage conduit (REMIC) through The Tax Reform Act of 1986 provided increased flexibility for the design and structuring of mortgage-backed securities. Traditional pass through and CMO securities prior to the creation of the REMIC had important tax implications which hindered the issuance of these and other mortgage-backed instruments. These tax related impediments were alleviated by the REMIC, which, by election of the issuer, is a well defined flow through entity for tax purposes.[37] Taxable income or loss is passed directly to the residual holder, thereby avoiding taxation at the entity level. The legislation permitted the use of sale of assets treatment for financial accounting purposes without the associated tax liability to the issuer.[38] REMICs have two representative forms of ownership: regular interests which can have multiple classes and debt characteristics, and residual interests which have only one class and have equity characteristics.

REMIC tax status permits the creation of synthetic assets, risk segmentation, maturity segmentation, or the addition of credit enhancement to mortgage loan documents subsequent to their origination. Thus REMIC status can be used with closed loans in the context of a conduit program, (where loans are pooled in a multi-class structure subsequent to origination without

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[37] Op. Cit., Conlon and Butch, p.687.
[38] Standard and Poor's, "Standard & Poor's Creditreview: Residential Mortgages"(New York: October 25, 1993), p.7.

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borrower involvement), for portfolio transactions, or for a market responsive restructuring of a

loan or pools of loans. REMIC status can be elected for if "certain tests under the relevant Code

sections are satisfied, regardless of the arrangement's state law status as a trust, corporation,

partnership, etc."[39] REMIC status can be used with either residential or commercial mortgage

pools and by compliance with the REMIC rules and making the REMIC election, a legal entity

or segregated asset pool may be treated as a REMIC for Federal tax purposes. The principal

benefits of REMIC status are: "(1) the ability to overlay a multi-class security on conventional

mortgages, (2) tax and accounting flexibility to portfolio lenders, and (3) a broader investor base

for mortgage securities."[40]


Further benefits of the legislation providing for REMICs included the removal of the

requirement for a financial subsidiary to issue securities. This effectively eliminated the need

for overcapitalization and improved the financial efficiency and viability of issuing mortgage-

backed securities. REMIC rules, however, permit only a closed-end investment vehicle and the

assets that may be included in the issue are restricted. Furthermore, REMIC status imposes

certain limitations on the ability to manage 'problem assets'. Unlike the federal precedent,

REMIC has no direct impact on matters of state taxation; although, some states have enacted

statutes which provide more favorable tax treatment.[41] Lastly, under the new legislation,

regular interest income in a REMIC is exempt from withholding requirements for foreign

investors.

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[39] Op. Cit., Conlon and Butch, p.686, 687.
[40] Roberta Paula Books and Jamshid Jahm Najafi, "Elements of Design for a Commercial
    Mortgage Security" (Salomon Brothers, December 1987), p.18.
[41] Jess Lederman, ed., The Secondary Mortgage Market (Chicago, IL: Probus Publishing Company, 1992),
    p.326.

The development of commercial mortgage securities can be traced to mortgage-backed bonds,

however, the contemporary market for commercial mortgage securities arguably first

developed in late 1983.  The evolution of the commercial mortgage bond had successfully

established the fundamental building blocks required to sustain future growth and development

in the commercial mortgage securities market.  These building blocks include: "underwriting and

rating methodologies, structural alternatives, credit enhancement mechanisms, tax and

### Exhibit VIII

### RTC and Non-RTC Issuance of Multifamily and Commercial
### Mortgage Backed Securities: 1984-1994
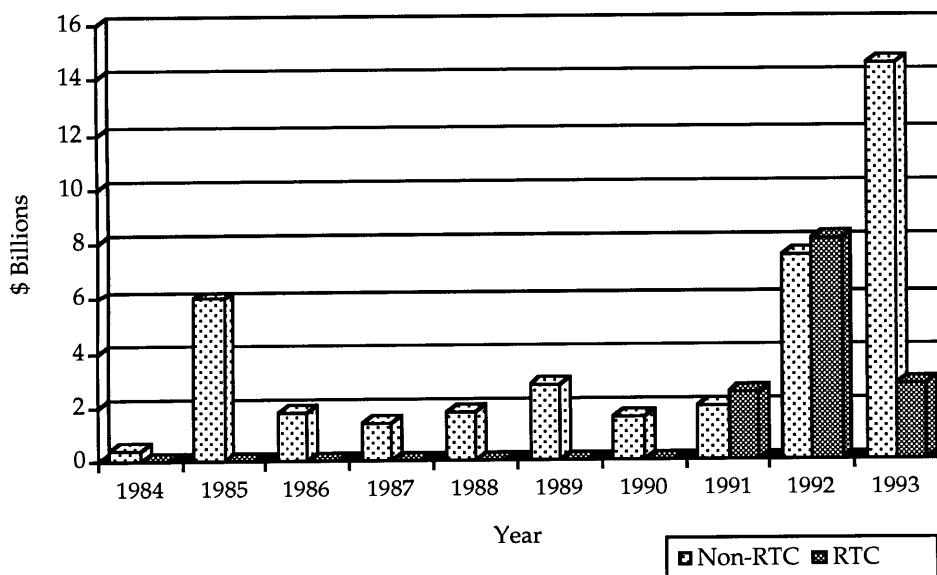


Source:  Kenneth Leventhal & Co.[42]

accounting treatment, and investor awareness, as well as placement and trading capability."[43]

Initially, the issuance of commercial mortgage backed securities was largely restricted to

Eurobond financings or private placements, so as to avoid the regulations and requirements of

the Securities and Exchange Commission (SEC).  This market has, partially due to the success

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[42] Kenneth Leventhal & Co., "Property Securitization Survey 1993" (1994), p.9.
[43] Op. Cit., Lederman, ed., The Handbook of Asset-Backed Securities, p.386.

of Resolution Trust Corporation's commercial mortgage-backed issues, grown dramatically in terms of both agency and non agency issues (Exhibit VIII).

The first commercial mortgage security was an unrated issue collateralized by first lien positions on three Manhattan office buildings owned by Olympia & York Equity Corporation. This issue in November 1983 totaled approximately $1.0 billion in floating rate first mortgage notes based on a fifteen year term to maturity. The terms of this issue were accrual rate floating at 175 basis points over the 90 day Treasury bill rate.[44] The security was bolstered with significant credit enhancement in the form additional collateral consisting of government securities and a letter of credit from an AA-rated New York City bank.

The increasing importance and implications of the commercial mortgage backed securities market fostered the publication of rating methodologies for single property and commercial mortgage pools. The rating agencies evaluate debt and other securitized transactions based upon the ability of an issuer to meet its debt obligations. In November 1984, Standard & Poor's published rating methodologies for individual properties and commercial mortgage pools.[45] In the case of the former, S & P focused on large, tenanted, single office buildings as they were perceived to be the least subject to substantial economic, structural and market changes. Regarding the latter, S & P evaluated pools of commercial mortgages due to the requirements of large portfolio lenders and their need to economically securitize their portfolios.

Following the release of the S & P criteria for the rating of commercial mortgage backed securities, several large issues were brought to the market using portfolio mortgage products. The first issue in December 1984 was a $204.8 million CMO offering by Penn Mutual Life Insurance Company, which was backed by a seasoned portfolio of eighty five properties.[46] One

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[44] Ibid., p.412.
[45] Thomas J. Healey, "A Promising Outlook," *Mortgage Banking* (July 1990), p.28.
[46] Op. Cit., Richards, p.135.

month later, in January 1985, Prudential Realty Securities III, an entity owned jointly by a wholly owned subsidiary of Prudential Life Insurance Company of America and a New York investment house issued a security (CMO) with credit enhancement through a Prudential subsidiary. The transaction totaled approximately $1.3 billion ($931.7 million in sinking fund bonds and $365.2 million in zero coupon bonds) and was placed in the Euromarket.[47] Both of these issues were AAA rated by S & P, however, the ratings were attributed to guarantee mechanisms provided by the issuers as in both cases neither the bonds nor the guarantees were secured by the mortgages.

The volume of commercial mortgage backed security activity increased dramatically throughout 1985 as evidenced by Exhibit VIII. This activity included mortgage pool issues by subsidiaries of The New England Life Insurance Company and Connecticut Mutual amongst others. In May 1985, the market for commercial mortgage backed securities collateralized by individual properties opened with the issuance of an AA rated commercial mortgage security (bond) on an unfinished, unoccupied building in Manhattan by the American Express Company. The unusual structure of this deal was accomplished due to; completion and interim debt service guarantees, zero coupon debt structure, high overcollateralization, and the strong covenant of an American Express long term lease. Similar issues secured primarily by single properties soon followed in 1985, including offerings by: Fisher Brothers Financial Realty Company, Olympia & York Maiden Lane Finance Corporation and Lincoln Property Associates Limited (the first participating mortgage bonds).[48] These issues utilized a variety of guarantees and provisions to secure cash flows to investors as credit enhancement. Both the Fisher Brothers and Olympia & York issues were AA rated by S & P, while the Lincoln Property Associates issue was unrated.

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[47] Ibid., p.135.
[48] Joseph C. Franzetti, "Growing the Market for Commercial MBS," *Mortgage Banking* (July 1989), p.34.

During late 1984 and early 1985, an organized market for the trading of commercial whole loans began to develop parallel to the development of rated and unrated securities. For a variety of reasons, many financial institutions have a need to liquidate all or part of their commercial real estate portfolios and the whole loan market emerged as a means to provide a secondary market for existing and seasoned whole loans that were not directly amenable to rating and structuring. Sellers and buyers in the whole loan market include thrifts, savings and loans, life companies, and pension funds with existing property portfolios. In the mid 1980's investment banks devised "re-underwriting" standards to evaluate, price and market seasoned mortgages.[49] This was achieved by packaging the whole loans in participations backed by the representatives and warranties of the vendor. The basic re-underwriting methodologies that were created for whole loans in 1985 remain in use for whole loan sale and security transactions.

The explosive growth of the residential mortgage backed securities market was somewhat retarded by the issuing of the "Sears Regulations" in 1984. By this period the market for residential mortgage securities was booming. In that year, however, the Treasury issued the "Sears Regulations", which prohibited the tax free treatment of multiclass pass through securities.[50] To counter the Sears Regulations and their affect on the development of the secondary market, a number of trust structures were created. These structures, however, were extremely complex and did not entirely overcome the impediment of the new regulations. The tax treatment of mortgage backed securities was ultimately resolved by the provision for real estate investment conduits as part of the Tax Reform Act of 1986. REMIC instituted guidelines to ensure the tax free treatment of mortgage backed securities on the federal level for both residential and commercial mortgage instruments. Additionally, the REMIC legislation had important implications for commercial mortgage securities through the provision for

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[49] Op. Cit., Lederman, ed., *The Handbook of Asset-Backed Securities*, p.394.
[50] Ibid., p.390.

senior/subordinated structures.[51] This structure permits a subordinated piece of debt to provide credit enhancement for the senior debt pieces and thereby improves the ability of issuers to attain higher ratings and improve the pricing of their issues. The risk is concentrated in the subordinated class which, in return for higher yields, sustains the risk of delinquencies and defaults.

During the initial expansion of the commercial mortgage backed securities market most issues were rated and received credit support based on the credit rating of the issuer. The first commercial mortgage backed issue with an agency rating based on third party credit enhancement were brought to the market in 1987.[52] The rating analysis was accordingly focused primarily on the credit quality of the institution issuing the support, as opposed to the actual real estate or issuer. There is in this instance no investor recourse to the issuer.

The commercial mortgage backed securities market experienced slow and unsteady growth through the late 1980's, both in terms of issuance and trading. Not coincidentally, the domestic commercial real estate market witnessed an extended correction in property values over this period. The weakness in the commercial real estate sector was a result of excessive leveraging of property transactions in the 1980's as well as a general decline in economic conditions. From 1988 to 1993 according to the National Council of Real Estate Investment Fiduciaries and the Frank Russell Company multifamily properties decreased in value by 16%, office properties by 43% and retail assets by 20%.[53] This study estimated the average loss for all property types to be 30%. In the 1980's competition among the primary lenders in the commercial mortgage market was fierce and given limited secondary markets for whole loans and mortgage securities, most of the loans originated were kept in portfolio. The economic downturn and

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[51] Tim S. Campbell, *Money and Capital Markets* (Glenview, IL: Scott, Foresman and Company, 1988), p.496.

[52] Op. Cit., Healey, p.30.

[53] Frank Russell Co., "The Russell-NCREIF Real Estate Performance Report (Third Quarter 1993)", p.5-7.

deterioration of the real estate market resulted in many financial institutions that held commercial mortgages in portfolio to attempt to reduce their real estate exposure through the sale of these mortgages. The holdings of multifamily and commercial mortgage debt for financial institutions from 1987 to 1993 reflect these changes (Exhibit IX and Exhibit X).

## Exhibit IX

### Multifamily Mortgage Debt by Holder: 1987-1993 Q4



| ■ Commercial Banks | ▨ Savings Institutions | ▯ Life Insurance Companies | ■ Federal and Related Agencies |
|---|---|---|---|
| ■ Mortgage Pools or Trusts | ■ Private Mortgage Conduits | ▨ Individuals and Others | |
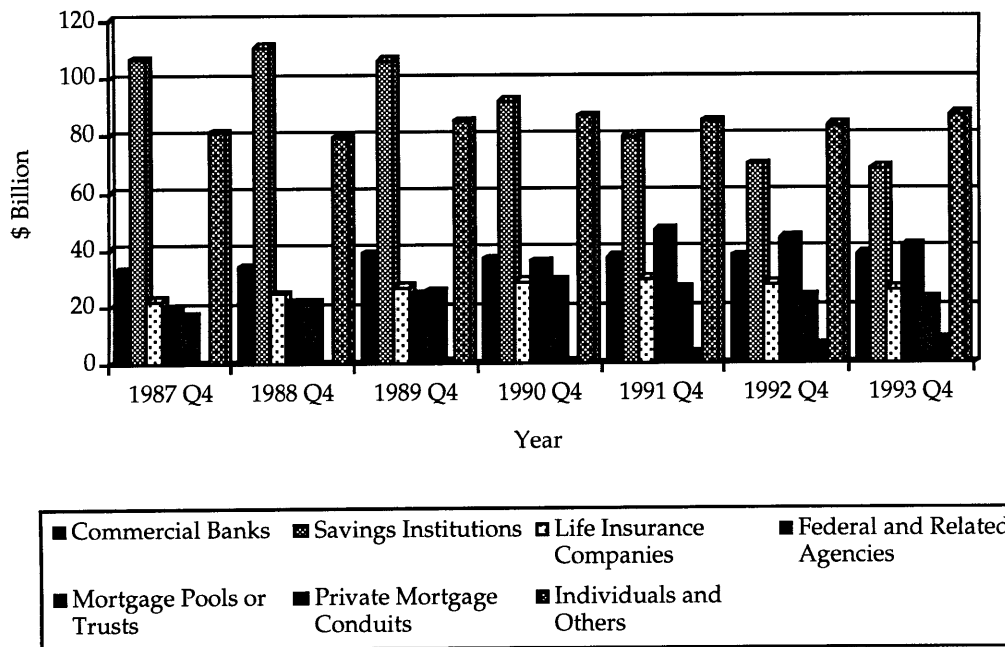
Source: Federal Reserve[54]

Activity in the commercial mortgage backed securities market was substantially increased by the actions of the Resolution Trust Corporation (RTC). Legislation providing for the creation of the RTC was contained in the Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA).[55] The objective of the RTC was to dispose of the assets and liabilities of the failed savings and loan institutions. This task was to be achieved by selling these institutions (or merging them with stronger thrift institutions) or liquidating their assets as a last resort.

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[54] Op. Cit., Federal Reserve Bulletin, p.A38.

[55] Stuart M. Saft, "The Basics of FIRREA and the Resolution Trust Corporation," *The Real Estate Finance Journal* (Winter 1991), p.48.

The RTC was under a congressional mandate to: "sell the assets of failed thrifts at the highest price, in the shortest time, and with the least possible disruption to the private sector."[56] The steps taken by the RTC to achieve its mandate included the sale of non agency (conventional) residential mortgages and the disposal of commercial and multifamily mortgages through securitization.

## Exhibit X
## Commercial Mortgage Debt by Holder: 1987-1993 Q4



| ■ Commercial Banks | ⊠ Savings Institutions | ◘ Life Insurance Companies | ■ Federal and Related Agencies |
| ■ Private Mortgage Conduits | ■ Individuals and Others | | |
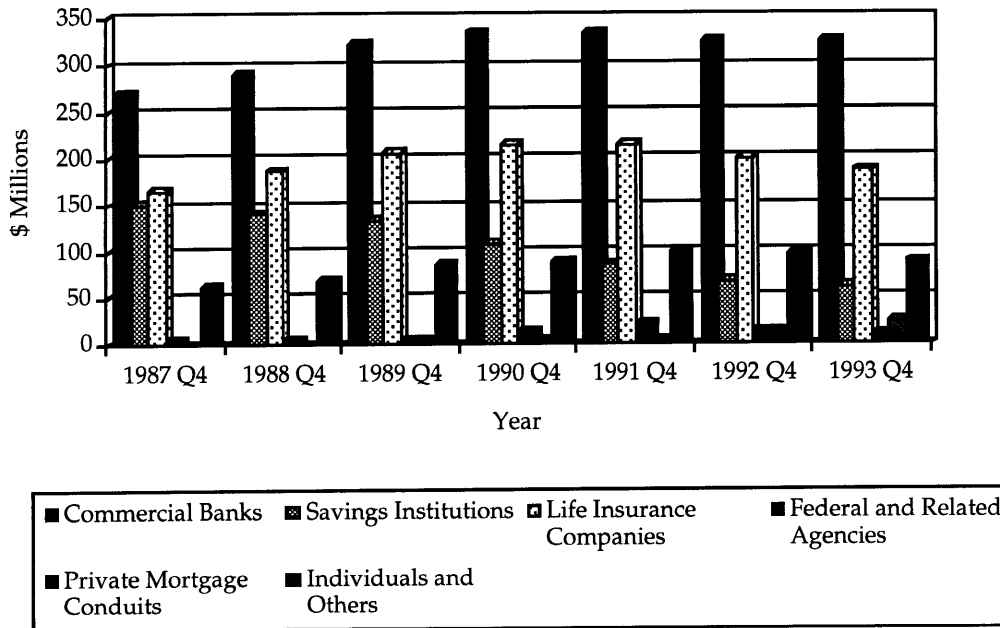
Source: Federal Reserve[57]

The RTC initially sought to dispose of multifamily and commercial mortgages held by thrifts by issuing securities collateralized by income producing properties. This task was difficult as the market for commercial mortgage-backed securities market was still in the early stages of development and the capital markets were not fully familiar with such instruments. The RTC, therefore, had to be a forerunner in the market and play an innovative role in the creation and marketing of commercial mortgage-backed securities products. In the two year period ending in

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[56] Leonard Sahling, "Managing the Cleanup of the Thrift Crisis," *Real Estate Review* (Winter 1993), p.51.
[57] Op. Cit., *Federal Reserve Bulletin*, p.A38.

December 1992, the RTC securitized more than $32 billion of mortgages, with multifamily and commercial mortgages comprising nearly $11 billion (or 34% of total RTC issuance over the period).[58]

The organization of the initial multifamily securities issued by the RTC was based on those issues securitized on successful RTC single family mortgage-backed securities. The multifamily securities, like the single family issues, are registered with the SEC and the collateral is held in trust. Additionally, in order to achieve investment grade ratings a number of credit enhancements have been utilized by the RTC in designing the securities. The modification of the single family mortgage-backed security prototype included a significant increase in reserve funds to compensate for credit risk inherent in commercial mortgage-backed securities The RTC increased reserve funds for the multifamily issues to a total 25% to 35% as compared to 10% to 27% for the one to four family mortgage securities.[59] Furthermore, the multifamily securities created by the RTC utilized senior/subordinated structures as credit enhancements, resulting in total credit enhancement for the multifamily mortgage backed securities ranging from 32% to 45%. In 1991 the RTC issued a total of seven multifamily mortgage-backed securities amounting to $2.6 billion.[60]

The RTC issued its first non residential commercial mortgage-backed security in February 1992. This issue (1992-C1) was a $496.99 million offering backed by a pool of 1,160 mortgages. These mortgages (all performing) had an average debt service coverage ratio of 1.34 and an average outstanding loan balance of $428,441. This issue (similar to most of the RTC's multifamily mortgage backed securities issues) was divided into senior and subordinated tranches and

[58] Tom R. Dalton, "Signs of a Rebound," *Mortgage Banking* (July 1993), p.47.
[59] Op. Cit., Sahling, p.58.
[60] Ibid., p.58.

included a reserve fund, which amounted to 30% of the issue.[61] The total credit enhancement

for 1992-C1 amounted to 45% for class A certificates.

The commercial mortgage securities market has evolved in response to the requirement for

greater liquidity for income producing mortgage loans, due in large part to the effect of risk-

based capital rules applied to regulated financial institutions. The foundations for these rules

were in the Basle Agreement of 1988.[62] Regulatory risk deals with the changing capital

requirements and operational freedoms imposed by the Federal Reserve and Congress. The

concept of risk based capital considers that appropriate capital levels should reflect credit risk

of the assets being supported. In the new regulatory environment, yields alone no longer

### Exhibit XI

### Commercial and Multifamily Mortgage Flows by Holder: 1983-1993 Q4



| ■ Commercial Banks | ▨ Savings Institutions | ◘ Life Insurance Companies | ■ Federal and Related Agencies |
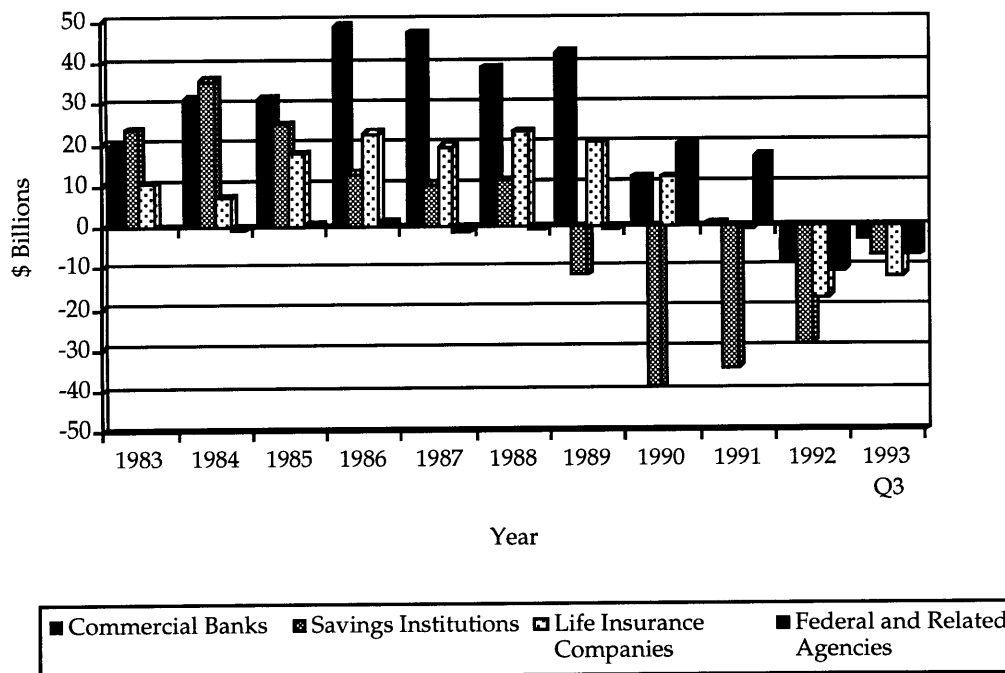
Source: Federal Reserve[63]

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[61] Standard & Poor's, "Creditreview: Commercial Mortgage Securities," (New York, March 1993), p. 49, 50.

[62] Michael L. Ryan, "Income Property's Brave New World: Tying the Hands of Banks and Thrifts," *Mortgage Banking* (July 1989), p.15.

[63] Op. Cit., *Federal Reserve Bulletin*, p.A40.

determine the best investment; institutions must seek assets that represent both acceptable risk

levels and the most efficient use of capital. Commercial and multifamily mortgage flows from

1987 to 1993 Q4 illustrate the dramatic changes occurring in the property finance markets

(Exhibit XI), in part due to the imposition of risk based capital requirements. For example,

"holding commercial real estate loans may be relatively less appealing for a bank or a savings

and loan from a capital standpoint because, except for certain multifamily loans having a fifty

percent risk weighting, they have been placed in the one hundred percent risk weighting

category, as compared to a fifty percent risk weighting category for residential whole loans and

a twenty percent risk weighting category for residential mortgage backed securities."[64]

In December 1990, the National Association of Insurance Commissioners (NAIC) officially

adopted the Solvency Agenda for 1991, which investigated the imposition of capital reserves

## Table I
### Risk Based Capital Requirements for Insurance Companies: Risk Factors

**Stocks and Bonds**

| | |
|---|---|
| Common Stock | 30.0% |
| Preferred Stock | 5.0% |
| U.S. Government Bonds | 0.0% |
| AAA to A Bonds | 0.3% |
| BBB to CCC Bonds | 1.0-20.0% |
| Bonds in or near Default | 30.0% |

**Mortgages**

| | |
|---|---|
| Joint Ventures and Limited Partnerships | 20.0% |
| Company-Occupied & Investment Property | 10.0% |
| Foreclosed Property | 15.0% |
| Commercial Mortgages | |
|     In Good Standing | 3.0% |
|     In Delinquency | 15.0% |
|     In Foreclosure | 20.0% |
| Non Insured Residential | 0.5% |

Source: Claude J. Zinngrabe, Jr., Urban Land[65]

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[64] Op. Cit., Ryan, p.17.

[65] Claude J. Zinngrabe, Jr., "Real Estate Investment by Insurance Companies," Urban Land (March 1994), p.14.

for commercial real estate mortgages and equities, recommended risk based capital requirements for all asset classes (Table I) and exposed for consideration a draft model law on authorized insurance investments to restrict a life insurance company's asset exposure in commercial real estate.[66] This risk is calculated following a review of four risk classes: asset default risk (C1), insurance risk (C2), interest rate risk (C3) and general business risk (C4). A failure to meet the Total Authorized Control Level Risk Based Capital Ratio results in the life insurance company facing regulatory action.[67]

The risk adjustment rating of the particular type of investment dictates the guidelines an institution must meet. A three percent risk adjustment factor for commercial mortgages would mean that for every $100 million invested in commercial mortgages, a financial institution must have $3 million of capital to meet the risk based capital ratio test. Given the low capital base that is generally associated with the banking and insurance industries, this risk rating system may be a powerful deterrent to the holding of commercial mortgages.

Commercial mortgage-backed securities are backed by a wide variety of collateral types and issues now include, among other products, mobile home parks, hotels and health care facilities. Total issuance of commercial mortgage backed securities increased by 3.62% in 1993, climbing to $17.2 billion from $16.6 billion in 1992. The growth of the market from 1990 ($1.6 billion) to 1992 reflects the massive issuances by the RTC. Although the commercial mortgage securitization program of the RTC has slowed, there has been explosive expansion in the issuance of private sector instruments. In 1993 the private sector (non RTC) accounted from $14.5 billion in securities issued, an increase of 93.33% over the $7.5 billion in securities issued in 1992. Even more indicative of the growth is a comparison of the issues in 1992 and 1993 with the

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[66] Gail Davis, "Building New Boundaries for Life Insurance Companies," *Mortgage Banking* (July 1992), p.42.

[67] Op. Cit., Zinngrabe, Jr., p.12, 13.

$2.0 billion of commercial mortgage backed securities issued in 1991. The projected total volume for commercial mortgage backed securities issuance in 1994 is $20 billion.[68]

Multifamily properties collateralized 28% of all commercial mortgage backed securities issued in 1993.[69] The successful issues by the RTC in the multifamily mortgage market, coupled with the relative ease to obtain investment grade ratings with minimal credit support relative to commercial mortgages and regulatory advantage over other commercial mortgage backed securities due to SMMEA, have made multifamily issues among the most popular issues. In 1993, twenty six multifamily issues (non RTC) resulted in total issuance of $3.0 billion (Exhibit XII).

Approximately 72% of all outstanding non RTC commercial mortgage backed securities are collateralized by non-multifamily properties.[70] Non-residential backed securities have been

**Exhibit XII**

**1993 Non-RTC Issuance of Commercial Mortgage Backed Securities: by type**



$ Billions
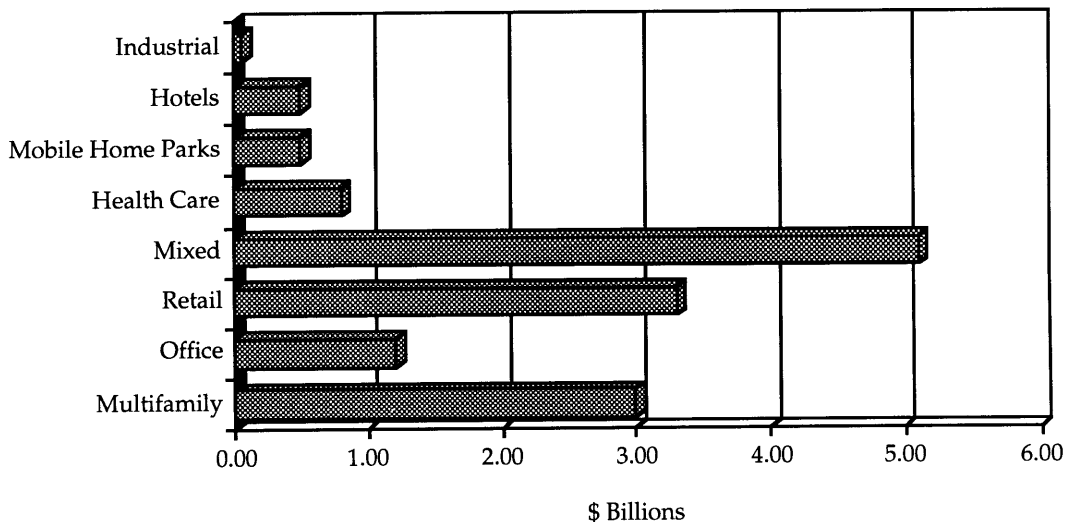
Source: Kenneth Leventhal & Co.[71]

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[68] Op. Cit., Benjamin and Baker, p.68.
[69] Op. Cit., Kenneth Leventhal & Co., p.15.
[70] Ibid., p.15.
[71] Ibid., p.15.

issued in pools in an increasing number of deals. In 1993, only 14.21% of all commercial

mortgage-backed securities issues were collateralized by single properties, including retail,

office and hotel properties.[72] These issues totaled $2.6 billion, or 17.93% of the non RTC

market. While the total issuance of commercial mortgage-backed securities increased only

3.62% from 1992 to 1993, there was a dramatic shift in the mix of issuers. In 1992, the RTC

issued 54.82% of all commercial mortgage backed securities, however, in 1993 the RTC issued

only 16.28% of these instruments.

The largest issuers of commercial mortgage backed securities (in dollar volume) in 1993 were

owners and developers (Exhibit XIII). This sector issued $3.1 billion in securities, or roughly

21.38% of the total non RTC issue in 1993. In fact, issuances by owners/developers and insurance

companies both individually exceeded RTC activity in 1993 in total volume, reflecting in the

case of the former a lack of capital available to real estate from traditional sources. Mortgage

**Exhibit XIII**

**1993 Non-RTC Issuance of Commercial Mortgage Backed Securities: by Issuer, 1993**



$ Millions
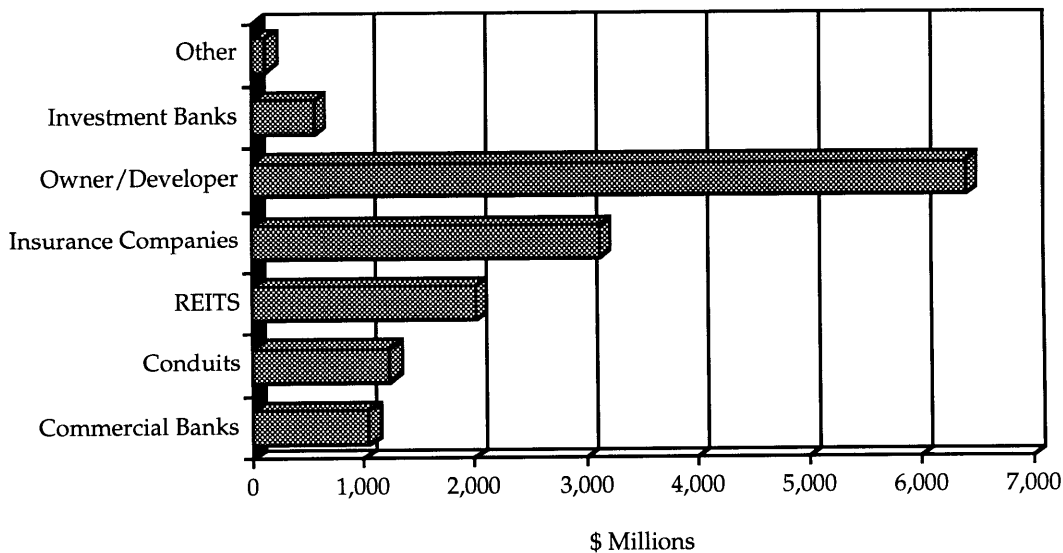
Source: Kenneth Leventhal & Co.[73]

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[72] Ibid., p.14.

[73] Ibid., p.11.

Real Estate Investment Trusts (REIT) have become an increasingly important issuer, as they invest in mortgages only. The thirty seven mortgage REITs in existence in 1993 had a total market capitalization of $3.4 billion.[74] The main capital market alternative to commercial mortgage-backed securities for investment in real estate are REITs. The growth of REIT activity in the commercial mortgage-backed securities market coincides with the increased number of initial public offerings in the REIT equity market. Over the three years up to July 1994, the market capitalization of REITs grew 251% to $41.66 billion. Hybrid REITs invest in both mortgages and equity and the market capitalization of these securities was $2.6 billion in June 1993.[75]

Conduits accounted for approximately 8.56% of total non RTC commercial mortgage-backed securities issuance in 1993 totaling $1.2 billion. Until recently, conduits focused on multifamily product; however, this has changed in part due to the emergence of substantial competition from life insurance companies. Conduits now compete in a variety of property types including shopping centers, industrial facilities, and mobile home parks.

Life insurance companies issued $3.1 billion of commercial mortgage-backed securities in 1993, accounting for approximately 21.54% of total non RTC issuance. The aforementioned changes to risk based capital requirements of insurance companies have provided incentive for these institutions to use securitization as a means to reduce holdings of commercial mortgages with relatively high risk ratings and risk based capital requirements. Insurance companies, like commercial banks and savings and loans, have had to alter their objective of maximizing return on assets to maximizing risk adjusted return on capital.

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[74] Laura Quigg, "Commercial Mortgage-Backed Securities" (New York: Lehman Brothers, December 1993), p.20.
[75] Ibid., p.19.

The growth of securities backed by commercial mortgages has been relatively slow in comparison to instruments backed by residential mortgages or even consumer receivables. At present, close to 40% of the one to four family mortgage loans have been securitized, whereas only 2.7% of commercial mortgage loans and 10.3% of multifamily mortgage loans collateralize securities.[76] The contrasting development of these markets has occurred despite having many common structural elements. Mortgage-backed bonds, mortgage pass-throughs and collateralized mortgage obligations can be used to securitize either residential (agency or non agency) or commercial mortgages.

Commercial mortgage-backed securities are similar to non agency residential mortgage securities and differ from agency securities (i.e. those backed by GNMA, FNMA or FHLMC) in that they have no government insurance or implicit guarantee for the payment of principal and interest. To compensate for the lack of a federal payment guarantee the commercial mortgage security, like the non agency residential mortgage security, is typically structured with some manner of credit enhancement to provide a safeguard against possible lags and deficits in cash flow. Credit enhancement for commercial mortgage securities is akin to that for non agency residential securities, it being either internal or external support. The amount of credit enhancement required for commercial mortgage securities, however, is usually far greater than for non agency residential securities, due to the various risks inherent in commercial mortgages.

The risk factors for residential and commercial agencies are perceived to differ in terms of relative importance. The most significant indicator of default in the commercial mortgage market is the debt service coverage ratio (DSCR). The main indicator of default in the residential mortgage market, however, is the loan to value ratio (LTV). Generally, the DSCR

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[76] Op. Cit., *Federal Reserve Bulletin*, p.A38.

of the commercial loan is reviewed periodically throughout the term of the mortgage and a default is deemed to have occurred should this ratio fall below specified minimum levels. The LTV for a residential mortgage is calculated at origination and reviewed thereafter only in the case of delinquent payments. Commercial mortgages have often been of a non-recourse nature and while amortized over periods of up to twenty five years, typically require a balloon payment prior to the amortization term. Furthermore, commercial mortgages commonly are originated with features preventing the prepayment of the loan, including; lockouts, prepayment penalties, and yield maintenance features.[77]

One of the primary obstacles to securitization (as well as the sale of whole loans) is the amount of information required by investors and regulatory authorities to facilitate the issuance of a mortgage-backed security. In the case of securities backed by commercial mortgages, the analysis of the property and review of tenancy agreements (as well as the quality of covenants) must be executed to meet investor demand as well as to merit a satisfactory rating. This analysis will provide the vendor with information necessary to determine the optimal strategy for the sale of the portfolio (or individual loan). Residential mortgages are largely homogenous and most home loans conform closely to standardized terms conceived by federal agencies, thereby requiring minimal additional information. The success of the residential mortgage market has furthered interest in expanding an active secondary mortgage market for commercial lending. The financing of commercial properties, however, remains the domain of institutional investors who issue mortgages for their own portfolios. The expansion of the commercial mortgage-backed securities market necessitates a number of impediments to be overcome or circumvented that make the securitization of, and creation of a secondary market for, commercial mortgages difficult at present.

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[77] Roberta Paula Books and Jamshid Jahm Najafi, "Elements of Design for a Commercial Mortgage Security: An Issuer's Primer" (New York: Salomon Brothers Inc., December 1987), p.5.

iv      Impediments to Development of the Commercial Mortgage Backed Securities Market

A survey conducted by Benjamin and Baker concluded that their are four main obstacles to the

expansion of commercial mortgage securitization.  These main impediments include; a lack of

consistent underwriting standards and a lack of homogeneity among product types, an

insufficient amount of data on project risks and products, regulatory constraints and the high

cost of securitization.[78]

There is a lack of uniformity of lending and underwriting standards for commercial mortgages,

both within institutions and the market generally.  Financial institutions participating in the

commercial real estate sector "maintain separate underwriting criteria that conform to their

portfolio requirements (e.g. different debt service coverage, loan to value ratios, or

documentation)."[79]  Individual institutions are now making concerted efforts to establish

uniform loan underwriting and documentation criteria.  Additionally, the lack of

standardization has been in part due to the fact that commercial real estate is heterogeneous,

with a diverse range of property types, tenants (and lease terms), locations and mortgage terms.

The success of residential mortgage-backed securities and the development of a secondary

market can be in part attributed to public policy.  Conversely, no federal or related agency has

issued mortgage insurance relating to, or been willing to guarantee, commercial mortgage backed

securities.  There has been no government agency or enterprise (like the FNMA, FHA or VA for

example) to set underwriting standards for the commercial mortgage market as there has for

the residential mortgage market.  The lack of standardization and government (direct

involvement or through agencies) intervention in the commercial mortgage securities market

have reduced the potential investor base for these instruments.

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[78] John D. Benjamin and H. Kent Baker, "Establishing an Active Secondary Market for Commercial
      Mortgages," *The Real Estate Finance Journal* (Summer 1994), p.67.
[79] Ibid., p.68.

A second impediment to the development of the commercial mortgage backed securities market as identified by Benjamin and Baker is the scarcity of available information on risks and product lines. The residential mortgage-backed market development has been in part facilitated by the availability of this data; however, there is very little information published regarding default histories and delinquency rates for commercial mortgages.[80] This information is essential to determine the credit worthiness and assessment of risk for properties to be securitized. Unlike securities backed by one to four family mortgages, where the primary risk is that homeowners will prepay their mortgage, the risk of default is the primary concern of investors in commercial mortgage backed securities.

In the case of single family mortgages, credit risk (the risk of default) is either minimal or non existent in the case of certain agency issues as the investor is indemnified against this risk. Default risk for non agency residential securities has been low and mortgage pool histories have been studied from an actuarial standpoint to determine risk.[81] There has been limited information available regarding default risk for commercial mortgages and given it is highly variable by property type and region, this makes it particularly difficult to quantify credit risk. As previously mentioned, and in contrast to residential mortgage securities, prepayment risk is minimal for commercial mortgages.

Benjamin and Baker cite the limited knowledge of financial institutions investing in real estate related products and risks as a factor restricting the growth of commercial mortgage backed securities. Books considers investment in real estate to require the development of new skills for investment bankers.[82] The knowledge of investors of these products and investment in

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[80] Ernest T. Eisner, "Progress in the Securitization of Commercial Real Estate," *The Real Estate Finance Journal* (Winter 1988), p.82.

[81] Ibid., p.81.

[82] Roberta Paula Books, "Commercial Real Estate as a Capital Market," *Real Estate Finance* (Fall 1988), p.20.

commercial real estate generally too appears insufficient and has contributed to the slow growth of the market. There is no "benchmark" security for investors or issuers alike to measure their product against. Benjamin and Baker comment that, "little empirical evidence exists on the risk and return characteristics of commercial mortgage pools, securitized instruments, and portfolios" and that there is "little understanding of the correlation between commercial mortgages and other assets that may reduce unsystematic risk."[83]

Regulatory constraints are a third major impediment to the development of the commercial mortgage-backed securities market. The risk based capital requirements created under FIRREA have slowed the growth of both the primary and secondary commercial mortgage markets. The inability of a bank to comply with the capital requirements will reduce the institutions' regulatory rating. The increased capital requirements for banks, thrifts and insurance companies has been less favorable to commercial real estate as compared to residential property. For example, a regulated bank must maintain capital reserves of 100% for commercial real estate mortgage assets. Conversely, residential mortgages necessitates reserves of 50% for whole loans and 20% for mortgage backed securities. Furthermore, "legislation to change existing reserve requirements and financial institution operating practices so as to help the securitization of commercial mortgages (and improve asset liquidity) has been slow to occur."[84] While this is strong incentive for banks, thrifts and insurance companies to securitize and sell their commercial loan portfolios, the risk based capital requirements therefore limit the potential market for investors for these securities.

Despite the strong demand for capital on the part of banks and thrifts, these institutions have been unable to sell their commercial mortgage loans at a high enough price, given their need to sell the first loss position on such transactions to qualify for sales treatment under Regulatory

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[83] Op. Cit., Benjamin and Baker, p.68.
[84] Ibid., 69.

Accounting Principal (RAP) Guidelines.[85] These institutions have had to find liquidity

through the sale of other assets. A final regulatory constraint to the growth of the commercial

mortgage backed securities market is the FDIC Improvement Act of 1991.[86] This act maintained

the restrictions on banks from underwriting securities and thus the expansion of the commercial

mortgage-backed securities is reliant on non-bank institutions.

There is a cost of securitization and this expense is an impediment to the development of the

commercial mortgage backed securities market. To meet regulatory and investor requirements,

## Table II

### Costs of Securitization: Sample $100 million Public Issue (in $000's)

| | |
|---|---|
| Gross proceeds from offering | $100,000 |
| Less: Underwriting Fee | (400) |
| Proceeds to issuer | $99,600 |
| | |
| Less: Issuance Expenses | |
| Credit Enhancement | 100 |
| SEC, Blue Sky Filing | 80 |
| Rating Agency Fee | 40 |
| Printing and Engraving | 30 |
| Accounting | 30 |
| Trustee's Fee | 40 |
| Legal Fees | 80 |
| Total Issuance Expenses | 400 |
| | |
| Net proceeds of issuance | $99,200 |
| As a percentage of gross offering | 99.20% |

Source: Salomon Brothers[87]

the process of securitization necessitates substantial legal, accounting, credit enhancement and

underwriting fees. In 1992 Salomon Brothers estimated the cost of securitization to be eighty

basis points as illustrated in Table II. Furthermore, the cost of servicing the loan requires

ongoing fees and is significant. The servicing of commercial mortgage pools is important to

maintain the flow of interest and principal payments to the investor. Like residential

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[85] Op. Cit., Lederman, ed., *The Handbook of Asset-Backed Securities*, p.68.
[86] Op. Cit., Benjamin and Baker, p.69.
[87] Salomon Brothers, 1992

mortgage securities, commercial mortgage pools may contain properties in a wide variety of locations and the ability of the servicer to maintain the credit quality is essential to integrity of the security. This is of particular importance to commercial mortgages due to increased delinquency and the likelihood of default relative to single family mortgages.

**IV    Default Risk for Commercial Mortgage-Backed Securities**

i    The Valuation of Commercial Mortgage-Backed Securities

There are few comprehensive or reliable sources of data available on commercial mortgage

performance to provide for the evaluation of this diverse asset group. Specifically, there is a

distinct and definite lack of broad historical information required to determine default

frequency and loss severity for commercial mortgages, unlike that which is available for the

single family residential mortgage market. The dearth of data and lack of uniformity of

underwriting standards (as well as the variety of individual commercial real estate assets)

results in commercial mortgage performance studies unable to provide the accuracy of those

relating to one to four family mortgages.

Titman and Torous use a contingent claims model to estimate the value of commercial

mortgages.[88] The paper focuses on default risk and its effect on the valuation of these

instruments. Commercial mortgages and commercial mortgage-backed securities are often

considered as an alternative to investments in corporate bonds. These instruments obviously

differ in a number of ways; however, they comprise substantial components of the capital

markets. Additionally, these instruments are similar in that they are affected by credit risk,

offer various maturities, and can have a variety of call protection features.[89]

Commercial mortgage-backed securities generally trade at much wider spreads over

comparable term treasury securities than corporate bonds. For example, a AAA rated

commercial mortgage-backed security with a seven year average life has traded at 105 basis

points over treasuries, whereas, a AAA rated corporate bond was trading at 35 basis points over

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[88] Sheridan Titman and Walter Torous, "Valuing Commercial Mortgages: An Empirical Investigation of the Contingent-Claims Approach to Pricing Risky Debt," *The Journal of Finance* (June 1989), p.345.

[89] David P. Jacob and Kimbell R. Duncan, "Commercial Mortgage-Backed Securities: An Emerging Market," (New York: Nomura Securities International, January 1994), p.42.

the same benchmark.[90] There are several reasons for this variation; these factors relate to the real estate market generally, the composition and characteristics of mortgage-backed instruments and to the development of the secondary market for commercial mortgages.

The widespread and enduring slump of the real estate markets in the late 1980's and early 1990's has had the effect of adding a "real estate" premium to securities backed by property.[91] Furthermore, some of the early structured commercial mortgage transactions have performed poorly, leading to investor apprehension and requirement of incentive in terms of increased yields. The regulatory actions which were a consequence of the real estate and banking crisis have resulted in many financial institutions reducing their exposure to or exiting the commercial real estate lending market, while a number of investor groups have been reluctant to participate in the market for new securitized products. Finally, the market for commercial mortgage-backed securities is relatively illiquid in comparison to the market for corporate bonds. All of these factors contribute to the valuation of commercial mortgage-backed securities requiring relatively higher yields compared to investments in corporate bonds.

ii      Default Risk and Commercial Mortgage Backed Securities

Default risk is the likelihood that a given loan or percentage of a pool of mortgages will become delinquent or enter foreclosure, resulting in a loss for the mortgagor. The costs of default can be incurred from delayed payments, loan restructuring, or through foreclosure or a deed in lieu-of-foreclosure and a sale of the asset at a price less than the sum of all accrued interest, principal, and related costs. The estimation of default risk for commercial mortgages is difficult to ascertain due to the lack of available historical default and delinquency rates (as well as severity of loss) relative to that which is available for one to four family residential

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[90] Ibid., p.42.
[91] Patrick J. Corcoran, "Commercial mortgages: Measuring risk and return," *The Journal of Portfolio Management* (Winter 1989), p.70.

mortgages. There is a need to compile more detailed and sophisticated data to evaluate

historical default and delinquency rates for commercial mortgages than exists at this time.

The American Council of Life Insurance (ACLI) is the most commonly referenced source of

information concerning commercial mortgage default. The ACLI gathers information from

member companies concerning their property portfolios and generates a number of statistical

reports, including a quarterly survey of mortgage loan delinquencies and foreclosures. In 1992

the firms supplying information to the ACLI held approximately 87% of the mortgages owned

by domestic life insurance companies.[92] The ACLI has collected data on mortgages on an

aggregate basis since 1965 and by individual property type since 1988.

## Exhibit XIV

### Commercial Mortgage Loan Delinquencies & Foreclosures: 1988-1994



In Process of Foreclosure    ⊠ Delinquent loans (including loans in the process of foreclosure)
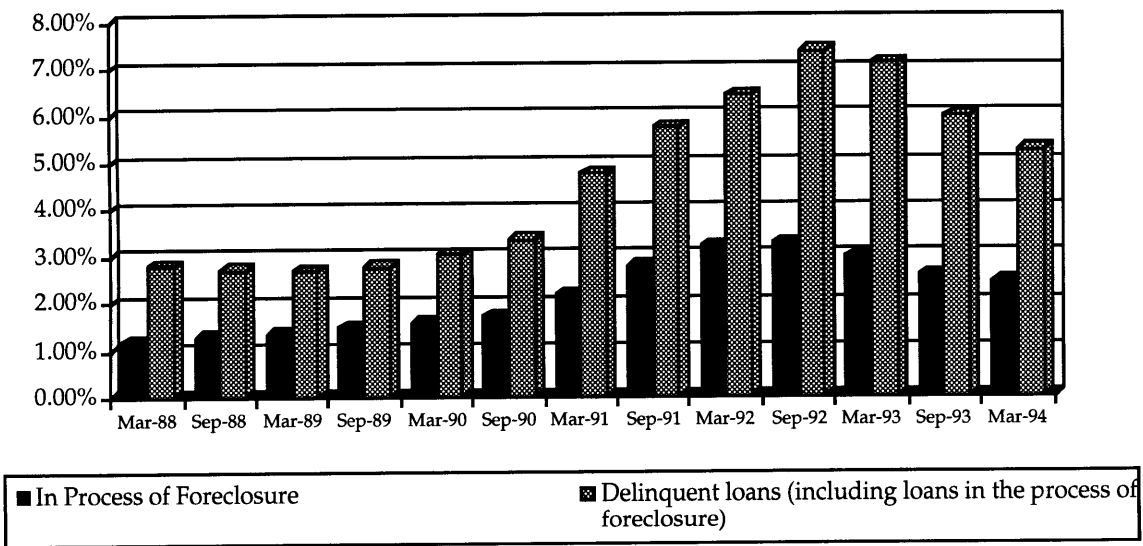
Source: ACLI[93]

The ACLI considers commercial loans delinquent if the loans are in the process of foreclosure

(even though not delinquent as to scheduled payments) or if two or more scheduled payments

are past due per the original or restructured loan agreement (based on monthly payments).

Loans in foreclosure are deemed to be those for which an acceleration letter has been sent or a

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[92] Fitch Investors Service, Inc., "Commercial Mortgage Stress Test" (New York: June 8, 1992), p.2.

[93] American Council of Life Insurance, "Investment Bulletin: Quarterly Survey of Mortgage Loan Delinquencies and Foreclosures, March 31, 1994," (Washington, D.C.: May 25, 1994), p.3.

summary judgment action has been filed, including any involved in a subsequent filing of bankruptcy.

The ACLI data indicates that although somewhat lower than in 1992, commercial mortgage foreclosures today stand close to their highest levels since the Depression. The ACLI reports that, as of March 31, 1994, 2.43% of the commercial mortgage portfolios of the major life insurance companies were in foreclosure and 5.24% were in the delinquent status (delinquency and foreclosure rates are based on dollar amounts).[94] This is among the highest delinquency rate recorded since the ACLI began collecting data in 1965. Exhibit XIV indicates that delinquency rates for the six year period commencing in March 1988 has ranged from 2.42% to 7.53%. Over the longer term, commercial mortgage delinquency as reported by the ACLI from 1965 to present has varied from 0.47% to 7.53%.

The need for a greater understanding of the factors affecting default risk for commercial mortgages is critical to further the securitization process and development of a secondary market for commercial mortgages. This will require a greater study of the particular commercial mortgage characteristics that contribute to credit risk. This process will remain slow until there is a sufficient supply of commercial mortgage data available for a thorough credit analysis to be conducted.

Credit or default risk for commercial mortgages can be attributed to a number of factors, including the underlying asset's location and property type. The underlying real estate, therefore, can be an important gauge of default risk for an individual commercial mortgage or pool of commercial mortgages. The ACLI data illustrates the advantage of diversification both in terms of geographic location and by property type. The regional performance of commercial mortgages (Exhibit XV) demonstrates significant variation in performance, with

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[94] Ibid., p.3.

delinquency rates exhibiting distinct regional differences. Further, the ACLI data indicates

deviations in relative regional default rates for the different property types. Thus,

performance varies within each region depending on property type.

### Exhibit XV

### Delinquent Commercial Loans by Region: 31 March 1993- 31 March 1994
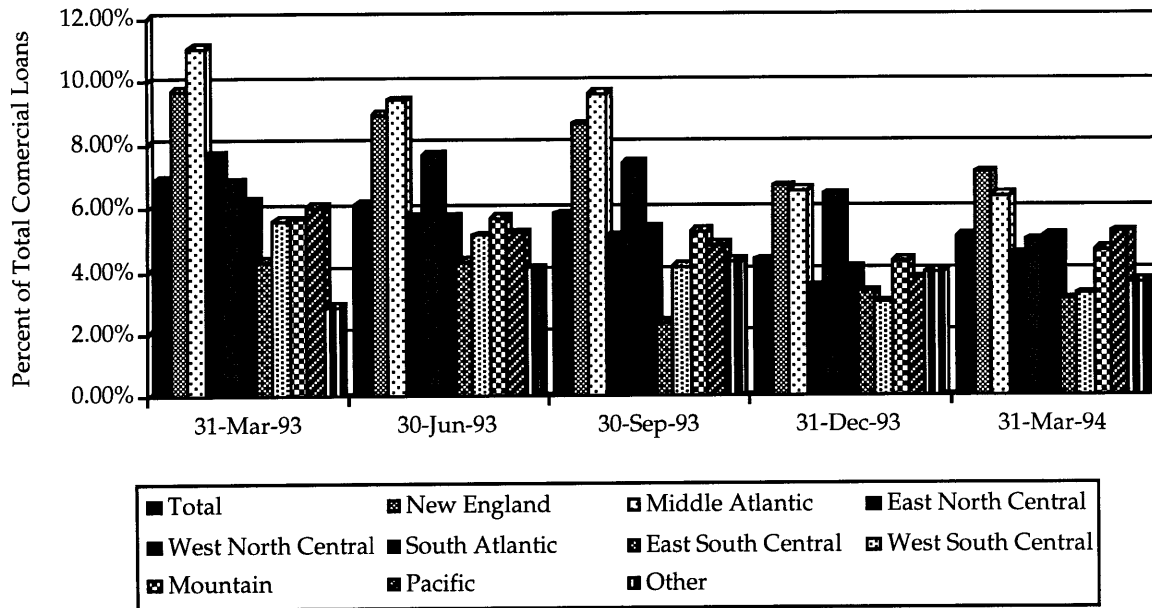


Source: ACLI[95]

Exhibit XVI displays how commercial loan delinquency rates for specific property types have

generally increased, reflecting the overall deterioration of the property market since 1988.

More importantly, however, this confirms the advantages of diversity by property type as

delinquency rates vary according to property type. The delinquency rates for specific property

types do not necessarily move proportionally, nor in the same manner. For example, there are a

number of examples of certain property types having an increasing level of loan delinquency (a

positive slope on Exhibit XVI) over a given period while other types have a decreasing level of

delinquency (a negative slope). It is therefore apparent that an investor in commercial

mortgage-backed securities could benefit from diversification of their portfolio both

geographically and by property type.

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[95] Ibid., p.21.

**Exhibit XVI**

**Commercial Loan Delinquency by Property Type: 1988-1994**
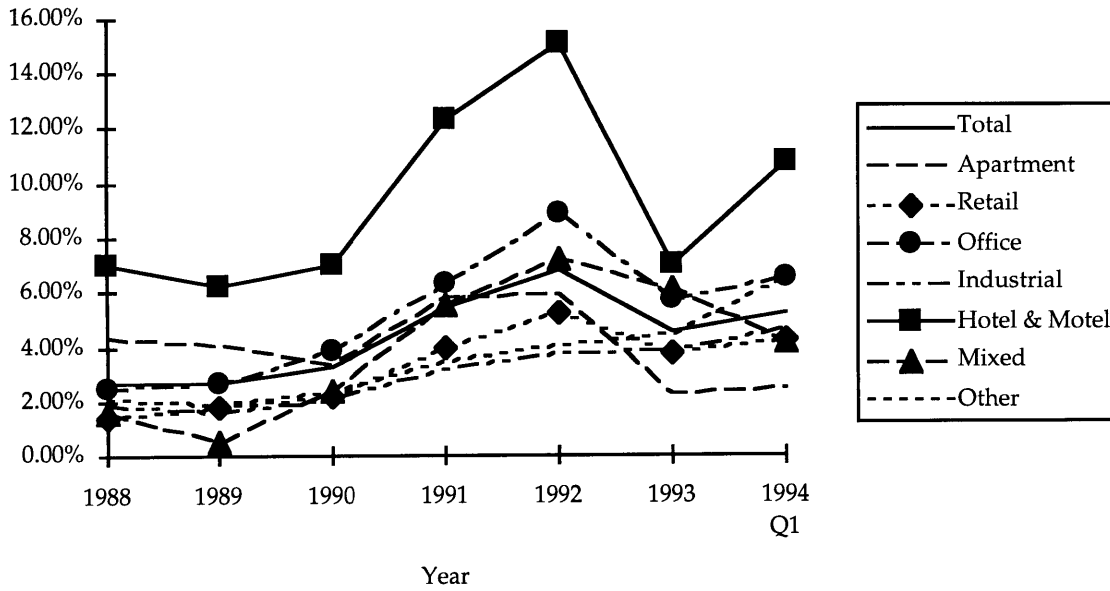


Source: ACLI[96]

There has been significant change in commercial loan delinquency by type (as evidenced in

Exhibit XVII and Exhibit XVIII) on a year to year basis. In aggregate, commercial foreclosure

**Exhibit XVII**

**Commercial Loan Delinquency by Type: 31 March 1993**
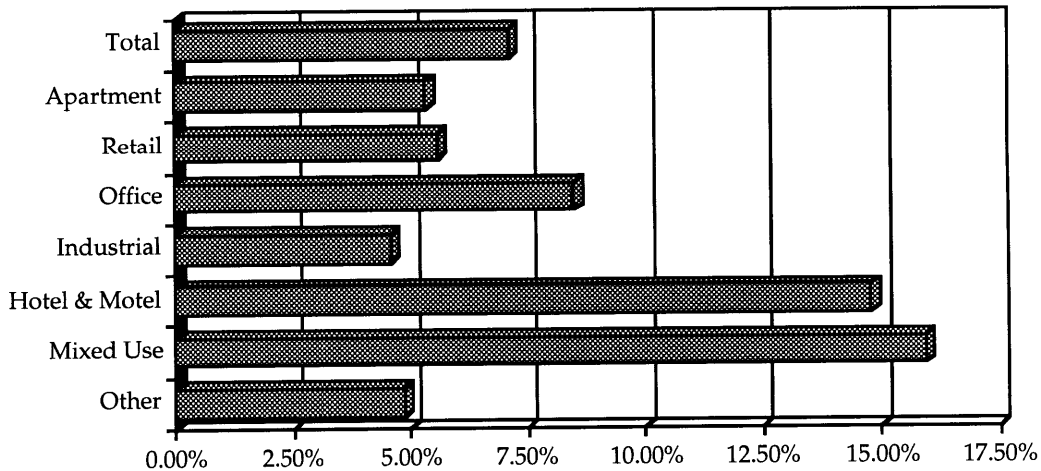


Source: ACLI[97]

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[96] Ibid., p.20.

[97] Ibid., p.21, 22.

fell (for the quarter ending 31 March) from 6.80% in 1993 to 5.24% in 1994. While substantially

lower than a total foreclosure rate for commercial properties of 7.11% in 1992, this does

represent an increase from 4.54% in the quarter ending 31 December 1993. The variation in

foreclosure rates has been particularly apparent in the apartment (multifamily), hotel &

motel and mixed use property types. For example, from March 31, 1993 to March 31, 1994,

foreclosure rates for apartments fell from 5.35% to 2.52%. Over the same period, foreclosure

rates for hotel & motel and mixed use property types fell from 14.80% and 15.93% to 10.77% and

4.20%, respectively. Conversely, industrial and 'other' property type foreclosure rates rose

## Exhibit XVIII

## Commercial Loan Delinquency by Type: 31 March 1994
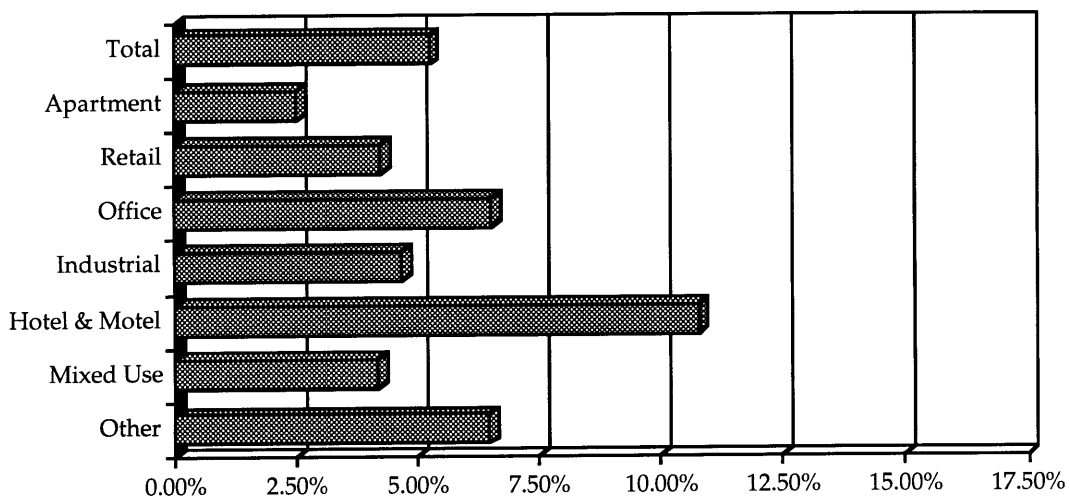


Source: ACLI[98]

from 4.58% and 4.86% to 4.66% and 6.48% over the year. Delinquency rates for retail and office

use, while reduced over the period were relatively unchanged, falling from 5.60% and 8.49% in

March 1993 to 4.22% and 6.51% in March 1994.

Other sources of information on default risk include financial data from banks and savings and

loans. The figures compiled by the Federal Deposit Insurance Corporation (FDIC) on banks and

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[98] Ibid., p.21, 22.

thrifts with FDIC insurance reports that at year end 1991, 5.81% of the (non-construction) loans at FDIC insured banks were non-current and 5.64% of multifamily loans were non-current.[99] It is important to note, however, that while the FDIC figures are a valuable source of delinquency rates for the commercial real estate portfolios of banks, but are not exact, as banks have flexibility in classifying a loan as construction or non construction. The information from the ACLI, FDIC and other institutions illustrate delinquency rates in a variety of portfolios at a given point in time, but lack the ability to display the cumulative rates of default in a static portfolio that are a prerequisite for a more accurate study of default risk in commercial mortgage portfolios.

The historical cost impact of default risk was measured by Snyderman in a study of 7,205 non farm, non-residential commercial, and multifamily mortgage loans originated by seven life insurance companies (ACLI based) from 1972 to 1984. These loans were all over $1.0 million in principal amount and were tracked from origination date until prepayment, default or the conclusion of 1989 (the study has recently been amended to include a total of 10,955 loans through 1991). The review focused on a calculation of default risk as a function of loan age and the correlation between default and the year of origination of the commercial mortgage.

The initial examination of the commercial loan portfolio led Snyderman to estimate an average aggregate life-time default rate of 12.1%, with an overall projected lifetime default rate of 15.4%.[100] This study estimated a historical average yield impact of defaults in commercial mortgage portfolios of between thirty one and fifty two basis points. The updated study resulted in an observed lifetime default rate of 13.8%; however, the likelihood of default was qualified by: "the sum of the average defaults over the period indicated a default rate of

[99] Op. Cit., Fitch Investors Service Inc., p.3.

[100] Mark P. Snyderman, "Commercial mortgages: Default occurrence and estimated yield impact," *The Journal of Portfolio Management* (Fall 1991), p.83, 84.

18.3%."[101] This figure illustrates the fact that many of the loans have yet to default or pay off and although the default rate was higher in the earlier years of the loan term, a significant proportion of loans default after the fifth year.

**Exhibit XIX**

**Lifetime Default Rates and Five Year Cumulative Property Value Changes (Through December 1991)**
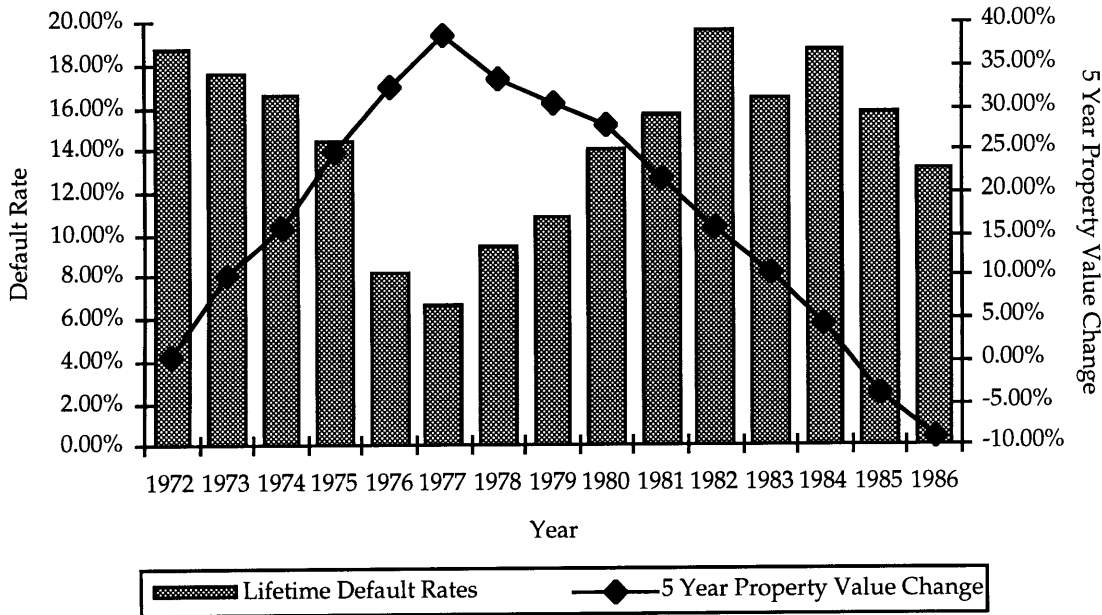


Source: Snyderman[102]

Snyderman reviewed the correlation between the year of origination of the mortgage and default to determine the effect of changing property values on default risk. He found that incidence of default increased in periods of declining property values, reflecting the option of non-recourse borrowing which allows the borrower to put the assets securing a mortgage back to the lender (Exhibit XIX). The regression calculated by Snyderman concluded:

$$\text{Default rate} = 21.5\% - 0.312 \times \text{Av} \qquad r^2 = 0.88$$

where Av is the five year cumulative property value change. This equation indicates that if there is no property appreciation twenty one and a half percent of commercial mortgages would

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[101] Mark P. Snyderman, "Update on Commercial Mortgage Defaults," *The Real Estate Finance Journal* (Summer 1994), p.26.

[102] Ibid., p.27.

default. While noting the influence of lending factors (including amortization periods and balloon repayments), Snyderman does not calculate the effect of these and other origination criteria on default risk.

Snyderman reviewed loss severity in terms of year of origination and yield loss by cohort. The study examined loan defaults resulting in ownership change from the mortgagee to the mortgagor through foreclosure deed in lieu proceedings and those in which the delinquent loan terms were restructured. Snyderman calculated an average severity of loss for foreclosed loans of 36%, but noted that there was a high variance and attributed it to wide range in the length of foreclosure actions.[103] In the case of restructured loans, Snyderman could not calculate loss severity due to a lack of information, however, estimated a rate of one half of that for property who changed title. The amended calculations result an average yield cost of defaults of fifty basis points and while, "this is above the costs of defaults reported by researchers for investment grade corporate bonds and less than that for high yield bonds, but well below the spread normally charged by lenders (150 to 300 basis points)."[104]

Commercial mortgage default and severity of loss was also investigated by Fitch Investors Service. Their studies used data from the portfolios of eleven life insurance companies to conduct an analysis of cumulative default risk and a pool of commercial mortgages held by a large Midwestern life company to study loss severity experienced when loans defaulted. In the case of the former (from 1984 to 1991), Fitch found the pool to have a weighted average default rate of 14%.[105] In the case of the latter, Fitch concluded that, "the sales proceeds of REO since 1988 total 79% of the original loan amounts."[106] Regarding severity of loss, Fitch qualifies

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[103] Ibid., p.27.
[104] Ibid., p.28.
[105] Op. Cit., Fitch Investor Services Inc., p.4.
[106] Op. Cit., Fitch Investor Services Inc., p.5.

their findings by stating that 79% probably represents the upper end of the recovery range as these are the most marketable assets and, thus, most likely to be sold.

Vandell, Barnes, Hartzell, Kraft and Wendt reviewed commercial mortgage defaults using disaggregate loan histories to distinguish the important correlates of default in commercial mortgage lending. Their study employs a proportional hazards model estimation technique determine the influence of underwriting variables on the duration of a loan. The data used for the analysis contained a portfolio of 2,899 loans held in portfolio by a major life insurance company beginning with originations in 1962 and concluding with originations in the third quarter of 1989.[107]

The proportional hazard model utilized length of time from origination until default (for loans that failed), repayment for loans which repaid in full or the end of the period for loans which continued to perform as the time to event. The results of the model are illustrated in Table III (an explanation of the variables is listed in Appendix I). Both ex post and ex ante variables were created for the regression run. Vandell et al tested a number of other variables in the model (including loan term, property age, loan amount and the existence of multiple liens), however, they were found "to be consistently insignificant or highly correlated with other variables with greater explanatory power" and therefore "omitted from the final specification."[108]

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[107] Kerry D. Vandell et al., "Commercial Mortgage Defaults: Proportional Hazards Estimation Using Individual Loan Histories," *Journal of the American Real Estate and Urban Economics Association* (Summer 1993, V21), p.462.

[108] Ibid., p.469.

## Table III

### Results of Vandell, Barnes, Hartzell, Kraft and Wendt,
### Estimation Results-preferred default model specification

| Variable | Coefficient | Chi-Square | Probability |
|---|---|---|---|
| MKTLTV | 0.049 | 124.32 | <.01 |
| INTRTE | 26.968 | 20.61 | <.01 |
| ORIGDSC | -0.672 | 0.87 | .35 |
| APT | 0.994 | 6.77 | <.01 |
| HOTL | 1.362 | 6.51 | .01 |
| OFF | 1.072 | 7.86 | <.01 |
| INDUS | 0.819 | 3.48 | .06 |
| OTH | 1.117 | 3.02 | .08 |
| INDIV | 0.535 | 2.02 | .15 |
| PARTNER | 0.582 | 3.82 | .05 |
| CORPORATION | 0.429 | 1.64 | .20 |
| CFDELTA | 0.737 | 13.43 | <.01 |
| GPMDUMMY | -2.040 | 26.70 | <.01 |
| ACRDUMMY | -0.139 | 0.30 | .59 |
| AMZDUMMY | -1.170 | 38.01 | <.01 |

model chi square = 677.27 with 15 D.F.

R = 0.407

Source: Vandell et al., Journal of the American Real Estate and Urban Economics Association[109]

The coefficients indicate that as the loan to value increases the hazard rate increases, and the conditional probability of the survival of the loan relative to average loans decrease. Interestingly, all of the property types indicated increased hazard rates relative to retail properties (the base variable), with hotel, office and other properties exhibiting the greatest relative default risk. The hazard model also suggests regarding ownership entities that partnerships exhibit higher default risk than individuals, and "both exhibit higher risk than

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[109] Ibid., p.470.

corporate borrowers, but the differences are not significant except at the 5% level between

partnerships and other borrowers."[110]

Vandell et al note that a number of the loan type characteristics are significantly correlated

with default risk. In particular, changes in debt service payment requirements (CFDELTA)

increases the hazard rate, whereas partial or full amortization (AMZDUMMY) and step rate

loans (GPMDUMMY) reduce default risk.

iii    The Rating Process for Commercial Mortgage Backed Securities

The rating of commercial mortgage backed securities is based on the probability of a particular

mortgage or pool of mortgages meeting its scheduled payments to investors under various

economic scenarios. This rating of creditworthiness permits the comparison of these securities

to similarly rated corporate or municipal debt and securities. The process focuses on a number of

factors, including: analysis of financial statistics, underwriting standards, seasoning levels,

mortgage and property types, tenancy agreements and the proficiency of the servicer. Rating

agencies typically concentrate on cash flow stability (the review of delinquency and default

history) and not on the liquidation value of the underlying asset. The liquidation value (in

terms of the property and credit support), nevertheless, is important should default occur.

The rating of commercial property transactions come in two main categories: the primary

market, where assets can be one or more properties and the issuer is the owner of the

real estate, and the secondary market, where the assets are one or more loans on properties and

the issuer is a lender who has the loans in portfolio. The rating of commercial mortgage

securities differs from the rating securities collateralized by one to four family residential

property as the latter asset pools are homogenous and often heavily seasoned. Conversely, the

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[110] Ibid., p.470.

analysis and 'stress testing' of individual commercial properties or pools of commercial properties necessitated innovative structuring.

The issuance of commercial mortgage-backed securities requires a detailed analysis of the underlying real estate collateral in order to assign a public or private credit rating. The rating analysis and valuation of these securities obligates a detailed appraisal of cash flow adequacy. The original Standard & Poor's rating methodology was amended to include multifamily and retail specific collateral and the concept of a national worst case scenario was later replaced with a more qualitative and quantitative analysis of local market conditions. Although first unveiled in 1984 and as part of the original Standard & Poor's rating criteria, no actuarially based ratings were assigned for commercial mortgages until 1987.[111]

The national rating agencies (Standard & Poor's Corporation, Duff & Phelps, Moody's Investors Service and Fitch Investors Service) have emerged as vital intermediaries between real estate lending institutions, large real estate borrowers and the underwriters of commercial mortgage-backed securities. The pricing of these instruments (and, therefore, relative yield to investors) is becoming increasingly dependent on rating and it is only in the past decade that this assessment of creditworthiness has been available. The ability to obtain an investment grade rating allows for less expensive and wider distribution of mortgage-backed securities, leading to a more competitive marketplace for lenders and borrowers alike. This is particularly important as a number of institutional investors are restricted to the types of investments they may acquire through limitations imposed by federal or state securities laws or state and federal laws relating to fiduciary obligations of fund managers, advisers or trustees. Furthermore, the advances in the rating of commercial mortgage-backed securities have led to an increasing standardization of documentation and augmented the potential investor base by

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111 Op. Cit., Lederman, ed., *The Handbook of Asset-Backed Securities*, p.392.

offering investment alternatives to those otherwise avoiding acquisition of unrated debt

obligations.

In 1993, $4.0 billion of non-RTC commercial mortgage-backed securities with a AAA rating were

issued, with an average transaction size of $129.0 million (Exhibit XX). This represented

**Exhibit XX**

**1993 Non-RTC Issuance of Commercial Mortgage Backed Securities: by Issuer, 1993**
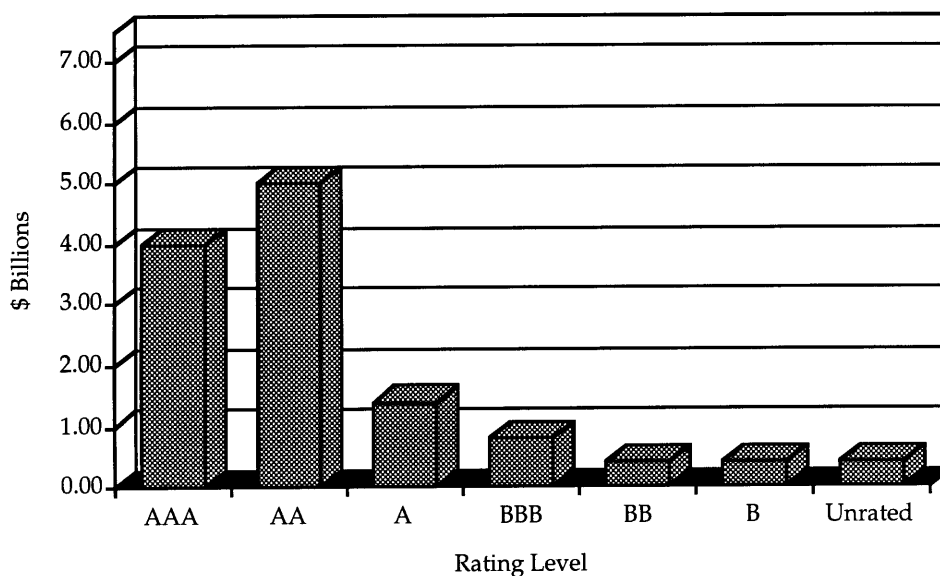


Source: Kenneth Leventhal & Co.[112]

approximately 23.3% of total issues for 1993 by dollar volume. In comparison, a total of $2.0

billion of commercial mortgage-backed securities were issued with a rating of BBB or below

(11.6% of total issues for 1993). The average size of the transactions receiving below investment

grade ratings was $400.0 million. The rating agencies all employ credit enhancement as a

means to improve the rating of securities, however, each has a specific method to ascertain

default risk.

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[112] Op. Cit., Kenneth Leventhal & Co., p.17.

The rating agencies provide an objective measurement of the probability that the cash flows from the underlying commercial mortgages will be adequate to meet scheduled payments of principal and interest on the security. Credit enhancement is necessary to achieve higher ratings where it is anticipated that there is some likelihood of delayed or insufficient cash flows. Commercial mortgage-backed securities with higher ratings are determined to be more capable of supporting cash flows under increasingly difficult economic circumstances. Thus, for a given pool, progressively greater support will be needed at higher rating levels. With the lack of standardization, increased credit risk, and dearth of historical delinquency and foreclosure data in the commercial mortgage market, the presence of such a rating system is a critical factor in attracting investors.

iv     Credit Enhancement

Credit enhancement is the level of credit support necessary in addition to the first mortgage on a property (or pool of properties) to achieve a specified rating level for a commercial mortgage backed security. The enhancement of credit may be attained through third party support or by structuring the security so as to reduce delinquency and default risk. The purpose of credit enhancement is to increase the likelihood that investors will receive timely payment of interest and principal in the event the underlying collateral endures significant delinquencies or defaults. This support can be in the form of surety bonds or insurance policies, letters of credit or other forms of guarantee. Relative to other instruments, "recent commercial transactions have featured credit enhancement as much as two to four times greater than representative residential mortgage securities."[113]

To ameliorate the rating of a security the servicer of the commercial mortgage pool will often undertake the liability to provide liquidity for delinquent payments. This stipulation may be

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[113] Judy L. Hoff, David J. Kostin and Anthony C. Lembke, "Commercial Mortgage Securities: Market Development and the Rating Process," (New York: Salomon Brothers, April 1992), p.2.

achieved with an obligation on the part of the issuer to establish a cash reserve account.[114] In

lieu of a lack of liquidity, a rating agency may require additional servicer liquidity in the form

of cash and or guaranteed servicer advance. The senior certificate holders only suffer shortfalls

to the extent delinquencies and or losses are in excess of the subordinate interests and the

required liquidity reserve.

Commercial mortgage-backed securities are often senior/subordinate, hierarchical class,

structures comprised of a rated senior interest and a rated or unrated subordinate interest or

interests in the mortgage collateral. The structure, depending on its size and complexity, may

provide for a number layers of subordination.[115] The structure may prohibit subordinate

certificate holders from receiving interest and principal payments until the senior certificate

holders have been fully paid. This payment priority reduces principal exposure and risk as to

timely payment of interest and principal for senior certificate holders as these risks are

absorbed by the subordinate certificate holders. Other structures may permit payment of

interest but not principal to subordinate certificate holders. The senior/subordinate structure

alone does not provide a source of liquidity in the event of a large amount of mortgage payments

are interrupted during a workout/foreclosure period.

The analysis conducted by the rating agencies of senior/subordinate structures is often divided

into two sections. The first is component evaluates the initial debt service coverage ratios and

cash flow shortfalls that are determined by stress projection scenarios over the term of the

issue. Shortfalls accumulated under these scenarios are then used to determine required levels

of credit enhancement. The second constituent of the analysis concentrates on the loan to value

ratios of the securities. In senior/subordinate structures, the subordination level effectively

reduces the loan to value for the rated security. The resulting loan to value is then compared to

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[114] Duff & Phelps Credit Rating Co., "The Rating of Commercial Real Estate Securities," (Chicago, IL: Duff & Phelps, May 1993), p.8.

[115] Christopher Lee, "The Commercial Mortgage-Backed Securities Frontier," *The Real Estate Finance Journal* (Summer 1989), p.81.

the rating agencies required loan to value coverage levels for the purpose of determining credit enhancement. Typically, stressed cash flows are forecast for each property to determine the aggregate shortfalls arising from negative debt service coverage over a five to ten year period. Overcollateralization is a form of credit enhancement utilized where the borrower effectively issues senior debt and maintains subordinated debt in portfolio.

The individual debt service coverage and loan to value ratios are calculated for each property (for individual property issues or pools) and shortfalls occur when these levels are below those guidelines prescribed by the particular rating agency. Loan to value shortfalls are defined as the incremental loan decrease that would be required to reduce the loan to value to the maximum level for the required rating. The weighted average loan to value shortfall is determined for all the properties in a small pool or, in the case of a large pool, for the sample properties. The debt service coverage ratio must meet the minimum ratio stipulated for the required rating level. The shortfall for each property is the difference between the actual annual net operating income of each property and the net operating income level need for the property type and rating level.[116] The loan to value, debt service coverage, and stressed cash flow shortfalls are used to determine the overall required credit enhancement.

Corporate guarantees and letters of credit are additional alternatives for the provision of credit enhancement. Typically, both of these options insure the security against losses up to a specified amount (usually a first loss position) and require strong credit ratings. The rating agencies, therefore, dictates the structuring of the security and the level of credit enhancement necessary based on the rating the issuer requires for the mortgage-backed security.

The rating agencies consider both quantitative and qualitative figures when determining the ratings and hence credit enhancement requirements for commercial mortgage-backed securities.

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[116] Fred J. Pastore et al., "Rating Securities Backed by Commercial Mortgage Pools," *The Real Estate Finance Journal* (Fall 1988), p.54.

Often the pool is too large to make a review of every mortgage practical and in these instances a statistical sample of the pool is used to determine the rating and credit enhancement. Diversification of geographical location and property type for a mortgage pool reduces the expected default risk and, therefore, the required credit enhancement. Additionally, the size of a portfolio and diversification (no single mortgage comprising too large a proportion of the portfolio) of borrowers effect default risk.

Loan type characteristics are important determinants of rating and credit risk. Loans that are partially or fully amortizing are considered to have relatively less default risk than those requiring balloon payments at the conclusion of the loan term. Furthermore, the rating agencies take a more conservative approach to mortgage pools with floating rate notes compared to those with fixed rates. This is due to 'stress tests' assuming interest rates increase in the future and will thus adversely effect the ability of the property to service the loan. The proficiency of the mortgagee to supply operating statements and the underwriting standards employed by the mortgagor are important determinants of the required level of credit enhancement. Other factors affecting the need for credit enhancement include collateral quality, basis risk, the seasoning of the property and the loan, economic trends and environmental risk.

## V.    A Model to Estimate Default Risk for Commercial Mortgage-Backed Securities

### i    Hypothesis of Model

A better understanding of the causes and impact of default risk is necessary to understand the pricing of commercial mortgage-backed securities and the development of the secondary market for these instruments. Many variables can cause a commercial mortgage loan to default, including: debt service coverage ratio, loan to value ratio, the rate, the term, economic, borrower and property characteristics. While underwriting guidelines are meant to establish limitations within which these characteristics must fall, the change in loan characteristics over time will better indicate the probability of default. In this light, applying a linear regression model to the characteristics of a given loan estimates the probability that a loan with those characteristics will default in a given time period, assuming there has been no default up to that time. Both a probit model and a proportional hazards model are applied to the commercial mortgage data to evaluate the likelihood and timing of default, subsequently providing a better means to understand and price commercial mortgage-backed instruments.

### ii    Data

The database used to estimate the probit model, proportional hazards model, and factors which are likely to increase or decrease the conditional probability of commercial mortgage default is provided by a regional commercial bank. The data contain all loans representing first mortgage liens made from their portfolio beginning with originations in 1972 and concluding with originations made in the second quarter of 1994. In all, 229 complete record loans were used for the study, with over ninety five percent of the loans relating to properties in central and eastern Massachusetts. The summary statistics for the loan database are displayed in Table IV.

## Table IV

### Summary Statistics for Default Database

| Variable | Mean | Minimum | Maximum |
|---|---|---|---|
| Original Debt Service Coverage Ratio | 1.34x | 0.11x | 6.28x |
| Original Market Loan to Value Ratio | 63.49% | 5.61% | 198.77% |
| Loan as a Percentage of Reported Net Worth | 12.27% | 0.11% | 2179.44% |
| Size of Loan | $249,848 | $25,000 | $988,000 |
| Property Appraised Value | $437,936 | $45,000 | $2,535,000 |
| Year of Loan Origination | 1992 | 1972 | 1994 |
| Term of Loan at Origination (months) | 72.96 | 12[*] | 300 |
| Relative Interest Rate at Origination | 2.08% | 0.80% | 3.50% |
| Seasoning of Loan (months) | 47.8 | 0.0 | 204.0 |

| | Proportion |
|---|---|
| **Loan Status Dummy Variables** | |
| Performing | 72.12% |
| Prepaid | 2.21% |
| Default | 25.66% |
| **Loan Type Dummy Variables I** | |
| Fully Amortizing over term | 19.91% |
| Balloon | 80.09% |
| **Loan Type Dummy Variables II** | |
| Fixed rate | 19.03% |
| Variable rate | 80.97% |
| **Property Type Dummy Variables** | |
| Retail | 15.49% |
| Apartment | 42.04% |
| Office | 16.81% |
| Industrial | 7.08% |
| Other | 18.58% |
| **Purpose of Loan Type Dummy Variables** | |
| Investment | 34.96% |
| Re-development | 5.75% |
| Re-finance | 59.29% |
| **Ownership Entity** | |
| Individual | 26.55% |
| Partnership | 31.86% |
| Corporation | 6.19% |
| Trust | 35.40% |

* For the purpose of this analysis, loans made on a demand basis are considered to have a loan term of one year.

The majority of the loans were gathered from the portfolios of lending officers with an additional sample being provided by the managed asset division of the bank. As such, these loans do not provide a true cross sample of the existing loan portfolio; however, they do accommodate an analysis for the purposes of studying the variables affecting default.

The great majority of the loans used for the study have been originated within the past five years (Exhibit XXI). It is interesting to note the climbing rate of default by year of loan

## Exhibit XXI

### Total Loans and Loan Defaults by Year of Origination



| ☒ Percent of Total Loans | ◆ Percent of Loans in Default |
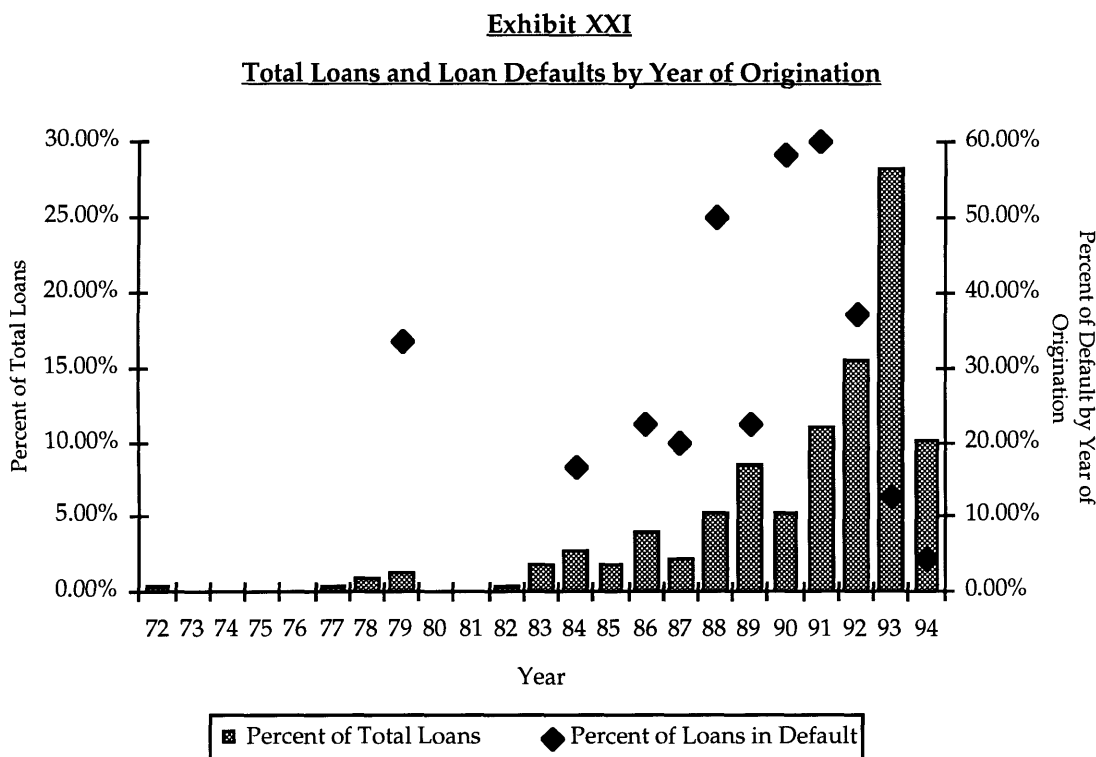
origination throughout the late 1980's and early 1990's (with the exception of 1989 which may be explained by a small sample size), followed by a declining rate of default from 1991 to 1994. This would suggest the strong influence of deteriorating economic conditions, the decline of the real estate market and reductions in the relative interest rate, followed by a tightening of lending policy by the bank.

The average term of loan for the sample was slightly over six years (Table IV), with a range of one year to twenty-five years. For the purpose of this analysis, loans made on a demand basis

are considered to have a loan term of one year. The dispersion of the loans by length of term at

origination is illustrated in Exhibit XXII. The preponderance of loans were made with loan

terms of one to five years, with a minority of the portfolio having a duration of between ten and

twenty-five years. It appears that the rate of default by term of the loan declines as the

length of the term of the loan increases.

## Exhibit XXII

## Total Loans and Loan Defaults by Term
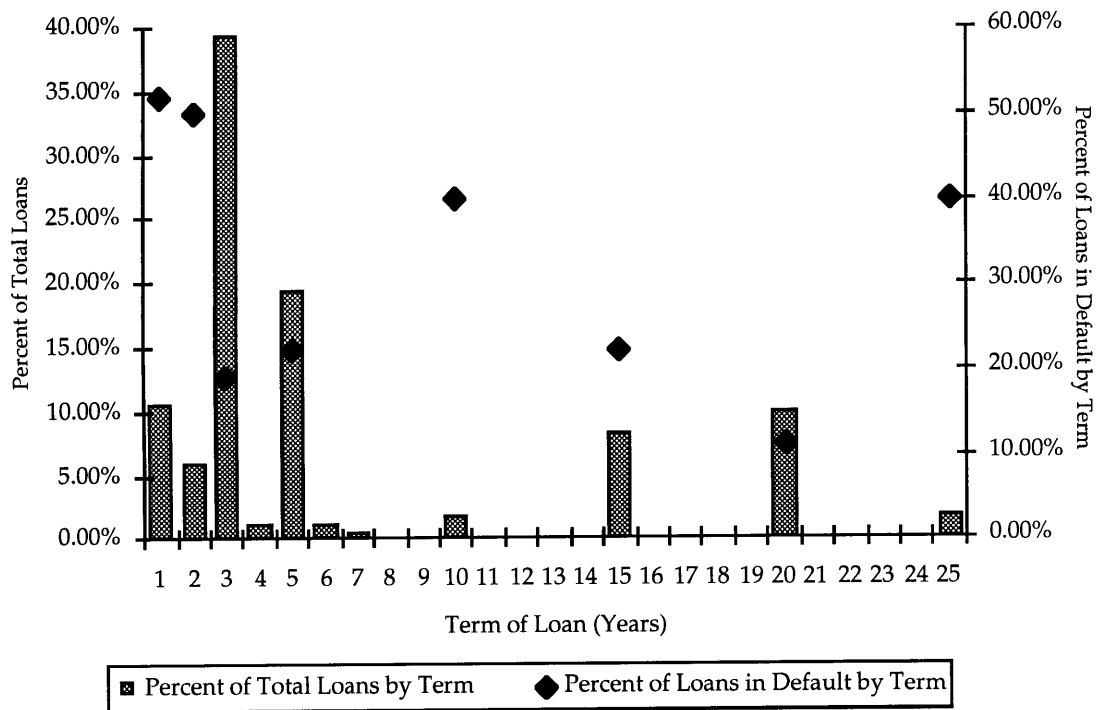


iii    Explanation of Variables used for Regression Analysis

**Dependent Variable (Proportional Hazards Model)**: The dependent variable in this model is

the time until an event occurs in the life of the loan (either default or prepayment), otherwise

it is the time of the performing loan from origination to date (TIME).

**Dependent Variable (Probit Model)**: The dependent variable in this model is the occurrence of

default (DEF). In this study default is defined as any loan transferred to the managed asset

division of the bank or to a federally sponsored, quasi public, real estate asset portfolio liquidator. The criteria used by the bank to initiate foreclosure of the borrower's interest in the property follows a 60-day delinquency period or a decline in the rating of the credit (based on borrower/guarantor credit strength, the collateral securing the loan and the sensitivity of the real estate collateral to the market) based on a trend indicator.

**Original Debt Service Coverage Ratio**: The Original Debt Service Coverage Ratio (DSCR) is the ratio of the current net operating income on a property to the debt service obligation on that property. This figure is calculated based on financial statements submitted by the borrower.

**Market Loan-to-Value Ratio**: The Market Loan to Value Ratio (LTV) is a measure of the ratio of the loan balance on a property to the estimated value of that property at the outset of the loan. In some instances this figure is the acquisition price (particularly for borrowing for purchases), but more typically it is based on a third party appraisal of the property or a multiple of net operating income (derived by capitalizing the net operating income using a cap rate) set by the bank depending on property type.

**Security of Loan**: The security of the borrower (LNTW) is calculated from the equity of the borrower in the property and any other asset value deemed to be of a recourse nature. This figure is based on a financial declaration submitted by the borrower to the bank, but is likely not to be a true reflection of liquidity or necessarily an accurate gauge of net worth.

**Size of Loan**: The size of loan originated (SIZE) is the amount of funds borrowed at the origination of the loan. Often this figure includes points or origination fees which are amortized over the term of the loan.

**Year Loan Originated**: The year the loan was originated (YEAR).

**Term of Loan at Origination**: The term of loan at origination (TERM) refers to the time between origination and final principal re-payment obligation.

**Loan Status Dummy Variables**: The loan status dummy variables include performing loans (PERF), defaulted loans (DEF) and prepaid loans (PREP). Performing loans include all loans in portfolio and not delinquent in payment to June 1994.

**Relative Interest Rate**: The relative interest rate (INT) in the case of variable-rate funding is a measure of the difference between the interest rate of the loan at origination and the prime lending rate of the bank; in the case of fixed-rate funding, it is the difference between the rate and the corresponding benchmark rate of U.S. Treasury Notes over the term of loan.

**Seasoning of Collateral**: The seasoning of collateral (SEA) refers to the number of years experience the bank has had with the loan prior to the origination of the current loan. The period from the latest origination or renewal of the loan is not included in this figure.

**Loan Type Dummy Variables I**: The loan type dummy variables I include loans fully amortizing (AMOR) over the term of the loan and those requiring balloon repayments (BAL) of principal at the end of the term.

**Loan Type Dummy Variables II**: The loan type dummy variables II include fixed-rate loans (FIX) and variable-rate loans (VAR).

**Property Type Dummy Variables**: The property type dummy variables include retail (RET), apartment (APT), office (OFF), industrial (IND) and other (OTH) loans. Other loans include

loans for property types including: hotels, nursing homes, recreational centers, restaurants and mixed use facilities.

**Purpose of Loan Type Dummy Variables**: The purpose of loan type dummy variables include investment (INV), re-development (DEV) and refinance (REF).

iv      Probit Model

The probit model is used to calculate the maximum likelihood estimates for the parameters of a probit response model, using aggregated data.

The estimate of a probit model is used to explain whether a loan defaults based on the aforementioned variables.  The variable default takes on two unique values, 0 and 1.  The value 0 denotes the loan either prepays or continues to be a performing loan; the value 1 denotes a default.  The model we seek to estimate is:

$$\text{Probit (default =1)} = f(\beta_0 + \beta_1 LTV + \beta_2 VAR + \dots + \beta_n)$$

where $f(\beta_0 + \beta_1 LTV + \beta_2 VAR + \dots + \beta_n)$ is the cumulative normal distribution.

This model can be used to obtain the predicted probabilities using the equation for samples of data.  The variables used in the probit model analysis included all of the following (while all of the variables were used in the analysis, some were tested and found to be consistently insignificant and omitted from the final specifications):

Probit Model: Probability of Default

$$Default = f(DSCR, LTV,...,REF)$$

| Dependent Variable | Code | |
|---|---|---|
| Default | DEF | |

| Independent Variables | Code | Expected Sign |
|---|---|---|
| Original Debt Service Coverage Ratio | DSCR | - |
| Original Market Loan to Value Ratio | LTV | + |
| Ownership Entity Dummy Variable | | |
|     Individual | INDIV | - |
|     Partnership | PART | - |
|     Corporation | CORP | + |
|     Trust | TRUST | ?/+ |
| Loan as a Percentage of Reported Net Worth | LNTW | + |
| Size of Loan | LOAN | ?/- |
| Year of Loan Origination | YEAR | ? |
| Term of Loan at Origination | TERM | ?/- |
| Relative Interest Rate at Origination | INT | + |
| Seasoning of Loan | SEA | ?/- |
| Loan Type Dummy Variables I | | |
|     Fully Amortizing over term | AMOR | - |
|     Balloon | BAL | + |
| Loan Type Dummy Variables II | | |
|     Fixed rate | FIX | ?/+ |
|     Variable rate | VAR | ?/- |
| Property Type Dummy Variables | | |
|     Retail | RET | ?/- |
|     Apartment | APT | - |
|     Office | OFF | + |
|     Industrial | IND | ?/+ |
|     Other | OTH | ?/+ |
| Purpose of Loan Type Dummy Variables | | |
|     Investment | INV | - |
|     Re-development | DEV | + |
|     Re-finance | REF | ?/+ |

Several series of variables were run to evaluate probit models, as follows:

## Parameter Estimates, (Probit Model I: (Probit(p)) = Intercept + BX):

| Variable | Coefficient | Standard Error | Coeff./S.E. |
|----------|-------------|----------------|-------------|
| LTV | 0.01712 | 0.00489 | 3.50201 |
| INT | -0.04004 | 0.14474 | -0.27662 |
| DSCR | -0.71942 | 0.24613 | -2.92293 |
| VAR | -0.51435 | 0.25970 | -1.98056 |
| BAL | 0.43371 | 0.29162 | 1.48726 |
| SEA | -0.03448 | 0.03636 | -0.94820 |

| | Intercept | Standard Error | Intercept/S.E. |
|--|-----------|----------------|----------------|
| | -0.69330 | 0.63931 | -1.08446 |

Pearson Goodness of Fit Chi Square = 246.296    D.F. = 219    P = 0.099

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The first probit analysis indicates that the loan to value (LTV) and debt service coverage ratio are statistically significant. As anticipated, the correlation coefficient of the former is positive (0.01712), while the latter is negative (-0.71942). Thus, for every positive unit change in LTV (from 64.00% to 65.00%) there is 1.712% increase in the risk of default for a given loan, whereas for each positive unit change in DSCR (from 1.00x to 2.00x, for example) there is a 71.94% decrease in the risk of default. The Goodness of Fit Chi Square is significant, and therefore a heterogeneity factor is used in the calculation of confidence levels.

The coefficient for variable interest rate loans (VAR) is negative (-0.51435), indicating that loans with variable rates have a lower probability of default relative to fixed rate (FIX) loans (as fixed rate loans were used as the base). It is interesting to note that this is in contradiction to the criteria used by rating agencies for determining the default risk of a loan and may be explained by recent economic factors. It is usually assumed by these agencies that fixed rate loans have a less default risk than do variable rate loans. Interest rates have dropped significantly since the late 1980's and, hence, borrowers with variable rate loans have benefited accordingly, whereas borrowers with fixed rate loans have been locked in and unable to take advantage of improved borrowing conditions.

The coefficients for relative interest rate (INT) and seasoning of the loan (SEA) are both negative (-0.04004 and -0.03448 respectively), implying that loans with relatively higher interest rates are less likely to default, as are loans with which the bank has had relatively more experience. Loans with balloon payments are expected to increase the probability of default as the coefficient is positive (0.43371), however, as in the case of INT and SEA, BAL is not proven statistically significant in this analysis.

The results of the second probit model were:

## Parameter Estimates, (Probit Model II: (Probit(p)) = Intercept + BX):

| Variable | Coefficient | Standard Error | Coeff./S.E. |
|---|---|---|---|
| LTV | 0.01840 | 0.00510 | 3.60743 |
| INT | -0.04434 | 0.15668 | -0.28298 |
| DSCR | -0.73387 | 0.25582 | -2.86870 |
| VAR | -0.52864 | 0.26539 | -1.99192 |
| BAL | 0.06838 | 0.36356 | 0.18808 |
| TERM | -0.00331 | 0.00189 | -1.75561 |
| SEA | -0.00545 | 0.00346 | -1.57387 |
| APT | 0.15329 | 0.31716 | 0.48334 |
| OFF | -0.23281 | 0.40895 | -0.56929 |
| IND | 0.69100 | 0.49867 | 1.38569 |
| OTH | 0.15095 | 0.36567 | 0.41281 |
| CORP | 0.44409 | 0.45239 | 0.98166 |
| PART | -0.11425 | 0.25200 | -0.45338 |
| INDIV | -0.12130 | 0.28100 | -0.43169 |
| | Intercept | Standard Error | Intercept/S.E. |
| | -0.16566 | 0.83636 | -0.19808 |

Pearson Goodness of Fit Chi Square = 246.801    D.F. = 211    P = 0.046

As in the case of the first model, the Goodness of Fit Chi Square is significant. This second probit model suggests that two variables are statistically significant and these are loan to

value (LTV) and the debt service coverage ratio (DSCR). The coefficient for LTV is positive as expected (0.01840), indicating a higher loan to value ratio will have a greater likelihood of default. Similarly, the coefficient for the debt service coverage ratio is negative (-0.73387), as anticipated, confirming that loans with relatively higher debt service coverage ratios are less likely to default than those with lower figures.

As was the case in the first probit model, the coefficient for variable rate loans (VAR) was found to be negative, indicating that loans with variable rates have a lower probability of default than do fixed-rate (FIX) loans. As the results above indicate, the coefficient for variable rate loans in this model is -0.52864, thus exhibiting a greater likelihood of default.

The probit model indicates that office (OFF) properties are less likely to default relative to retail properties (RET), while apartments (APT), industrial (IND) and other (OTH) properties are more likely to default. Similarly, corporations (CORP) have a relatively higher hazard rate than do trusts, while partnerships (PART) and individuals (INDIV) have relatively less default risk. This may be explained as many of the corporate entities are created with the sole purpose of acquiring a particular property. The guarantor status of these entities is often limited relative to that of an individual and, hence, they are more likely to put the property back to the bank. It is important to note, however, that none of the property or ownership entity variables proved statistically significant in any of the analyses.

As expected, the coefficients for the term (TERM) of the loan (-0.00331) and loan seasoning (SEA) (-0.00545) are both negative. This would imply that the longer the term of the loan and the greater the experience with the loan, the less likelihood there is of default. Conversely, loans with balloon payments (BAL) are expected to increase the probability of default as the coefficient is positive (0.06838). It is interesting to note the coefficient for relative interest rate

(INT) was negative, insinuating loans with relatively higher interest rates have a lower hazard rate. None of these four variables, however, proved statistically significant. The results of the third probit model were:

## Parameter Estimates, (Probit Model III: (Probit(p)) = Intercept + BX):

| Variable | Coefficient | Standard Error | Coeff./S.E. |
|---|---|---|---|
| LTV | 0.01824 | 0.00558 | 3.26700 |
| BAL | 0.41730 | 0.33617 | 1.24134 |
| DSCR | -0.64433 | 0.26904 | -2.39494 |
| VAR | -0.63690 | 0.29383 | -2.16758 |
| Y82 | -0.33171 | 4.01590 | -0.08260 |
| Y83 | -0.85087 | 2.11368 | -0.40255 |
| Y84 | 0.32381 | 1.04893 | 0.30870 |
| Y85 | -0.61980 | 2.09573 | -0.29574 |
| Y86 | 0.35483 | 0.88243 | 0.40210 |
| Y87 | -0.05333 | 1.07707 | -0.04951 |
| Y88 | 1.13207 | 0.84238 | 1.34388 |
| Y89 | -0.21355 | 0.87495 | -0.24407 |
| Y90 | 1.14173 | 0.84827 | 1.34595 |
| Y91 | 1.10767 | 0.80837 | 1.37024 |
| Y92 | 0.78901 | 0.77300 | 1.02071 |
| Y93 | -0.19904 | 0.79025 | -0.25187 |
| Y94 | -0.89886 | 0.91160 | -0.98602 |

| | Intercept | Standard Error | Intercept/S.E. |
|---|---|---|---|
| | -1.29849 | 0.90414 | -1.43616 |

Pearson Goodness of Fit Chi Square = 168.283    D.F. = 208    P = 0.980

The third probit model was run, with the intention of reviewing the contribution of the year of loan underwriting to the likelihood of default. Loans underwritten from 1982 to 1994 were included in this analysis, using loans originated from 1972 to 1981 as the base. In this model three of the variables are determined to be statistically significant: debt service coverage ratio

(DSCR), variable-rate loans (VAR) and loan to value ratio (LTV). The coefficients for these variables mirror the results of the previous two probit models. The coefficient for loans requiring balloon payments (BAL) of 0.41730 reflects a greater tendency of default relative to partially or fully amortizing loans.

The importance of the year of loan underwriting relative to the likelihood of default was studied by using loans originated from 1982 to 1994 (with loans originated from 1972 to 1981 as the base). This indicates that loans underwritten in the years 1988, 1990-92 had a relatively greater probability of default than loans underwritten from 1982 to 1987, 1989, 1993 and 1994. These variables, however, are not statistically significant. Furthermore, as the Goodness of Fit Chi Square is not significant, no heterogeneity factor was used in the calculation of confidence levels.

v        Cox Proportional Hazards Model

The Cox proportional hazards model is used to estimate models in which time until failure, or any well defined event, is the dependent variable. This modeling is often used in medical sciences to predict the survival of patients who have had heart transplants or cancer diagnoses, based on the patient's characteristics. Recently this method of analysis has been applied to economic studies, such as estimating the time to failure of banks and thrifts. This model estimates the conditional probability of mortgage default on the basis of the loan characteristics. In the Cox proportional hazards model, an individual or event, is assumed to be at risk of the event happening at every instant. That risk is summarized in the instantaneous failure or hazard rate function:

$$h(t) = \frac{\text{Probability of failing between times } t \text{ and } t + \Delta t}{(\Delta t)\,(\text{Probability of failing after time } t)}$$

$$h = h_0(t)e^{\beta_1 x_1 + \ldots + \beta_1 x_1}$$

The Cox regression estimates the coefficients $\beta_1, ..., \beta_K$. The value $h(t) / h_0(t)$ for some values $x_1, ..., x_K$ is called the relative risk, and thus the combination of $\beta_1 x_1 + ... + \beta_K x_K$ is the (natural) log of the relative risk. This is the log relative risk of comparing observation with values $x_1...,x_K$ to an observation with all x's equal to 0.

Typically, however, it is more important to compare risks not against the baseline hazard but against each other. The relative risk or hazard ratio for a one unit change in $x_i$ is:

$$\frac{e^{\beta_1 x_1 + ... + \beta_i(x_i+1) + ... \beta_K x_K}}{e^{\beta_1 x_1 + ... + \beta_1 x_i + ... + \beta_K x_K}} = e^{\beta_i}$$

More generally, the relative risk for a $\Delta x_i$ change in $x_i$ is $e^{\beta_i \Delta x_i}$.

The Cox regression with censored data is for used when time of 'failure' is not observed for every observation in the data. The statistical problems created by not observing the death or failure go by the term censoring. If the data is censored, a variable that records the outcome must be defined to permit analysis. In the proportional hazard model his variable takes on the value 1 if the observation represents a death or failure and 0 if it instead represents a censored observation - in this instance the last time the loan was known to be performing.

The variables used in the proportional hazard analysis included all of the following (while all of the following variables were used in the analysis, some were tested and found to be consistently statistically insignificant and omitted from the final specifications):

## Cox Proportional Hazards Regression Model: Time Co-Variate

TIME = $f$(DSCR, LTV, ...,REF)

| Dependent Variable | Code | |
|---|---|---|
| Time to Event | TIME | |

| Independent Variables | Code | Expected Sign |
|---|---|---|
| Original Debt Service Coverage Ratio | DSCR | - |
| Original Market Loan to Value Ratio | LTV | + |
| Ownership Entity Dummy Variable | | |
|     Individual | INDIV | - |
|     Partnership | PART | - |
|     Corporation | CORP | + |
|     Trust | TRUST | ?/+ |
| Loan as a Percentage of Reported Net Worth | LNTW | - |
| Size of Loan | LOAN | ?/- |
| Year of Loan Origination | YEAR | ? |
| Term of Loan at Origination | TERM | ?/- |
| Loan Status Dummy Variables | | |
|     Performing | PERF | - |
|     Prepaid | PREP | - |
|     Default | DEF | |
| Relative Interest Rate at Origination | INT | + |
| Seasoning of Loan | SEA | ?/- |
| Loan Type Dummy Variables I | | |
|     Fully Amortizing over term | AMOR | - |
|     Balloon | BAL | + |
| Loan Type Dummy Variables II | | |
|     Fixed rate | FIX | ?/+ |
|     Variable rate | VAR | ?/- |
| Property Type Dummy Variables | | |
|     Retail | RET | ?/- |
|     Apartment | APT | - |
|     Office | OFF | + |
|     Industrial | IND | ?/+ |
|     Other | OTH | ?/+ |
| Purpose of Loan Type Dummy Variables | | |
|     Investment | INV | + |
|     Re-development | DEV | - |
|     Re-finance | REF | ?/+ |

The results of the first Cox proportional hazard model were:

### Results of Proportional Hazards Model

| Variable | B | S.E. | Wald | Sig | R | Exp(B) |
|----------|-------|-------|--------|--------|---------|--------|
| DSCR | -1.0850 | 0.3604 | 9.0651 | 0.0026 | -0.1152 | 0.3379 |
| INT | 0.4301 | 0.2049 | 4.4055 | 0.0358 | 0.0672 | 1.5374 |
| LTV | 0.0152 | 0.0058 | 6.9366 | 0.0084 | 0.0963 | 1.0153 |
| SEA | 0.0100 | 0.0039 | 6.4779 | 0.0109 | 0.0917 | 1.0100 |
| VAR | 0.0331 | 0.3190 | 0.0108 | 0.9174 | 0.0000 | 1.0336 |
| BAL | 1.1263 | 0.4278 | 6.9311 | 0.0085 | 0.0963 | 3.0841 |
| DEV | -1.3756 | 0.8721 | 2.4879 | 0.1147 | -0.0303 | 0.2527 |
| REF | -0.1141 | 0.3154 | 0.1309 | 0.7175 | 0.0000 | 0.8922 |

-2 Log Likelihood = 468.397

Overall Chi-Square = 51.954

The proportional hazard model created using the variables above indicate that six of the variables are statistically significant. Pearson's R statistic measures the linear association between two variables and can range from -1.00 (a perfect negative relationship in which all points lie on a line with negative slope) and 1.00 (a perfect positive relationship in which all points lie on a line with positive slope), and a value of 0.00 indicates no linear relationship. The survival function at the mean of covariates is illustrated in Exhibit XXIII and the hazard function is depicted in Exhibit XXIV. The survival function at the mean of covariates indicates that only approximately one fifth of the loans survive past 144 months, an average of 12.55% default annually.

DSCR and LTV are both significant variables, and reiterate the results found in the probit models. The coefficients for these variables are -1.0850 and 0.0152, indicating that as DSCR

increases, the hazard rate is decreased, while in increase in LTV increases the hazard rate and, therefore, the likelihood of default.

## Exhibit XXIII

## Survival Function at Mean of Covariates

Survival Function at mean of covariates
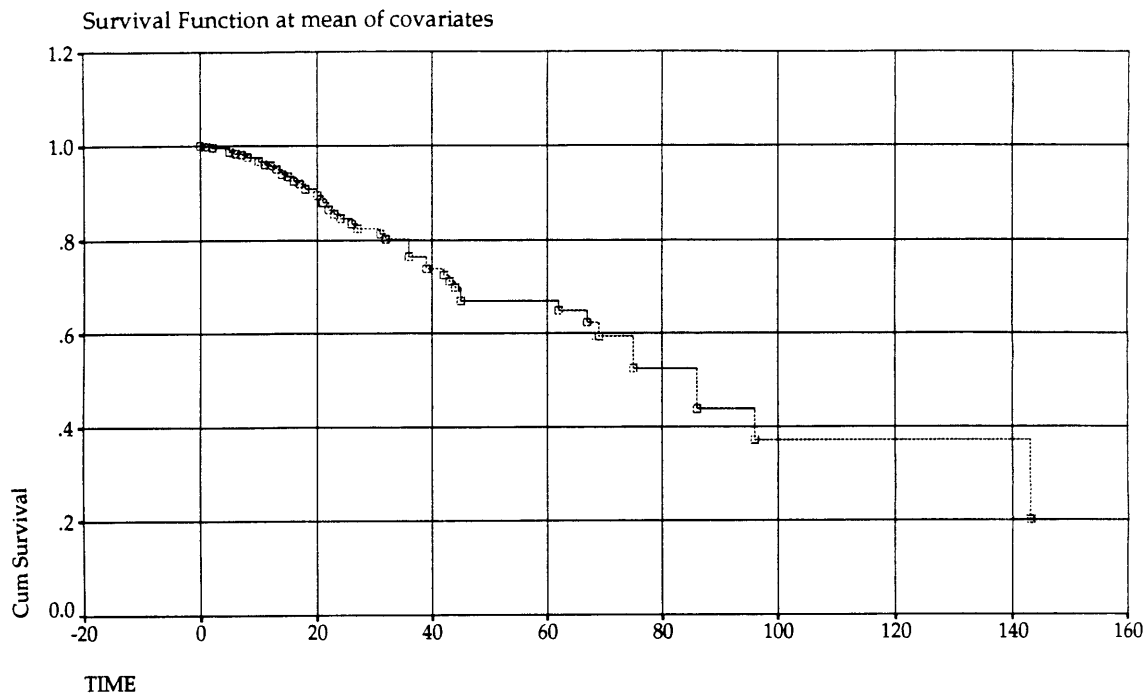


Relative interest rate (INT) was found to have a positive coefficient (0.4301) in the proportional hazard model, thereby differing from the results of the probit models (however, the variable INT was found statistically insignificant in the probit model). This suggests that loans with relatively higher interest rates increase the hazard rate and are more likely to result in a default. Loans with variable interest rates (VAR) were found to have a coefficient of 0.0331, indicating a relatively higher hazard rate than for fixed loans; however, this variable had a Pearson's R statistic of 0.000, indicating that there was no linear relationship.

The seasoning of loans (SEA) was found to be significant in the proportional hazard model. The coefficient value of 0.0100 is interesting in that it suggests the greater the seasoning of the loan the higher the hazard rate with a consequential decrease in the conditional probability of survival.

## Exhibit XXIV
## Hazard Function at Mean of Covariates

Hazard Function at mean of covariates
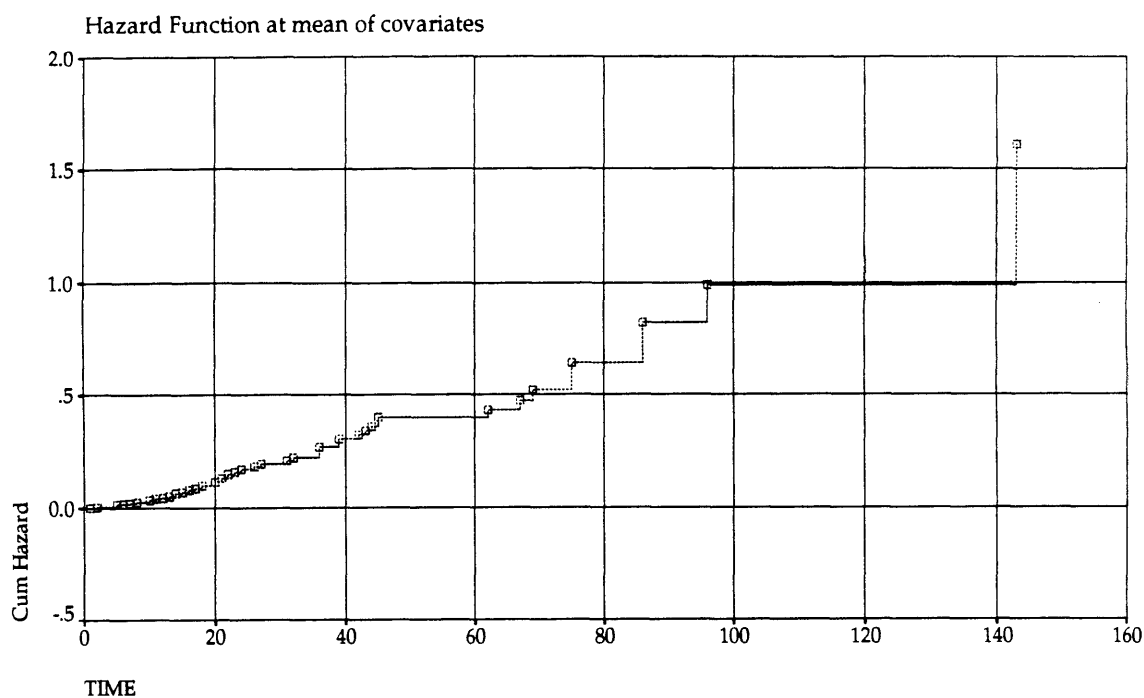


The model was run with variables to determine if the purpose of the loan had an effect on the hazard rate. In this instance, investment or property acquisition (INV) were used as base to determine the coefficients and relative significance of re-development (DEV) and refinance (REF) loans. Both DEV and REF were found to have negative coefficients (-1.3756 and -0.1141), implying that they increase the conditional probability of survival relative to INV. The Pearson's R statistic for REF, however, was 0.000, suggesting no linear relationship.

The results of a second proportional hazards model are displayed to illustrate the effect of incorporating the year of loan origination into the analysis. Loans originated from 1972 to 1981 were used as base to investigate the effect of loan origination from 1982 to 1994 on the hazard rate. While the Chi-Square increased from 51.954 to 86.289, the 2 Log Likelihood decreased relative to the first model from 468.397 to 402.617.

## Results of Proportional Hazards Model II

| Variable | B | S.E. | Wald | Sig | R | Exp(B) |
|---|---|---|---|---|---|---|
| BAL | 0.5538 | 0.4519 | 1.5017 | 0.2204 | 0.0000 | 1.7399 |
| DEV | -1.0103 | 0.8244 | 1.5017 | 0.2204 | 0.0000 | 0.3641 |
| DSCR | -0.8769 | 0.4161 | 4.4409 | 0.0351 | -0.0677 | 0.4161 |
| INT | 0.2212 | 0.2384 | 0.8610 | 0.3535 | 0.0000 | 1.2476 |
| LTV | 0.0177 | 0.0068 | 6.7845 | 0.0092 | 0.0948 | 1.0178 |
| REF | 0.3873 | 0.3555 | 1.1873 | 0.2759 | 0.0000 | 1.4731 |
| VAR | -0.7007 | 0.3974 | 3.1086 | 0.0779 | -0.0456 | 0.4963 |
| Y82 | 1.1940 | 191.2649 | 0.0000 | 0.9950 | 0.0000 | 3.3003 |
| Y83 | 1.1991 | 104.3948 | 0.0001 | 0.9908 | 0.0000 | 3.3173 |
| Y84 | 8.6166 | 61.2108 | 0.0198 | 0.8881 | 0.0000 | 5522.4468 |
| Y85 | 0.5339 | 104.2284 | 0.0000 | 0.9959 | 0.0000 | 1.7056 |
| Y86 | 15.6348 | 72.0603 | 0.0471 | 0.8282 | 0.0000 | 6167535.4 |
| Y87 | 16.0273 | 72.0660 | 0.0495 | 0.8240 | 0.0000 | 9131634.4 |
| Y88 | 19.0760 | 72.0692 | 0.0701 | 0.7912 | 0.0000 | 192575388 |
| Y89 | 18.6741 | 72.0736 | 0.0671 | 0.7956 | 0.0000 | 128841991 |
| Y90 | 20.4280 | 72.0722 | 0.0803 | 0.7768 | 0.0000 | 744314102 |
| Y91 | 22.1081 | 72.0722 | 0.0941 | 0.7590 | 0.0000 | 3.994E+09 |
| Y92 | 21.9928 | 72.0717 | 0.0931 | 0.7603 | 0.0000 | 3.559E+09 |
| Y93 | 21.8465 | 72.0731 | 0.0919 | 0.7618 | 0.0000 | 3.075E+09 |
| Y94 | 22.2007 | 72.0789 | 0.0949 | 0.7581 | 0.0000 | 4.382E+09 |

-2 Log Likelihood = 402.617

Overall Chi-Square = 86.289

In the second model only three variables were found to have a significant Pearson's R statistic. These coefficients of these variables, DSCR (-0.8769), LTV (0.0177) and VAR (-0.7007), had same signs as the first model. None of the other variables tested were found to be statistically significant in the second model. The variables for loans originated from 1982 to 1994 (Y82 to Y94) had coefficients that differ significantly from zero and indicate (particularly for loans originated from 1986 to 1994) a strong increase in the hazard rate and hence default risk. These variables, nevertheless, were consistently found to be statistically insignificant. Given the data available, the analysis therefore indicates that year of loan origination did not effect default risk.

The results of a proportional hazard model evaluating the effect of ownership entity on default risk are displayed in Appendix II. The analysis determined that corporations (CORP), individuals (INDIV) and partnerships (PART) all had negative coefficients (using trusts as the base). Trusts, therefore, have a relatively higher hazard rate than any of the other entities, with corporations (-0.0480), partnerships (-0.0711) and individuals (-0.1065) representing a descending order of hazard rates. It is important to note, nevertheless, that the variables for ownership entities were statistically insignificant.

Property types were examined with the proportional hazard model to determine their effect on default risk. The model in Appendix III illustrates that apartments (APT), industrial (IND) and other (OTH) properties have relative greater hazard rates than retail properties (the base), whereas office (OFF) properties have a negative coefficient and therefore relatively less default risk. None of the property types, however, were found to be statistically significant.

v i     Comparison of results to existing research

The findings of the statistical analysis ascertain many expected default relationships. Given the different composition of the loan portfolio used in this study (commercial real estate loans under $1.0 million), a comparison to the results of Snyderman and Vandell et al. merits discussion.

The Vandell study, similar to the probit model and proportional hazards model created for this study, indicates a negative coefficient for the variable for debt service coverage ratio and a positive coefficient for the loan to value variable (it should be noted, however, that the loan to value ratio in the Vandell model is an ex ante variable derived as the market value at the time of event, be it default, prepayment or conclusion of the period of study). The probit model in this study differs from the proportional hazard model and that result found by Vandell in that the relative interest rate coefficient is negative, indicating that loans with relatively higher interest rates have a decreased probability of default. This variable, however, was statistically insignificant and can be discounted.

Regarding property type, the Vandell study found apartments, hotels, office, industrial and other property types to all have a relatively higher hazard rate than retail properties. Both the probit and proportional hazards models created for this study found apartments, industrial and other properties to have higher default likelihood and hazard rates relative to retail properties; however, office properties were found to have relatively lower default rates. This may be explained by the purpose for the loan and that a significant proportion of the office properties in this study were owner occupied. Thus, the performance of the loan will be more a factor of the individual's business performance than a reflection of the performance of real estate markets.

The Vandell study found partnerships, individuals and corporations to exhibit increased hazard rates relative to other ownership entities. The probit model and proportional hazard model, however, displayed different results. It is important to note both the probit and proportional hazard model in this study use trusts as the base variable for ownership entity. The probit model indicated that while corporations had a higher probability of default, partnerships and individuals had a lower likelihood of default. The proportional hazard model indicates trusts to have the highest hazard rate relative to (in decreasing order of hazard levels) corporations, partnerships and individuals.

The probit and proportional hazards models both indicate positive sign coefficients for loans requiring balloon repayments at the conclusion of the loan, reflecting a higher default risk relative to mortgages fully amortizing over the term of the loan. Similarly, the Vandell study has a negative coefficient (AMZDUMMY) for mortgages partially or fully amortizing over the loan term.

The initial Snyderman study estimated an average life time default rate of 12.1% with an average overall projected life time default rate of 15.4%. These figures were updated to 13.8% and a sum of average defaults over the period resulting in an 18.3% default rate when the study was amended with loan data up to 1991. The estimated default rate of 12.55% for the commercial real estate loan portfolio used in this study may vary due to the relatively small sample of loans.

## VI.    Conclusions

i        The Future of Commercial Mortgage Backed Securities

The development of the market for commercial mortgage-backed securities has largely been evolutionary as opposed to revolutionary. While it may be incorrect to draw a correlation to the infancy stages of the residential mortgage-backed market, there exists significant opportunity for expansion and it will likely play an increasingly important role in the real estate and capital markets. The refinancing of loans originated during the years of the real estate boom (which are now maturing) on its own provides a strong impetus to securitization. Exhibit XXV illustrates projected commercial mortgage rollovers from 1991 to 1996. Commercial mortgage rollovers are estimated to total $140 billion in 1994 and "based on

### Exhibit XXV

### Projected Commercial Real Estate Loans Maturing: 1991-1996
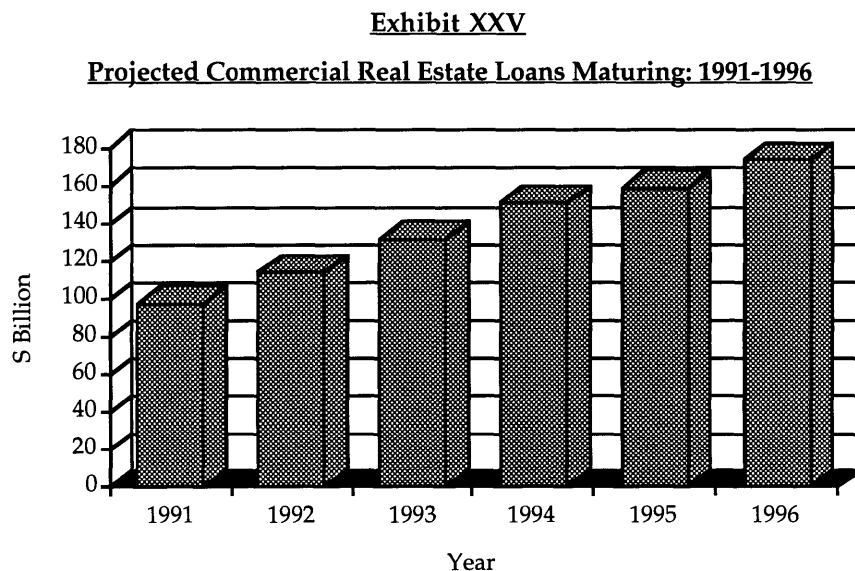
Source:[117]

the fact that loan originations by commercial banks, life insurance companies and foreign banks did not peak until the 1991-1992 period, future rollover activity should continue to be significant and peak sometime during 1996 or 1997. Until then, the annual volume of rollovers

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[117] Leanne M. Lachman and Gregory A. White, "The Need for New Money," *Mortgage Banking* (October 1993), p.61.

may be lower than estimated previously, probably averaging about $140 billion annually."[118] The need to refinance these mortgages will require funding from a variety of sources, of which securitization is an alternative available to large developers/owners and financial institutions alike.

The potential for securitization is significant as financial institutions covet the ability to regulate their financial and credit risk exposure. This has become increasingly important due to the imposition of risk-based capital requirements. The development of securitized markets will result in increased liquidity for both commercial mortgage originators and the purchasers of these instruments. Furthermore, the development of the secondary market for commercial mortgages should be abetted by an increased understanding of these investments by investors and there has been some movement toward standardization of loan documentation and underwriting criteria to facilitate improved ratings. The pricing of these instruments has improved substantially as increased participation by a number of institutions (ranging from large life insurance companies and commercial banks to small, highly specialized, mortgage conduits) has served to decrease spreads for both investment and secondary properties. This should ultimately benefit the real estate market by helping to provide more efficient and diverse sources of funds.

The reduced activity of the RTC and FDIC in the commercial mortgage-backed securities market will result in future growth being reliant on private (i.e. non-governmental) issuance. Securitization, therefore, must provide a financially and economically viable means of trading commercial real estate debt for expansion of the secondary market to continue. While many traditional lending sources are re-entering the market, the increasing acceptance of commercial mortgage-backed securities by borrowers and lenders alike will enhance the role and importance of capital markets in the funding of commercial real estate.

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[118] William B. Brueggeman, "Improving Conditions in the Commercial Mortgage Market," *The Real Estate Finance Journal* (Summer 1994), p.21.

i i    Suggestions for further research

The analysis of the small commercial real estate loan portfolio in this study centered on a probability-based estimate of default. Risk for commercial mortgages is fundamentally different from that pertaining to residential mortgages in that risk associated with commercial mortgages primarily relates to default risk. Pre-payment can be reduced through lock-outs, prepayment penalties and yield maintenance provisions. The study of default risk for commercial mortgages, be they individual loans or portfolios, is critical to the development of the commercial mortgage backed securities market.

The study of default risk for commercial mortgages has been retarded due to the proprietary nature of pertinent data. A comprehensive study of the characteristics of loan origination terms, property-specific information and macroeconomic conditions are necessary to provide a better understanding of default. Data on loan origination should be compiled from a number of geographically dispersed financial institutions. A study including loans originated over a number of years (preferably from the early 1970's to date) and with several loan portfolios will provide for a comprehensive evaluation of commercial mortgages and lending criteria over time and by institution.

The analysis of a large pool of commercial real estate loans should incorporate an evaluation of severity of loss. Combined with the probability of default derived through a probit or proportional hazard analysis, the model could then incorporate mortgage loss into a pricing risk adjusted pricing equation as:

Severity of loss x Probability of Default = Expected Losses[119]

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[119] Op. Cit., Jacob and Duncan, p.20.

The severity of loss for defaulted loans would be calculated by subtracting the funds recovered through foreclosure or restructuring from the total outstanding balance of the loan together with additional administration and restructuring costs, and any interest foregone. Clearly this would require detailed information on individual loan histories within the mortgage pool(s). The combination of the probability of default with loss severity would provide the basis of a risk-adjusted pricing model for commercial mortgage backed securities.

iii     Conclusion

The commercial mortgage-backed securities market has developed at a haphazard rate since their introduction in the early 1980's. While the initial issues were primarily placed on the Eurobond market, the development of rating criteria for these products served to increase the potential investor base for these instruments. The development of the market for commercial mortgage-backed securities was further facilitated by the conception of the collateralized mortgage obligation and the Tax Reform Act of 1986 (resulting in the birth of the Real Estate Mortgage Investment Conduit).

To advance and expand, the commercial mortgage-backed securities market must compete against a myriad of investment alternatives in the highly competitive capital markets. This will require the issuance of products that are marketable and attractive to retail and institutional investors. Securitization expands the sources of funding for real estate by allowing both traditional and non traditional investors to participate in the commercial mortgage market. It is likely that until an active and liquid secondary market emerges for commercial mortgage-backed investments that private placements will be more common than public offerings.

The ongoing malaise of the real estate industry will continue to result in investors seeking a premium when investing in property related products. Issuers of commercial mortgage-backed securities must surmount the "perception of added risk that attends the commercial real estate field today."[120] This risk is particularly important to the development of the commercial mortgage market relative to the residential mortgage market as there are no implicit government guarantees, a lack of consistent underwriting standards, and homogeneity among product types.

The study of default in commercial mortgages is essential to foster the development of the secondary market. Further analysis is necessary to evaluate default relationships; in particular, the loan origination terms and real estate trends over time in effecting default and the severity of loss. Securitization, nevertheless, is a viable means to expand the commercial mortgage market to non-traditional real estate investors and lenders, which will serve to utilize more efficient primary and secondary capital sources.

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[120] Op. Cit., Lee, p.83.

# APPENDIX I

Explanation of the variables used by Vandell et al.[121]

| Variable | Code |
|---|---|
| Market Loan-to-Value (at time of event) | MKTLTV |
| Contract Interest Rate | INTRTE |
| Original Debt Coverage Ratio | ORIGDSC |
| Property Type Dummy Variables | |
|     (RETAIL is base) | |
|         Apartment | APT |
|         Hotel | HOTL |
|         Office | OFF |
|         Industrial | INDUS |
|         Other | OTH |
| Borrower Type Dummy Variables | |
|     (OTHER is base) | |
|         Individual | INDIVID |
|         Partnership | PARTNER |
|         Corporation | CORP |
| Loan-Type Variables | |
|         Accrual Dummy | ACRDUMMY |
|         Cash Flow Change Dummy | CFDELTA |
|         Amortization Dummy | AMZDUMMY |
|         Step Rate Payment Dummy | GPMDUMMY |

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[121] Op. Cit., Vandell et al, p.468.

## Results of Proportional Hazards Model III

| Variable | B | S.E. | Wald | Sig | R | Exp(B) |
|----------|------|------|------|-----|---|--------|
| DSCR | -1.0982 | 0.3606 | 9.2737 | 0.0023 | -0.1169 | 0.3335 |
| INT | 0.4520 | 0.2057 | 4.8273 | 0.0280 | 0.0729 | 1.5714 |
| LTV | 0.0101 | 0.0048 | 4.4226 | 0.0355 | 0.0675 | 1.0102 |
| SEA | 0.0096 | 0.0040 | 5.6947 | 0.0170 | 0.0833 | 1.0096 |
| VAR | 0.0187 | 0.3226 | 0.0033 | 0.9539 | 0.0000 | 1.0188 |
| APT | 0,3871 | 0.4421 | 0.7667 | 0.3812 | 0.0000 | 1.4728 |
| IND | 0.3332 | 0.6385 | 0.2724 | 0.6017 | 0.0000 | 1.3955 |
| OFF | -0.0361 | 0.5792 | 0.0039 | 0.9503 | 0.0000 | 0.9645 |
| OTH | 0.2363 | 0.5234 | 0.2038 | 0.6516 | 0.0000 | 1.2666 |

-2 Log Likelihood = 470.103

Overall Chi-Square = 52.649

## Results of Proportional Hazards Model IV

| Variable | B | S.E. | Wald | Sig | R | Exp(B) |
|----------|-----|------|------|-----|---|--------|
| BAL | 1.1256 | 0.4354 | 6.6835 | 0.0097 | 0.0938 | 3.0822 |
| DSCR | -1.1327 | 0.3465 | 10.6886 | 0.0011 | -0.1278 | 0.3222 |
| INT | 0.4101 | 0.1959 | 4.3805 | 0.0364 | 0.0669 | 1.5069 |
| LTV | 0.0097 | 0.0045 | 4.6870 | 0.0304 | 0.0711 | 1.0098 |
| SEA | 0.0093 | 0.0039 | 5.7005 | 0.0170 | 0.0834 | 1.0093 |
| VAR | 0.0685 | 0.3278 | 0.0436 | 0.8346 | 0.0000 | 1.0709 |
| CORP | -0.0480 | 0.5677 | 0.0071 | 0.9327 | 0.0000 | 0.9532 |
| INDIV | -0.1065 | 0.3724 | 0.0818 | 0.7748 | 0.0000 | 0.8989 |
| PART | -0.0711 | 0.3404 | 0.0436 | 0.8346 | 0.0000 | 0.9314 |

-2 Log Likelihood = 471.564

Overall Chi-Square = 52.642

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