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Robert M. Dunsky
Syracuse University

James R. Follain
Syracuse University

Jan Ondrich
Syracuse University

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Robert M. Dunsky, James R. Follain, and Jan Ondrich

**Center for Policy Research
Maxwell School of Citizenship and Public Affairs
Syracuse University
Syracuse, New York 13244-1090**

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Abstract

This study uses recurrence probabilities to generate forecasts of the volume of multifamily mortgage originations for the period 1992-2002. The approach concentrates on predicting the volume of property sales using the baseline of a multifamily prepayment hazard estimation to generate the predicted cohort-specific proportion of calendar sales in a given year. The forecast for the volume of originations depends strongly on the definition of the relevant mortgage population. A definition that excludes assumptions but otherwise includes all properties selling between 1971 and 1991 in which a first mortgage was used in its acquisition yields a forecast of $47.2 billion for 1997. A more restrictive definition that approximates the pool of loans covered by HMDA leads to a forecast of $23.5 billion for 1997.

I. Introduction

The U.S. Department of Housing and Urban Development is assigned the task by Congress to establish specific affordable housing goals for the two Government Sponsored Housing Agencies (GSEs), Fannie Mae and Freddie Mac. There are three goals, one for low-moderate income housing, one for central cities, rural areas, and other underserved areas, and a special affordable goal, which focuses on housing for low-income families in low-income areas and very low-income families. The goals as proposed in February 1995 specify the percentages of the GSE loan purchases that must apply to the target groups.

Critical input into the overall policy decision is a methodology that estimates the fraction of total multifamily and single family mortgage originations. The existing methodology is reviewed by Blackley and Follain (1995). This study focuses on a new approach that uses recurrence probabilities to generate forecasts of the volume of multifamily mortgage originations for the period 1992-2002.

The new method is based on the assumption that multifamily mortgage originations are largely driven by the sales of multifamily properties. The larger the volume of sales, the larger will be the volume of mortgages used by buyers to purchase the properties. In our approach, the volume of property sales is computed using elements of a multifamily prepayment hazard function estimated in prior work by Follain, Ondrich, and Sinha (1995). Specifically, we use the baseline portion of this hazard function to generate the predicted cohort-specific proportion of property sales in a calendar year.[1] Cohorts are distinguished by the number of years since acquisition, the number of housing units within these properties, and the average market value of each unit. The forecast is the summation of mortgage originations of each cohort for each calendar year.

The forecast of the volume of multifamily originations for 1997 ranges from $23.5 billion to $47.2 billion. The primary cause of the variation is the difference in the definitions of the two

mortgage populations that are analyzed in this study. The "All Properties" definition is the most general category. It includes multifamily properties in which a first mortgage was used in its acquisition; cash purchases and assumptions are excluded. This category also excludes properties purchased without a mortgage and those that did not sell between 1971 and 1991, which is a sizeable amount. The "restricted" sample, drawn from the second population, uses the restrictions developed by John Gardner to approximate the pool of loans covered by HMDA.

The outline of the remainder of this paper is as follows. The next section explains the methodology used to produce the forecasts. The following section explains key assumptions used to generate the forecast. The results of the analysis are contained in the fourth section. Important caveats are contained in the fifth section, and the major conclusions are briefly summarized in the final section.

II. A New Methodology

Multifamily originations can be viewed as the sum of four major components: the volume of originations made to purchase existing multifamily properties or to refinance for non-interest rate reasons; the volume of loans made to "purchase" new construction projects (convert construction into permanent financing); the volume of loans to refinance short-term bullet loans; and the volume of loans to refinance existing loans due to interest rate declines. Our approach focuses on the first two components and almost exclusively on the first component; originations due to property sales or loans to refinance an existing loan for reasons other than interest rate declines, e.g., portfolio restructuring. Relatively noncontroversial assumptions are used to generate forecasts associated with new construction property. The last two components are not

addressed in this approach, although some estimates of the volume of loans likely to require new mortgages during the next several years are provided, i.e., balloon mortgages with only a few years remaining until maturity. In this sense, our forecast focuses on a steady state in which interest rates are stable and new originations are generated solely by property sales, loans to restructure a portfolio and new construction. This approach ought to generate conservative forecasts of future multifamily loan originations because it omits refinances due to future interest rate declines and balloon loans to mature in the next several years. This seems to be a defensible approach because the forecasts obtained with this approach generate estimates already well into the upper ranges of the estimates being discussed by HUD and the GSEs.

A better understanding of the methodology can be obtained by defining multifamily originations in the current year as follows:

$$MF = p_e N_e K_e U_e V_e LTV_e + N_c M_n + RF$$

where MF = multifamily originations (in dollars) in the current year; p_e = proportion of sales that use a mortgage in the current year; N_e = fraction of properties that sell in the current year; K_e = the total number of properties in the current year; U_e = number of units per property in the current year; V_e = value per unit in the current year; LTV_e = loan to value ratio on typical acquisition in the current year; N_c = number of newly constructed units in the current year; M_n = size of mortgage per new property in the current year; and RF = volume of refinances due to interest rate changes and maturing balloon mortgages in the current year. Our approach focuses on the first of these terms, which we label as MF_e. Assumptions are made regarding the number of multifamily housing starts (N_c) and the typical size of a mortgage associated with the permanent financing of these loans (M_n); RF is ignored.[2]

The first term can be further distinguished in terms of the number of years since the property was acquired as follows:

$$MF_e = \sum_{j=1}^{T} p_{ej} N_{ej} K_{ej} U_{ej} V_{ej} LTV_{ej}$$

where each of the terms are subscripted by *j*, the years since the property was acquired. For example, N_{e2} is the fraction of the properties last sold two years ago that will sell in the current period. Information about several of these factors is available from the 1991 Residential Finance Survey (RFS); specifically, information about the average value per unit, the number of units per property, and the fraction that sell with a first mortgage by years since acquisition can be computed from the RFS.

Our approach views N_{ej} as a conditional baseline hazard rate; that is, the hazard rate is the conditional probability that a mortgage will terminate in a particular period given that it has survived to that period. The term baseline refers to the fact that the conditional hazard is evaluated under the assumption that all other exogenous determinants of mortgage termination are taken into account, e.g., the contract interest rate relative to the current period market rate.

If the hazard rate is constant among all years since acquisition, then the forecast of multifamily loan originations is straightforward; one simply multiplies this constant times the summation of the other terms in the previous expression. Even if the hazard rate is not constant, the expression is relatively easy to evaluate if the forecast is only one year ahead; in this case, the forecast is a weighted average of the components of the hazard rate with the weight calculated from the remaining factors.

The problem becomes considerably more complex as the number of years in the forecast increases. Define the cohort number of a mortgage in the current year to be the number of years

since the property was acquired rounded to the next highest integer. Those in the first cohort in 1992 that do not sell in 1992 move into the second year of the mortgage; those in the first cohort in 1992 that do not sell in 1993 move into the third year of the mortgage, and so forth. Those in the first cohort in 1992 that actually sell in 1992 must be reassigned to a new group that includes properties with newly originated mortgages for the 1993 calculations (the first cohort in 1993); similarly, those among the second cohort in 1992 that actually sell in 1992 are reassigned to the new group that, in essence, begins its life again in 1992. The composition of the group with a new life changes, from year to year and includes properties from all cohorts. Hence, in the second year of the forecast, the problem becomes more complex because some of those that sold in year 1 and were reassigned may have sold again; these are reassigned to the first cohort. Keeping track of these reassignments and the resulting change in the characteristics of the various cohorts using first recurrence probabilities from the theory of stochastic processes is the heart of our forecasting approach.

We design a program to make these calculations for two samples of properties that sold between 1972 and 1991. To our knowledge, this is the first attempt to use hazard rates to develop a forecast for either multifamily or single family mortgages. We make an eleven year forecast for the period 1992 through 2002 of the total volume of multifamily loans to be originated for the existing stock of multifamily housing as of 1991.

III. Key Assumptions

A number of assumptions are made in order to produce the forecast. These assumptions are made explicit in this section.

A. Two Populations

The hazard rate analysis is applied to two different groups of properties. The first includes most multifamily properties acquired with the use of mortgage debt; as such, they represent a potential universe from which Fannie Mae and Freddie Mac might look to purchase multifamily loans. The second is narrower and corresponds more closely to the types of loans likely to be found in the HMDA data set, which focuses on loans originated by the banks, thrifts, and mortgage bankers. The use of this smaller population helps identify the accuracy of the estimates of multifamily originations using HMDA data. It is not intended to represent the pool of loans to which the GSEs should limit their attention.

Both are based upon the public use version of the 1991 RFS. The first population is the largest; the second is a subset of the first. The unit of observation in our analysis is the multifamily property.[3] The specific attributes of each group are as follows:

Group 1:

a. Only properties with five or more units are included; mobile homes and condominiums are excluded;

b. Properties are excluded if they were converted from nonresidential use around the time of acquisition;

c. Only properties acquired with a first mortgage are included;

d. Only properties acquired by a purchase are included; this excludes nonarmslength transactions;

e. Properties in which the land and structure were acquired at different times are excluded;

f. Properties are included only if their acquisition was financed with a new mortgage or if the information was not reported (this excludes assumed mortgages);

g. Only properties with a first mortgage originated in 1987 to 1991 are included;

The second population is the first population less:

a. Loans held by insurance companies, real estate investment trusts, pension funds, finance companies, state or municipal governments or housing finance agencies, individuals, or those otherwise not classified;

b. Loans serviced by institutions other than commercial banks, savings and loans, mutual savings banks, mortgage bankers, and credit unions;

c. Loans with FHA, VA, FmHA, state bonding agency or "other" types of mortgage insurance. Thus, only loans with private mortgage insurance or no insurance are included in the second population.

B. Hazard Rates

The hazard rates are based upon previous econometric work by Follain, Ondrich, and Sinha (1995). They estimate a variety of hazard models using data from Freddie Mac's portfolio of multifamily loans. The particular sample of properties includes Plan A loans; these were originated in the 1970s and through to 1986 and typically have long-term fixed rate mortgages with maturities greater than or equal to 15 years. The mortgages are observed through April 1989 or until they terminate. The data include virtually no mortgage defaults; some of Freddie's troubles with multifamily loans began in late 1989 and 1990. Although Plan A has been replaced by newer plans in the 1980s (Plans B and C), they were the dominant type for many years and generated a rich set of data with which to study the termination behavior of multifamily loans.

The paper reports several functional forms and estimates for the hazard rate. The particular hazard function estimated in this paper is as follows:

$$h_i(t) = 1 - \exp\left[-\exp[\gamma(t) + z_i(t)\beta]\right]$$

where $h_i(t)$ is the hazard rate in quarter t for the ith loan; $\gamma(t)$ is the baseline hazard parameter for quarter t (56 quarterly dummy variables); $z_i(t)$ is the vector of exogenous variables in the model and includes a value of the option to refinance, seasonal dummies, and a dummy for the fourth quarter of 1986. The specific estimates are taken from Table 4, Column 1 of Follain, Ondrich,

and Sinha (1995). Further details about the model, the data, and the estimation procedure are provided therein.

Annual hazard rates are simple averages of the quarterly hazard rates. These are based upon an analysis of the hazard rate for a mortgage that is deeply out of the money; specifically, the ratio of the difference between the market value of the mortgage and its book value relative to the book value of the mortgage is set at minus 10 percent. We do this to eliminate the impact of interest rates upon termination rates in order to support our interpretation of the estimated baseline as a description of prepayments due to property sales and normal portfolio restructuring among investors in multifamily properties.

The estimated annual hazard rates are reported in the second column of Table 1. The hazard rate for the first year equals 0.6 percent; very few prepay in the early years. The hazard rate rises substantially through year 13 when it peaks at 14.7 percent. Our data do not allow us to estimate baseline hazard rates beyond year 14 and we set them equal to 12.7 percent.[4]

C. Cohort Sizes and Characteristics

The RFS is used to estimate characteristics of the two populations. Statistics are calculated for properties with mortgages that were originated since 1971 by year of origination. The statistics include the average value per unit (value is the current estimate of the market value of the property by the owner in 1991) and the number of units in each cohort. These statistics are reported in Table 1. They are used to compute the distribution of property value by years since acquisition, the total value of the stock represented by each cohort ($523 billion over all cohorts in the larger group and $267 billion in the restricted group), and the total number of units (9.97 million in the larger group and 5.04 million in the restricted group). The volume of existing

mortgage debt is estimated using the amount of outstanding debt on the first mortgage at the time of the survey, April 1991.

Other important assumptions include:

1. **Value Appreciation**. The value of each property is assumed to grow at a modest 1.5 percent per year during the forecast period.

2. **Initial Loan to Value Ratio (LTV)**. Properties that sell are assumed to be purchased by someone who uses a first mortgage. These mortgages are assumed to have an initial LTV of 70 percent. This number is based upon the average LTVs of loans in the first cohort.

3. **New Construction**. Several simplifying assumptions are made to incorporate multifamily originations due to new construction. First, we use actual production of multifamily housing units for 1992 through 1994. Annual production beyond this is assumed to be 175,000 units. The number of new units in the restricted sample equals the forecast or actual number of new units times the ratio of the number of properties in the restricted sample to those in the larger sample. Second, the average value per unit is assumed to be about $52,000 for properties in both populations. This is the mean value of property per unit among all cohorts in the samples. Third, all newly constructed properties are assumed to be associated with a new multifamily loan with an initial LTV of .7. Fourth, the resulting estimate of new construction per year is simply added to the forecast based upon the existing properties as of 1991.[5]

4. **1991 Values Inflated by Factor of Three**. The RFS was taken in April 1991 so only properties originated in the first three or four months of 1991 are included in the survey. Rather than exclude 1991 data, we simply inflate the number of originations for 1991 by a factor of three.

5. **Fixed Rate Mortgages**. The hazard model is estimated using a sample of long term fixed rate mortgages (FRMs). A question arises as to the applicability of these estimates to a sample that includes properties with both FRMs and short-term balloon mortgages even though the dominant mortgage instrument in the sample is the FRM. Strictly speaking, we assume that the hazard function applies equally well to both types of mortgages; we discuss this assumption and report some other data regarding the magnitude of balloon mortgages in the sixth section.

The attempt was made to validate these assumptions with the RFS whenever possible. Moreover, the assumptions concerning the annual appreciation rate, the initial LTV, and the characteristics of the two samples of properties all seem to lead to conservative but reasonable estimates of multifamily loan volume.

IV. Forecasts

The results of the analysis are presented in Table 2. The top panel includes the estimates based upon the hazard analysis for the two populations for the years 1992 to 2002. The middle panel includes the estimates for new properties and the bottom panel is the sum of the numbers in the top two panels. The bottom panel is our forecast of total multifamily loan originations less any refinances or loans originated to purchase.

Several important conclusions emerge from these forecasts. First, and foremost, our estimates for 1997, the second year in which the affordable housing goals are to apply, are $47.2 billion for the larger sample and $23.5 billion for the restricted sample. The average rates of multifamily loan originations in 1996 and 1997 are about $45.6 billion and $22.5 billion per year, respectively for the two samples.

Second, the forecasts of the volume of loan originations change relatively little in the latter years of the forecast, although they rise substantially in the early and middle part of the 1990s. The relatively large increases in the early and middle 1990s occur for a couple of reasons. First, a relatively large amount of multifamily debt was originated in the 1985-1988 period; and , second, the hazard rate rises substantially in the ninth and tenth years. These characteristics lead to a relatively large volume of property sales in the early and middle 1990s. The flattening out of the forecasts reflects the fact that the hazard rate beyond year 14 is assumed to be constant; indeed, extension of the forecast far into the future would generate a forecast that grows by the rate of inflation.

Third, the estimates for 1993 shed light on the validity of the debate regarding the differences in the estimates of multifamily loan originations reported by HUD's Survey of

Mortgage Lending (SMLA) and the HMDA data. The 1993 SMLA reports multifamily loans of $31.70 billion; HMDA gives only $12.85 billion. The estimates for the larger sample in 1993 are $32.2 billion and just over $15 billion for the restricted sample. Given the number of assumptions and the major differences in the methodology among the three groups, the results validate the new methodology. The estimate for the restricted sample is within 15 percent or so of the HMDA data and the estimate for the larger group is even closer to the SMLA estimate.

The differences between HMDA and the SMLA are often considered functions of the quality of the methods used to produce the SMLA and HMDA estimates. The SMLA is criticized because its sampling design is outdated and based upon a small sample of lenders, primarily commercial banks. The HMDA data are criticized because many suspect that it underreports lenders that it is supposed to cover. For example, mortgage bankers are almost surely underrepresented in the 1993 survey. Our sense is that the differences between the SMLA and HMDA are largely due to the fact that they are designed to study different groups of lenders. HMDA is designed to measure a relatively small portion of the multifamily loan market, namely those originated by traditional lending institutions that do a substantial residential loan business in metropolitan areas. Surely some of the differences are due to problems of capturing loan consortia, mortgage bankers, workouts and other such things; however, both data sets probably do a reasonable job of estimating what they are designed to estimate.

V. Caveats: Refinances and Balloon Mortgages

There are several potential weaknesses in the methodology used to generate the forecasts. First, it omits originations generated by refinances due to interest rate declines. Given our desire to err on the conservative side, this is a defensible approach. Nonetheless, refinances could be

incorporated into an extended version of the approach by computing mortgage terminations that include refinances. This would involve the introduction of an interest rate generating process, the use of the coefficient of the prepayment option, and the computation of the forecast for a wide variety of interest rate scenarios.

Second, the forecasts omit originations generated by loans that do not fully amortize by the maturity date and have relatively short maturity dates. The principal example of this type of mortgage is the short-term balloon mortgage or bullet loan. This is an interest only mortgage that usually matures in less than ten years. The last payment is one large enough to retire the debt. Borrowers usually make this last payment by originating a new loan. Many observers of the multifamily mortgage market indicate that balloon mortgages were relatively popular in the late 1980s and early 1990s. If so, these balloon mortgages will be coming due in the 1990s and will require new mortgage originations. To the extent our forecasts omit originations associated with these balloon mortgages, they underestimate the volume of multifamily originations.

The 1991 RFS is used to investigate the importance of balloon mortgages. Table 3 reports on the volume of conventional multifamily loan originations for the years 1987 to 1991; these tabulations are made using actual Census data and not the public use file; as a result, we have access to the exact year of origination and the exact amount of the loan. We focus on first mortgage loans; only the amounts of the first mortgage are used to compute the numbers in the table. The total of these originations exceed those in Table 1 because these calculations are based upon mortgage originations whereas Table 1 is based upon property acquisitions; as such the numbers in Table 3 include refinances.

The originations in Table 3 are broken down by three types: fixed rate mortgages (FRMs); balloons; and, adjustable-rate mortgages (ARMs). These comprise the overwhelming number of

all loans made during this period (144,874 of the 148,138 loans made during the period were one of these types).

Several conclusions emerge from a review of Table 3. FRMs comprise less than one third of the volume of multifamily loans originated between 1987 and the first quarter of 1991; however, they represent about 41 percent of the number of loans.[6] Balloons are about 28 percent of the total during this period in terms of loan volume. Balloons have shorter maturities than either the FRMs or the ARMs; balloon maturities are usually less than ten years. They also tend to be on the largest properties with average units per property averaging between 31 and 52 units; property size among FRMs and ARMs averages about 20 units per property. As a consequence, balloon mortgages tend to be twice as large, on average, as either FRMs or ARMs. In general, balloons were a significant portion of loan originations during this period. Although this was not confirmed and is difficult to confirm with the RFS, our sense is that this is a relatively recent phenomenon; FRMs were probably the dominant instrument in the 1970s and throughout much of the 1980s.

The growth of balloon mortgages in the late 1980s will give rise to mortgage originations in the 1990s as borrowers take on new debt to pay off the balloons. To obtain a sense of the importance of this source of mortgage originations, the RFS is used to compute the distribution of first mortgage debt outstanding in 1991 by years to maturity and mortgage type. The computations are presented in Table 4. The population upon which these computations are based is generally the same as in Table 3. Differences stem from the fact that the information regarding the remaining term includes missing observations. Similar calculations have been made at the Census using its own RFS file.

The first point to note is that a large number of balloon mortgages have matured or will mature in the 1990s. A total of 5,193 balloon mortgages matured in 1994 alone. Over $20 billion in balloon mortgages have or will have matured between 1992 and 1998. This is double the amount of FRMs maturing and four times larger than the number of ARMs. Despite their importance, it appears that their largest impact has already been realized. Only $1.8 billion is expected in 1995. About $4.5 billion is expected in 1996 and 1997, the years in which the affordable housing goals apply.

The analysis suggests that, indeed, balloons were a major part of the environment in the late 1980s; furthermore, these loans have an impact upon multifamily loan originations above and beyond that predicted by the forecasting model used in the previous sections. Nonetheless, the boom in balloon originations seems to have past for the most part. Unless the balloons maturing in the early 1990s were replaced with very short-term balloons (and we have no information about this), the exclusion of balloons from our previous calculations are unlikely to have a major impact on our forecast.

VI. Conclusions

This paper is motivated by the desire to offer a new method with which to estimate the volume of multifamily originations for the remainder of the 1990s. It has the advantage of forecasting on the long run or steady state volume of originations generated by property sales and normal portfolio restructuring by investors in such properties. In this sense, it is less sensitive to year to year fluctuations in the historical volume of mortgage originations.

We wish to emphasize three conclusions from this analysis. First, our best estimate of the volume of multifamily originations in 1993 is $32 billion. This is close to the estimates produced

by the SMLA for 1993, but is higher than the volume of loan originations in the late 1980s, which usually averaged in the low $20 billion range. The estimates for 1996-1997 are $44 and $47 billion, respectively.

Second, although our forecast does not explicitly take account of originations driven by the maturity of balloon mortgages, our investigation of the 1991 RFS suggests that they will add modestly to the forecast. Balloon mortgages were quite common in the late 1980s, but it appears that many of these matured in the early 1990s. The scheduled amount of balloons originated in the late 1980s and maturing in 1996-1997 is only $4.6 billion.

Third, the comparison of the results for the larger sample and the restricted sample shed light on the often noted discrepancy between estimates of multifamily loan originations from HMDA versus the SMLA and the RFS. Applying restrictions to the RFS data that correspond to those associated with HMDA reporting requirements produces estimates of multifamily originations close to those produced by HMDA. For example, we estimate $17.6 for 1994 while the preliminary HMDA numbers for 1994 indicate loan volume of $14.4 billion. These are consistent with a 15 percent underreporting of loans in the HMDA data set for the groups it is supposed to represent.

Our final comments refer to ways in which research on this general topic might proceed. First, the approach can be applied to single family originations. This would be relatively easy to do given the relative abundance of prepayment functions that have been estimated for single family loans. Second, the hazard models ought to be estimated for balloon and ARM multifamily mortgages; data at the individual loan level is needed to do this. More generally, further exploration of the performance of balloons and ARMs is needed. Third, the forecasting model can be embellished to include a forecast of originations due to refinancing.

Endnotes

1. We assume the value of the prepayment option is deeply "out of the money" in our calculations by computing the hazard rates in which the difference between the book value of the debt and its market value is minus ten percent.
2. Our estimate of the hazard rate does permit the incorporation of originations due to refinances into the forecast; however, this requires numerous assumptions regarding the nature of the interest rate process and Monte Carlo simulation analysis, which is beyond the scope of this particular paper.
3. The public use tape has multiple records per property. One record provides information about the property, e.g., acquisition date, numbers of units, purchase price, etc. Other records are included if there are mortgages associated with the property; there is one record per mortgage. Our data set has one record per property; in essence, we have appended the mortgage information to the property record.
4. Beyond year 14 the calculations are based upon the average of the $\gamma(t)$s for year 14.
5. A more complete approach would have included originations based upon new constructions; this approach tends to lower the forecast, all else equal. On the other hand, our approach does not incorporate the possibility that some properties will exit the stock as losses, which tends to raise the forecast. Our sense is that neither of these affect the forecast in a significant way.
6. As mentioned previously, the RFS was conducted in April 1991 and so only includes loans originated in the first few months of 1991.

Table 1. Baseline Hazard Rates and Cohort Characteristics

Years Since Acquisition	Annual Hazard Rate (percent)	All Properties				Restricted Sample			
		Average Value Per Unit (dollars)	Number of Units	Amount of First Mortgage Debt (dollars)	Share of Debt (percent)	Average Value Per Unit (dollars)	Number of Units	Amount of First Mortgage Debt (dollars)	Share of Debt (percent)
1	0.6	33,008	643,149	14,656,079,412	5.4	34,976	337,413	8,238,275,808	6.4
2	0.6	37,941	543,436	14,361,926,608	5.2	39,408	296,950	8,034,576,150	6.3
3	2.3	55,877	688,746	24,564,814,836	9.0	62,592	416,296	15,892,932,392	12.4
4	2.3	64,352	796,415	27,851,428,965	10.2	71,671	472,368	15,230,561,424	11.9
5	2.6	59,236	659,027	22,403,622,865	8.2	60,432	373,965	11,773,166,130	9.2
6	1.8	57,779	860,095	26,553,712,935	9.7	50,560	515,205	13,282,500,105	10.4
7	2.8	53,847	931,380	28,904,446,920	10.6	54,697	457,046	12,335,671,540	9.6
8	3.9	50,882	713,133	19,871,451,045	7.3	44,183	370,174	9,376,507,420	7.3
9	8.3	52,831	578,279	14,072,997,744	5.1	62,389	243,050	5,118,876,050	4.0
10	9.6	48,213	450,763	12,004,269,453	4.4	44,974	154,742	3,871,180,614	3.0
11	12.1	52,258	392,694	10,241,459,520	3.7	52,554	146,244	3,665,313,372	2.9
12	10.0	47,964	441,816	9,864,425,832	3.6	47,963	150,117	2,863,481,775	2.2
13	14.7	59,532	396,178	13,385,269,908	4.9	64,455	164,048	3,653,020,864	2.9
14	13.0	51,472	426,604	8,430,974,852	3.1	50,174	208,182	3,570,945,846	2.8
15	12.7	50,203	315,702	5,525,732,106	2.0	42,480	164,613	2,190,669,804	1.7
16	12.7	45,670	323,779	5,885,654,662	2.2	46,552	175,077	2,862,859,104	2.2
17	12.7	50,560	264,173	5,387,279,989	2.0	54,383	143,036	2,541,320,612	2.0
18	12.7	52,509	262,198	4,538,909,578	1.7	61,531	129,860	2,116,068,700	1.7
19	12.7	70,790	280,699	5,222,685,594	1.9	39,170	122,675	1,417,754,975	1.1
			9,968,266	273,727,142,824	100.0		5,041,061	128,035,682,685	100.0

Sources: Follain, Ondrich, and Sinha (1995) and author's calculations from the 1991 Residential Finance Survey.

Table 2. Forecast of Multifamily Loan Originations: 1992-2002
(dollars)

Calendar Year	All Properties	Restricted Sample
Multifamily Loans from Turnover of Existing Properties		
1992	24,378,511,979	11,463,118,374
1993	27,443,868,423	12,856,751,482
1994	30,782,830,941	14,556,158,994
1995	34,032,689,564	16,180,312,388
1996	37,154,933,674	18,024,837,663
1997	40,223,997,434	19,867,231,381
1998	42,867,818,862	21,508,073,926
1999	45,022,056,672	22,759,366,526
2000	46,036,455,454	23,300,608,678
2001	46,972,190,136	23,806,624,096
2002	47,398,531,191	24,020,659,408
Multifamily Loans from New Construction		
1992	5,863,464,556	3,042,395,320
1993	4,783,733,536	2,482,151,701
1994	5,925,991,169	3,074,838,711
1995	6,790,994,719	3,523,665,975
1996	6,892,859,640	3,576,520,965
1997	6,996,252,534	3,630,168,779
1998	7,101,196,322	3,684,621,311
1999	7,207,714,267	3,739,890,630
2000	7,315,829,981	3,795,988,990
2001	7,425,567,431	3,852,928,825
2002	7,536,950,942	3,910,722,757
Total Multifamily Loan Originations		
1992	30,241,976,535	14,505,513,694
1993	32,227,601,958	15,338,903,183
1994	36,708,822,110	17,630,997,706
1995	40,823,684,283	19,703,978,363
1996	44,047,793,314	21,601,358,628
1997	47,220,249,968	23,497,400,160
1998	49,969,015,184	25,192,695,236
1999	52,229,770,939	26,499,257,157
2000	53,352,285,435	27,096,597,668
2001	54,397,757,567	27,659,552,920
2002	54,935,482,133	27,931,382,165

Source: Authors' calculations.

Table 3. Conventional Multifamily Loans Originated in 1987 to 1991 for FRMs, Balloons, and ARMs

Year	Number of Loans	Mean Loan Size (dollars)	Total Volume of First Mortgages (dollars)	Mean Units per Property	Mean Term
Fixed Rate Mortgages					
1987	12,788	622,012	7,954,289,456	23.6	18
1988	13,239	578,020	7,652,406,780	20.7	19
1989	13,606	507,458	6,904,473,548	22.6	19
1990	15,745	448,506	7,061,726,970	21.3	19
1991	7,498	465,192	3,488,009,616	22.1	15
Subtotal	62,876		33,060,906,370		
Balloons					
1987	4,722	1,229,274	5,804,631,828	37.9	10
1988	3,934	1,465,742	5,766,229,028	52.3	7
1989	5,287	1,200,054	6,344,685,498	43.8	8
1990	7,087	1,023,442	7,253,133,454	43.0	6
1991	4,031	672,764	2,711,911,684	31.2	6
Subtotal	25,061		27,880,591,492		
Adjustable Rate Mortgages					
1987	14,348	538,535	7,726,900,180	15.9	22.6
1988	13,566	613,909	8,328,289,494	17.6	25
1989	10,576	624,385	6,603,495,760	20.0	22
1990	14,836	488,916	7,253,557,776	15.0	24
1991	3,611	519,683	1,876,575,313	19.9	20
Subtotal	56,937		31,788,818,523		
Total for Three Types	144,874		92,730,316,385		
Total for All Types	148,138		101,269,406,274	24.9	18

Source: 1991 Residential Finance Survey and author's calculations.

Table 4. Conventional Multifamily Loan Volume by Year of Maturity and Mortgage Type

Year of Maturity	Number of Loans	Mean Loan Size (dollars)	Total Volume of First Mortgages (dollars)	Mean Units per Property
Fixed Rate Mortgages				
1992	2,136	885,535	1,891,502,760	26.4
1993	1,640	614,112	1,007,143,680	26.7
1994	1,508	645,736	973,769,888	31.5
1995	1,362	787,300	1,072,302,600	36.5
1996	1,392	740,986	1,031,452,512	36.2
1997	3,461	693,829	2,401,342,169	27.8
1998	1,390	746,237	1,037,269,430	33.0
Subtotal	12,889		9,414,783,039	
Balloons				
1992	3,717	583,042	2,167,167,114	23.5
1993	3,041	428,588	1,303,336,108	23.1
1994	5,193	1,716,278	8,912,631,654	56.3
1995	2,866	637,926	1,828,295,916	29.7
1996	1,341	1,160,953	1,556,837,973	51.1
1997	1,341	2,294,722	3,077,222,202	75.3
1998	771	2,177,633	1,678,955,043	78.0
Subtotal	18,270		20,524,446,010	
Adjustable Rate Mortgages				
1992	681	563,741	383,907,621	30.4
1993	575	651,150	374,411,250	34.4
1994	499	892,183	445,199,317	24.3
1995	553	811,065	448,518,945	33.4
1996	192	1,183,989	227,325,888	70.7
1997	1,478	1,763,027	2,605,753,906	43.7
1998	798	1,364,831	1,089,135,138	51.5
Subtotal	4,776		5,574,252,065	
Total	35,935		35,513,481,114	
1996-1997	9,205		10,899,934,650	

Source: 1991 Residential Finance Survey and author's calculations.

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