GEOGRAPHIC AND ECONOMIC DIVERSIFICATION IN THE INSTITUTIONAL RESIDENTIAL MORTGAGE INDUSTRY

by

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ABSTRACT

A study was conducted on the existing research concerning the benefits of geographic and economic diversification for institutional holders of residential mortgage portfolios. Interviews were conducted with industry participants including large financial institutions, rating agencies, mortgage research firms and private mortgage insurers to determine the extent to which diversification techniques are utilized in practice. Mortgage portfolio foreclosure and delinquency data was collected from three sources (including the Mortgage Bankers Association and the Office of Thrift Supervision) and statistical analysis performed to observe historical relationships that might suggest that diversification between regions in the United States would provide positive benefits to holders of residential mortgage portfolios.

The results of the interviews with industry participants demonstrated that the majority believe that positive benefits can be derived from the use of geographic diversification; in practice, however, true diversification techniques are rarely utilized. Statistical analysis on mortgage portfolio data concluded that geographic diversification is a useful technique that would provide the holders of residential mortgage portfolios with a tool for risk management. Historical delinquency and foreclosure data for the Northeast and Western regions of the United States exhibited negative or no correlation which leads to the conclusion that prudent portfolio managers should attempt to exploit these benefits.

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Chapter 1: Introduction

Recent developments in financial markets make it increasingly important to understand the risks associated with large portfolios of mortgages. Local and national business journals and newspapers have been filled with stories of the financial collapse of both small and large financial institutions of every conceivable type. It is estimated that the S&L debacle will ultimately cost U.S. taxpayers $500 billion over the next 30 years.[1] Varied reasons have been listed for the causes of these institutions' downfall: large investments in junk bonds, concentration of lending business in real estate assets, unchecked growth, and management focus on short run profits versus long run strategic planning, to name a few. Whatever the specific reason for these failures, there is some indication that they shared one basic business problem: their lines of business or their investments were too narrowly confined into one or two geographic/economic regions or into a particular type of investment.

The national policy implications for regulatory bodies due to the above circumstances appear to be obvious. To some extent, these issues have been discussed on a national basis for some time with regard to the benefits of encouraging a nationwide banking system. The Bush Administration and the Treasury Department have issued their policy statements concerning their goal of establishing a strong nationwide

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[1] The Boston Globe. Brady: $80b more for S&L cleanup. Page 51. June 27, 1991.

banking system that would be modeled closely after the successful banks of Europe and Japan.

Diversification of government-insured financial institutions' assets is sure to be an important component of any new national banking legislation. As it is expected that any new banking legislation will promote full interstate banking, the topic of geographic diversification will gain increasing prominence in the years ahead. The purpose of this paper is to study in some depth geographic and economic diversification of mortgage portfolios. This paper will seek to validate the broad assumption that geographic and economic diversification of a residential mortgage portfolio can be an important determinant of an institutional mortgage holders long-term success.

By means of interviews with people in the industry, a survey of the studies that have been done to date on this topic, and analysis of mortgage data provided by several sources, this study will provide insight into the usefulness of economic and geographic diversification for both mortgage originators, securitizers, and investors. The conclusions of the paper will also be useful for mortgage pool rating agencies, mortgage insurers, and regulators, all of whom seek to know the volatility and risk associated with securitized pools of real estate mortgage loans.

An added benefit of a study such as this are conclusions that might encourage mortgage bankers to more closely scrutinize their originations for diversification advantages. If diversification can be shown to

provide benefits such as a reduced risk of delinquency and foreclosure and these translate into a reputation for higher quality originations, it seems to follow that their fees for origination should exhibit more profitable characteristics than those who do not practice such techniques.

The large government sponsored securitizers, Fannie Mae and Freddie Mac, in packaging their pools of residential mortgages, have viewed geographic diversification in a naive fashion: risk of default and foreclosure in a pool of loans could be reduced by simply requiring a certain percentage of the total package to have been originated in each geographical subsection of the country. With the onset of severe regional recessions such as the oil patch debacle of the mid 1980s and the Northeast recession of the early 1990s, both the national securitizers and mortgage insurers have come to see diversification to be a more sophisticated tool necessary to reduce the cost of capital and losses.

The above trends seem to validate the need for large national banking institutions that can compete more efficiently and profitably than regional institutions. These large institutions, if sufficiently diversified geographically, could provide pools of originations to Fannie Mae and Freddie Mac that exhibit less risk based on their dispersion characteristics. Furthermore, these large financial institutions could bypass the secondary market agencies altogether and securitize their own originations for sale. The financial benefits of this capability for national banking institutions may be substantial.

The historical literature on default, delinquency and foreclosure contributing factors is quite extensive. In this regard, the loan-to-value ratio (LTV) has been found to be the most dominant variable in explaining loss incidence in residential mortgage portfolios. Von Furstenburg [1969], Herzog and Earley [1970], and Vandell and Thibodeau [1985], together with a host of other researchers, have all found LTV to be positively related to default and highly significant. In addition, other factors such as borrower's characteristics, type of loan, and term of loan have been found in some cases to significantly impact delinquency and default. The great majority of previous studies, however, have focused on the micro characteristics of the loan or the borrower. Few studies have researched the potential benefits of reducing risk in residential mortgage portfolios by utilizing geographic and economic diversification techniques. This study clarifies some of the existing knowledge on this matter and discovers by analyzing historical delinquency and foreclosure data on large samples of residential mortgages that a reduction in risk can be accomplished by constructing efficient portfolios of residential loans in which regional economic diversification issues were considered.[2]

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[2] Delinquency and foreclosure are used as a proxy for ultimate loss in this study as well as most other studies that have looked at mortgage portfolio default experience.

Chapter 2: Survey of the Important Research Conducted on the Components of Residential Mortgage Portfolio Risk

The literature on factors relating to mortgage default, delinquency, foreclosure, and prepayment is quite extensive. Although not directly related to the geographic or economic diversification topic, these issues are the essential reason that diversification is an important consideration for industry players. If it was true that all economic and geographic areas of the country exhibited similar historical default, delinquency, foreclosure, and prepayment experience in any given period, then the benefits of diversification might only be seen as an interesting concept but not useful in practice. Recent history has shown that if one was unlucky enough to hold a portfolio of residential mortgage loans in the oil patch states in the mid-1980s, that portfolio underperformed all other portfolios that did not have such an exposure. Thus, in order to assign the proper perspective to the importance of diversification for reducing risk in a residential mortgage portfolio, the relative importance of other factors that contribute to an increase in risk of default, delinquency, foreclosure, and prepayment must be understoon. A chronicle of some of the most important research completed on the issues involving residential home mortgage portfolio risk follows.

An important early study on mortgage default risk was completed by George M. von Furstenburg of Cornell University. Entitled "Technical Studies of Mortgage Default Risk", this book became the predecessor of

a number of additional studies by von Furstenburg on similar topics.[3] Von Furstenburg performed statistical analysis on a number of mortgage default factors and concluded, as have many subsequent studies, that what is referred to in industry jargon as the loan to value ratio (LTV) is the single most important factor contributing to the probability of default in a residential home mortgage portfolio. The study acknowledges that the lower the initial level of debt and the older the mortgage, the greater the price declines in the local real estate market have to be before owner's equity is wiped out and default becomes probable.[4] Other risk factors that von Furstenburg found to be significant included the original term to maturity (20 year term mortgages were found to be significantly less risky than 30 year term) and the age of the mortgage (increasing risk up to years four and five from origination and then declining risk thereafter). An important additional conclusion of von Furstenburg's study was that the price of a home is not correlated positively with the risk of default (this has relevance in Chapter 7, where a "jumbo" mortgage lenders portfolio is discussed).

A surprising conclusion of von Furstenburg's study, and one that relates at least partially to the diversification topic of this paper, is that risk is not greater in low growth areas than in high growth areas.

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[3] G. M. von Furstenburg. Technical Studies of Mortgage Default Risk: An Analysis of the Experience with FHA and VA Home Loans during the Decade 1957-1966. Center for Urban Development Research, Cornell University, Ithaca, New York, 1971.

[4] Von Furstenburg, pg.2.

Von Furstenburg believed that the greater concentration of recent and high loan to value ratio mortgages, as well as the above-average vacancy rates needed due to the inmigration of young and mobile families/populations, cause default rates to be higher in most growing regions.

Von Furstenburg found that an implication of his study was that geographic portfolio diversification between areas as large as states does not effectively spread risk by itself. He believed that diversification should concentrate on an appropriate mix of different LTV ratios and age of mortgages in line with the underlying characteristics of the market area being serviced, i.e., areas with high degrees of mobility and vacancy rates should be scrutinized for potentially lower LTV ratios and possibly shorter term mortgages. Thus, von Furstenburg believed that a naive strategy of geographical diversification would be ineffective without concentrating on the more important parameters mentioned above.[5]

Another study dating from approximately the same time as the von Furstenburg research was John Herzog's and James S. Early's "Home Mortgage Delinquency and Foreclosure".[6] This study included 13,000 sample loans with data provided by the Mortgage Bankers Association. The sample period included the late 1950s through the 1960s, essentially

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[5] Von Furstenburg, pg.7.

[6] John P. Herzog and James S. Early. Home Mortgage Delinquency and Foreclosure. National Bureau of Economic Research. Columbia University Press. New York, 1970.

the same time period as von Furstenburg's study utilized. Because von Furstenburg's study included only FHA and VA defaulted loans versus Herzog's and Early's sample which included information on all types of conventional mortgages (defaulted and non-defaulted), one might expect to see a difference in conclusions reached. The characteristics of the FHA and VA defaulted mortgagor are somewhat more homogeneous than those of all types of conventional mortgages combined. Generally, FHA and VA loans are made to relatively low income people and are made with little or no down payments (thus, high LTVs).

In fact, Herzog and Early reached a significantly different conclusion. The number one factor they found that contributes to serious loan delinquency (90 or more days in arrears) is borrowing for refinance purposes and the presence of junior financing. However, it is likely that von Furstenburg did not consider this as a potential factor or did not have the available data from which to measure its impact. It is reasonable to assume that the more leveraged an individual mortgagor happens to be, the higher the chance for default. However, borrowing for refinance purposes and the presence of junior financing can be viewed as an extension of the LTV ratio factor. If this connection is made, then the results of the von Furstenburg study and the Herzog and Early study are not inconsistent. Herzog and Early find that the LTV ratio is the next most important factor contributing to delinquency and foreclosure. Herzog and Early did not reach the same conclusion when it comes to "Term to Maturity", however. Unlike von Furstenburg, they found that the original term to maturity had little or no influence once the effects of other variables were removed.

Borrower occupation proved to be a relatively important factor in determining delinquency and foreclosure in the Herzog and Early study. Executives, professional people, and managers showed the least delinquency, self-employed persons and salesmen the most. Most importantly for this study, unlike von Furstenburg, Herzog and Early found that delinquency was significantly different between regions and that these differences accounted for a relatively important component of overall delinquency. They state that the failure to include the region variable in their regression equations would have seriously biased their results.[7]

One of the most important studies (which is often quoted in the research of others) is Vandell's and Thibodeau's "Estimation of Mortgage Defaults Using Disaggregate Loan History Data".[8] Unlike the first two studies which emphasized the loan-to-value (LTV) parameter as being the essential variable in determining default, Vandell and Thibodeau sought to discover the relationship between default and other variables. These "non-loan" related effects included: 1) payment levels relative to income; 2) current and expected neighborhood and housing market conditions; 3) economic conditions; 4) wealth; 5) borrower characteristics proxying for variability in income or "crisis" events; and 6) transaction costs incurred upon default. Vandell and Thibodeau utilized a data set of 348 single-family conventional fixed-rate loan histories from the Dallas area over the period 1972-1983 and

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[7] Herzog and Early, pg. 52.

[8] K.D. Vandell and T. Thibodeau. Estimation of Mortgage Defaults Using Disaggregate Loan History Data. AREUEA Journal, Vol. 13, No.3, 1985.

supplemented this with census and economic conditions data to allow projection of origination period incomes and house prices over time. This became their operational model. The model was used to predict the expected default experience of four hundred and fifty conventional, owner-occupied, single-family loans, originated in the period 1972-1983. The loan histories were provided by Dallas Federal Savings and Loan Association.

As expected, the LTV ratio dominated the loan-related effects, proving consistently to be the most statistically significant influence on default. Other loan-related effects, such as the percentage difference between the market value and the par value of the mortgage (i.e., changes in interest rates which increase or decrease the relative value of the mortgage), and the contemporaneous mortgage payment-to-income ratio (negative influence on default) were found to be significant. Borrower characteristics, including the permanent income of the borrower, employment type, length of employment, source of income, and level of wealth did influence default probabilities and were also found to be significant.

Vandell's and Thibodeau's most significant finding for the purposes of this paper related to the housing market and the general economic conditions. There was some indication that the ratio of ownership costs to rental costs positively affected default. Also, default was shown to be dependent on whether the neighborhood was rated "good" or "excellent" by the appraiser. Local housing market conditions thus were shown to be important parameters that lenders should consider

when increasing their exposure in a given metro area. It would appear that this variable would be particularly important for "jumbo" mortgage lenders who lend in prestigious and exclusive markets. Vandell's and Thibodeau's results are apparently confirming that boundaries between distinct communities may be very important (e.g., the chances of default may be significantly greater in Quincy vs. Weston, MA because the nature of supply and demand within these two communities are entirely different).

Unlike von Furstenburg's study, Vandell and Thibodeau found that the age of the mortgage does not matter. They conclude that "the likelihood of default is not dependent on how a borrower got to a specific set of loan, borrower, housing, neighborhood, and economic conditions, only that he is there."[9]

The most important conclusion of the Vandell and Thibodeau study concerns the LTV default variable. Although they find that the LTV and the par value of the mortgage matter, "they do not dominate in magnitude as effects on default, especially in comparison to the source-of-income variables. For example, raising the initial loan-to-value from 75 to 95% has only about one-fourteenth the effect on default risk of being self-employed (as measured by the percent deviation of the present value estimate from the base case). Similarly, reducing the difference between the market value and the par value of the mortgage to zero has only one-tenth the effect of being self-employed."[10]

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[9] Vandell and Thibodeau, pg.309.
[10] Vandell and Thibodeau, pg. 312.

Significantly, Vandell and Thibodeau find that negative net equity does not, as suggested by previous studies, increase the default rate dramatically. Other studies have suggested that the probability of default approaches 100% when a negative net equity situation exists. Vandell and Thibodeau did simulation runs with their model that created a 10% negative equity situation in year 5 after loan origination and the probability of default was predicted to be only 1.75% in that year.

While not explicitly dealing with geographic and economic diversification in their study (data consists only of Dallas loans), Vandell and Thibodeau have implicitly uncovered an essential component of the regional diversification argument. Non-loan related variables such as borrower characteristics, property characteristics, neighborhood characteristics, housing market conditions and other economic conditions play a significant role in affecting default levels. It follows that if these are indeed important variables, a greater level of diversity created by holding mortgages in a wide spectrum of metropolitan areas should reduce the level of default for any given mortgage portfolio.

Chapter 3: Recent Studies Demonstrating the Benefits of Regional Geographic Diversification for Residential Mortgage Portfolios

The presence of research on the advantages of regional geographic diversification as a means of reducing risk in residential mortgage portfolios has increased significantly during the past five years. It is obvious that the oil patch and S&L regional problems precipitated the sudden spurt in research on the topic. The diversification topic has become more important in light of recent economic discussion surrounding the chronic "boom and bust" cycle to which certain regions of the country apparently are subject. (A recent Wall Street Journal article raised the spector of New England being a region that may be subject to this anomaly.) The raging debate on the S&L debacle and the weakness in the commercial banking industry are likely to elicit new legislation that will allow full interstate banking by 1994.[11] As banks become mega-institutions with branches nationwide, they will finally possess the resources to diversify their mortgage portfolios based on economic and geographic diversification techniques. Thus, the literature and research on geographic diversification issues have only begun to proliferate. This area of portfolio management is likely to become a specialty in large financial institutions in the years to come.

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[11] The Wall Street Journal. Banking Panel Approves Plan on Branches. Page A3, June 26, 1991.

Corgel's and Gay's study entitled "Local Economic Base, Geographic Diversification, and Risk Management of Mortgage Portfolios"[12] is the first research found that specifically deals with the issue of geographic diversification as an important tool for reducing risk in mortgage portfolios. They point out that previous studies primarily focused on systematic mortgage risks, i.e., decreasing home prices, declining interest rates, and general economic conditions that cause a mortgagor to default. Corgel and Gay, however, are interested in analyzing unsystematic factors that are important reasons for understanding mortgage default and delinquency. Unsystematic factors such as specific characteristics of the mortgage, the borrower, the property, the neighborhood, and the local economic environment are important in understanding mortgage default.

They selected monthly rates of change in employment levels among industry groups in the thirty largest United States metro areas to measure economic growth (decline) and stability. Their data span the time period January 1969 through September 1984 and are taken from various issues of "Employment and Earnings", published by the U.S. Bureau of Labor Statistics. Factor and principal-component analysis are used in the first phase of their study to determine if the variance of employment changes across industries and across local economies are independent.They use an application of portfolio theory in the second phase of their study to measure the gains from diversification across

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[12] J.D. Corgel and G.D. Gay. Local Economic Base, Geographic Diversification, and Risk Management of Mortgage Portfolios. AREUEA Journal. Vol.15, No.3, 1987.

metropolitan areas They divide their data into two time periods. Data from the first time period are used to construct an efficient frontier of portfolio holdings. Portfolio weights from this efficient portfolio were then used to construct portfolios for investment in the second time period. Corgel and Gay then compared the risk and return characteristics of these portfolios with those of eleven "naive" ad hoc investment strategies. Naive strategies concocted by Corgel and Gay included a sunbelt strategy, large and small metro areas strategies, a maximum return strategy, a minimum variance strategy, and strategies based on the degree of concentration of industry employment. In each case, the efficient portfolios outperformed the naive portfolios.[13]

The results from their multivariate analysis indicate that each local economy is heavily influenced by a dominant economic factor. However, when these factors are compared across local economies, there are significant differences suggesting that the benefits from geographical diversification may be substantial.

Corgel and Gay's efficient portfolio corresponds to mean-variance efficiency. They use monthly rates of change in total employment for each standard metropolitan area (SMA) from the first time period to develop an efficient frontier which reflects optimal diversification.

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[13] A **naive strategy** is one that does not consider how factors leading to default are related between regions. It creates a portfolio based upon general economic expectations and past default experience for given regions. An **efficient portfolio strategy** analyzes historical data via a mean-variance approach and correlates the trends in one region with those in every other region. From these results, a portfolio is formed that represents the highest potential returns for a given level of risk.

These sets of portfolios reflect all combinations of SMAs having minimum variance for given rates of employment change. Corgel and Gay conclude that "the efficient

> frontier strategy is a feasible and easily implementable strategy for portfolio managers...Generally, the portfolios on the efficient frontier dominate the eleven naive portfolio strategies examined in this study. With the exception of the ex ante maximum-return portfolio (a nondiversified portfolio), the EF portfolios have consistently higher rates of change in employment for given levels of variance as compared with the naive strategies. These results suggest that a mean-variance approach to geographic diversification is superior to ad hoc diversification schemes."[14]

Corgel and Gay conclude that: "Mortgage portfolio investors, such as mortgage lenders, insurers, and secondary mortgage participants who follow naive diversification strategies (e.g., investing only in sunbelt or large metropolitan areas) are not likely to achieve optimal risk return relationships."[15]

A year after Corgel and Gay's study, Terrence Clauretie published a study with a different slant on the residential mortgage diversification issue. His study entitled "Regional Economic Diversification and Residential Mortgage Default Risk" focused on the role of local economic diversification in risk management.[16] He shows that residential foreclosure rates are negatively related to local economic diversification and concludes that geographical diversification with reference to local

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[14] Corgel and Gay, pp. 262-64.
[15] Corgel and Gay, p. 267.
[16] T.M. Clauretie. Regional Economic Diversification and Residential Mortgage Default Risk. Journal of Real Estate Research. V#2. 1988.

economic diversification is more efficient than naive geographical diversification alone.

The central purpose of Clauretie's study was to determine if regional residential default rates have a non-systematic component related to local economic diversification or specialization. Another important component of Clauretie's study was to decide on the type of measure of regional diversification which best explains default rates. Data on default rates for Federal Home Loan Bank Board (FHLBB) institutions in the second half of 1982 and the first half of 1983 were obtained for 109 SMSAs. Several alternative measures of economic diversification were obtained for a series of subsets of those same SMSAs. The cross-sectional data were used to determine how and which measures of local economic diversification were functionally related to mortgage default rates.[17] Clauretie was careful to heed his own advice and in his models used explanatory variables to reflect the local legal structures of the default-foreclosure process.

Clauretie's most important finding is that of a functional relationship between regional economic diversification and foreclosure rates. The significance of this relationship was emphasized by showing the predicted default rate between the most and the least diversified cities according to one of the indices of economic diversification (Conroy)[18],

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[17] Clauretie, p. 88.

[18] Five indices of accepted economic diversification measures were identified by Clauretie: 1.) **U.S. National Economy Index:** A diversified local economy is one in which the proportion of employment in each industry is equal to that in the U.S. economy; 2.) **Ogive**

Topeka, Kansas and Stockton, California, respectively. The foreclosure rates on FHA/VA loans for these two SMSAs were .06% and 4.22% respectively in the second half of 1982.

Clauretie believes, based on the results of his study, that regional economic diversification is important in explaining foreclosure rates on residential mortgage loans. He finds that a portfolio measure of diversification taking into account the covariance of unemployment between industries is the best predictive measure: "The implication is that insurers should price their guaranty with reference to regional economic diversification. That is, simple naive diversification with a uniform fee structure will not lead to minimization of risk or maximization of return. Pricing and portfolio diversification with respect to the economic diversification of the region is required."[19]

Index: Defines ideal regional diversification as one with equal percentages of employment in each industrial group; 3.) **Durable Goods Production Index:** Optimum diversification is measured in terms of the degree of employment in durable goods in a given region. Local economies with a high proportion of employment in durable goods are likely to experience large fluctuations in employment when significant changes occur in national income; 4.) **Minimum Requirements Index:** A normal level of employment exists in each industrial category that is the minimum necessary to satisfy the needs of the local economy. The diversity index is computed with reference to the deviation of actual employment from these "minimum requirements"; and 5.) **Portfolio Indices:** These are similar to the Conroy index that Clauretie employs in his study. These indices measure diversification by considering each industry's contribution to regional economic stability in terms of its stabilizing or destabilizing effects.

[19] Clauretie, p. 92.

A recent study (April, 1990) on the benefits of diversification for a residential mortgage portfolio is Quigley and Van Order's "Defaults on Mortgage Obligations and Capital Requirements for U.S. Savings Institutions: A Policy Perspective".[20] The study was conducted in the wake of the enormous costs being projected to clean up the S&L problem. The authors make the point that although there is current support for new capital requirements in order to prevent the magnitude of the current failures from occurring in the future, the rcommendations are not based strongly on any empirical or theoretical research. In the past, capital requirements were a function of the perceived risk of different assets, e.g., commercial real estate versus single family home mortgages. Quigley and Van Order believe that the current recommendations generally ignore the notion of risk as a portfolio-wide rather than asset-specific concept and this causes them to ignore potentially important sources of risk control, such as geographic diversification.

Quigley and Van Order's study analyzes capital requirements for institutions holding single-family mortgages. Their data consists of records on 300,000 conventional loans originated from 1976 through 1980 and bought by Freddie Mac (Federal Home Loan Mortgage Corporation). The historical data on these loans extend through March, 1989. They estimate mean returns and their variances and covariances for various loan-to-value (LTV) and geographic groups. The question they frame

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[20] J.M. Quigley and R. Van Order. Defaults on Mortgage Obligations and Capital Requirements for U.S. Savings Institutions: A Policy Perspective. Center for Real Estate and Urban Economics, University of California, Berkeley. April, 1990.

is: For a given risk of bankruptcy by the S&L, how should capital requirements vary by LTV and by amount of geographic diversification?

The data is broken down into the Northeast, Northcentral, Southeast, Southwest, and West regions. They find that both LTV and diversification have a significant effect on the risk of a given S&L's bankruptcy. They suggest that policy would be improved by setting capital requirements by LTV and by geographic diversification. Their results imply that an S&L with loans having LTVs between 81 percent and 90 percent needs about one-third of the capital of an institution with LTVs between 91 percent and 95 percent. Holding LTV constant, a nationally diversified institution needs only half to a third of the capital of one located entirely in one region (of the five regions in which the data has been broken down into).

Quigley and Van Order compute means, variances and covariances of probability distributions of returns "without relating them to an explicit microeconomic model of optimizing behavior. In this respect, our approach is similar to applications of the asset pricing model, which use historical returns and their moments without a detailed microeconomic specification."[21]

As determined from the data, annual default rates were not small in the period 1976-1989. Default averaged about four-tenths of one percent for the United States as a whole during this period. Importantly, the

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[21] Quigley and Van Order, p. 9.

variation in default rates by region was quite substantial. Default rates in the Northcentral region were approximately five times as large as rates in the Southeast region and approximately four times as large as default rates in the Northeastern region. "These differences reflect the credit rate risk associated with the real estate markets in each of the regions, the fortunes of the regional economies, and the loan-to-value ratios and ages of the mortgages."[22]

An interesting piece of information not included in other studies that I have researched is the loss experience for the portfolio. Quigley and Van Order find that the loss rates on defaulted mortgages are surprisingly large. Approximately 35 percent of the initial mortgage loan was lost upon default of a mortgage during this period for the United States as a whole. They discovered that a large part of this loss is accounted for by the considerable time it takes for a bank to take possession of a property and then to sell it. This can cost 20 to 25 percent of the value of the original mortgage in interest alone. Even with insurance covering typically the first 25 percent of loss, the net cost to the lender can be significant. For the United States as a whole, the average annual loss associated with a mortgage originated between 1976 and 1980 was 0.13 to 0.16 percent of the contract amount. "The average loss varied by a factor of ten among the five regions, from 0.02 percent in the Southeast to almost a quarter of a percent in the Northcentral 'rust belt'."[23]

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[22] Quigley and Van Order, p. 11.
[23] Quigley and Van Order, p. 13.

Quigley and Van Order find that the correlations for default rates between regions to be "quite striking". When LTV and age of the loan are held constant, there is a negative correlation between default rates in the Northeastern and the Western regions for the safest loans (LTV less than or equal to 80%). A negative correlation was also found between the Northeastern and Southeastern regions for the riskiest loans (LTV greater or equal to 91%). These negative correlations indicate that more efficient portfolios of residential mortgages (lowest risk of loss for a given return objective) can be created by prudent portfolio managers by combing mortgages from different regions, e.g., the Northeastern and the Western regions of the country.

Correlations were also negative for several comparisons across geographical regions when loan loss rates were considered. Therefore, Quigley and Van Order conclude that the "pattern of covariance in these returns suggests that portfolio risk can be reduced by geographical diversification, holding other determinants of credit risk constant."[24] They find that diversification clearly matters. The standard deviation of a nationally diversified portfolio are found by Quigley and Van Order to be about one-third of an undiversified portfolio, and its estimated capital requirements should be between one-third and one-half of the requirement for an undiversified portfolio. The capital requirements for an optimal portfolio (i.e., one using conservative LTV ratios as well as geographic diversification techniques) is less by about 80 to 90 percent.

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[24] Quigley and Van Order, p. 16.

Quigley and Van Order's study is encouraging research for the world of economic diversification proponents. No study more clearly highlights the practical applications of the benefits of mortgage portfolio geographic diversification. Robert Van Order, as the Chief Economist at Freddie Mac, should be an influential voice for the need for national mortgage portfolios created by large interstate financial institutions. It is obvious from the results of their study that losses and bankruptcies in the field of banking can be reduced by practicing geographic diversification both within their various lines of business and between different lines of business. The resulting benefits to the economy as a whole should include a reduction in the cost of doing business for these institutions and, hopefully, a reduction in the cost of borrowing for both businesses and consumers.

Chapter 4 - Residential Mortgage Industry Diversification Practices

Diversification is universally recognized as being a necessary prerequisite for any successful large financial institution. Senior management and the board of directors of most significant financial institutions would be remiss if a discussion of what the institution is doing to ensure appropriate diversification of its lines of business did not occur regularly. However, it appears, from interviews conducted for this paper, that within specialty lines of business (e.g., commercial real estate lending and residential mortgage lending), diversification has not been seen as a top priority. The most important reason for the lack of focus on diversification has been the regional nature of most large financial institutions' business.

Even the largest financial institutions are regionally entrenched. U.S. institutions such as Citicorp and Bank of America, the two largest banks, respectively, have most of their assets located on the East Coast (Citibank) and West Coast (BOA). Therefore, the benefits of diversification can be seen as limited for regionally focused institutions. Further discussion about aggregation in banking and its potential impact on diversification as a tool to reduce risk in mortgage portfolios can be found in Chapter 8.

Interviews were conducted with executives of three large residential mortgage originators: Chemical Banking Corporation, Citibank, and Boston Safe Deposit and Trust Company. These interviews lead to the

conclusion that no sophisticated techniques are used today by large financial institutions. However, each one of these institutions acknowledged the importance of diversification as a means of managing risk in their respective mortgage portfolios. It' also became evident that the need for thinking about diversification and its practical benefits varied with the product/services offered by each one of the institutions interviewed.

Chemical Banking Corporation

Chemical Banking Corporation's residential mortgage lending business is focused in the Tri-state area (NY, CT, NJ) and Texas (its Texas Commerce Bank affiliate). Chemical only originates mortgages for sale to the secondary market. Therefore, its emphasis is on originating high quality mortgages within these regional concentrations. The ultimate sale of these conventional residential mortgages to the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Bank Board (Freddie Mac) results in these individual mortgages being packaged in securitized pools where appropriate geographical locations are considered so as to provide an acceptable level of diversification for the given pool of loans. David Grout, Senior Vice President of Chemical's Mortgage Banking marketing area was interviewed on June 5, 1991. Having worked with the rating agencies and in mortgage banking most of his career, he is cognizant of all the latest trends in the industry. His key contacts with the secondary market agencies, with private mortgage insurers, with the rating agencies and with mortgage research firms regularly send him the latest studies on issues in the mortgage banking industry. However, because of the limited impact he

can have on his originations due to the lack of geographical diversity in Chemical's branch network, diversification is not a day-to-day priority of his. Only to the extent that his customers at the secondary mortgage agencies dictate a desire for more, e.g., "Austin" metropolitan loans or "Buffalo" metropolitan loans, can he communicate this to the line area. Overall, however, his loans can be sold regardless of where they're located and therefore diversification as an issue is far down on his list of marketing objectives.

Citibank

Citibank's objectives are somewhat different than Chemical's. As the largest banking institution in the U.S., Citibank has resources that others lack. It has a greater presence in more regional markets than any other institution. Though still concentrated in a few markets, its reach extends to the Midwest/Farm Belt (major corporate offices in St. Louis), the Southwest, the West, and the Northeast. As the largest originator of home mortgage loans in the country, Citibank has the capability of securitizing its own pools of residential mortgage loans.

An interview was conducted with Marge Wolf, an executive in the company's securitization group, on June 7, 1991. Armed with an MBA from MIT's Sloan School, Ms. Wolf is trained in the benefits of diversification as a tool useful in reducing risk when managing investment portfolios of all types. However, in practice, at least with respect to packaging Citibank's residential loans for securitization, diversification is practiced only in a naive fashion. Wolf states that the pools are balanced geographically to the extent possible. Presently,

however, the costs of developing an origination network throughout the country that would allow for more sophisticated diversification is prohibitive. To the extent that certain areas of the country are perceived negatively by the market place (e.g., oil patch in the mid 80's or the Northeast currently), underwriting standards become more strict. For example, Citibank experienced a high delinquency rate over the past couple of years in the "low doc" (no income verfication) program in New England. Initially, the company decided to eliminate this program in New England only. Subsequently, as the secondary market viewed this program as exhibiting an unacceptably high level of risk (i.e., delinquency), Citibank eliminated it throughout the country. Practices such as this, which essentially create tougher underwriting standards, can and are used by industry players to limit exposure to certain "undesirable" geographic locations. Mortgage originators must be careful in how they communicate these business standards, as their practices can be interpreted as "redlining" (which could severely affect the company's public standing and their relationship with regulators).

Boston Safe Deposit and Trust Company

Boston Safe Deposit and Trust Company (BSDT), due to the nature of its mortgage business, can benefit more than the two institutions above from geographic diversification (see Chapter 7 for a practical examination of the potential benefits to BSDT from diversification). BSDT is a century old banking and trust company specializing in providing financial services to affluent individuals. Today it is a wholly-owned subsidiary of The Boston Company, which in turn is owned by Shearson Lehman Brothers (a subsidiary of American

Express). BSDT began its national residential mortgage program in the early 1980s and today has a portfolio of residential mortgages which approaches $4 billion in principal outstanding.

The Bank has focused its residential mortgage business on "jumbo" mortgage products. A jumbo mortgage in industry parlance means a mortgage in a dollar amount which exceeds the mortgages that the secondary market agencies (such as Fannie Mae) will purchase for securitization in their conventional packages. Today, a single-family residential mortgage loan in an amount exceeding approximately $200,000 is considered a jumbo mortgage. BSDT's focus today is on new mortgage loans between $500,000 and $2,000,000. It is one of the few national mortgage companies that specialize in this field. The Bank's primary marketing areas today for these mortgages are New England, the Mid-Atlantic Corridor, the West Coast and prestigious resort communities in Colorado and Florida. BSDT concentrates its new business on communities that it knows very well and does not move quickly into new markets before completing extensive marketing studies.

There are two components to the BSDT mortgage portfolio, the "direct" and the "agent" portfolio. The direct portfolio consists of mortgages that are serviced by BSDT's own staff in Boston. The agent portfolio consists of loans that were originated by other institutions and bought by BSDT. A large percent of these agent loans continue to be serviced by the originating institutions.

Interviewed was Joseph Mevorah, BSDT's portfolio manager, on July 22, 1991, regarding the Bank's diversification philosophy. Mr. Mevorah is new to the institution, having most recently held a similar position with Security Pacific's mortgage subsidiary. Presently most of his time is spent on managing the Bank's relationships with its various servicing institutions on the agent portfolio (the Bank is actively attempting to take over the servicing itself on portions of the agent portfolio where feasible). We spoke about the dispersion of the Bank's existing direct portfolio (see Chapter 7, page 69 for geographic breakdown). Approximately 88% of the direct portfolio represents properties located in the Northeast. During the past couple of years the Bank has been increasing its presence outside of the Northeast market and the percentage of total loans outside this region is expected to grow substantially over the next few years. This is due both to a strategic business decision that has been made to grow the mortgage portfolio and to a desire to "diversify" outside of the Northeast region. The growth of the portfolio outside of the Northeast region is seen as one way to manage risk in the mortgage portfolio. The California mortgage market is one that the Bank appears to see as a growing share of its overall portfolio.[25] Also, BSDT has had success in originating mortgages in retirement communities and prestigious second home resort areas. This is also seen as a potential growth segment for the Bank's mortgage portfolio.

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[25]Based on the analysis conducted in Chapter 7 of this study, it would appear that this is a prudent decision by BSDT. We show that historical default and delinquency data for these regions are uncorrelated or slightly negatively correlated.

While originating loans in certain areas of the country may be too costly for BSDT, buying existing portfolios in areas that would complement its existing portfolio is not. Mr. Mevorah personally believes that today might be a good time to start buying Texas mortgages. This market is recovering from its severe economic downturn in the middle and late 1980s and Mevorah believes prices for portfolios concentrated in this region might be relatively low due to the stigma that still lingers in financial markets.

Although Mr. Mevorah sees geographic diversification to be important, he mentions product line diversification as another means to manage risk in the portfolio (e.g., a mixture of fixed and variable product, a portion of the portfolio to be held in Ginnie Maes, and pass-through vehicles).

Rating Agencies

Moody's Investors Service

Moody's Investor Service's Structured Finance Group located in New York City considers "economic diversity" of a region in which a given property is located to determine the riskiness of a mortgage on that property.[26] Their belief is that the more diverse the regional economy, the more resistant is the local home market to exogenous shocks, such as a stock market crash or an oil industry bust. Residential home values in diverse economies have less potential for abrupt drops

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[26] Moody's Investors Service. Moody's STRUCTURED FINANCE. 99 Church Street, New York, New York. April, 1990.

resulting from a softening in a certain industry or economic sector. Moody ranks state economies into five categories for industrial diversification: High, above average, average, below average, and low. The breakdown of states by category is shown below as of April 1990. The numbers at the top of each column represent risk weights for each category. These risk weights range from 0.9 for highly diversified states to 1.3 for states with low diversification.

Moody's State Industry Diversification

Rankings

1.3 Poor	1.2 Below	1.1 Average	1.0 Above	0.9 Strong
Alabama	Arizona	Florida	Conn.	California
Alaska	Arkansas	Hawaii	Delaware	Virginia
Kentucky	Colorado	Illinois	Georgia	
Louisiana	Idaho	Maine	Maryland	
Mississippi	Indiana	Mass.	Minnesota	
Oklahoma	Iowa	Missouri	New Jersey	
Texas	Kansas	N.Carolina	New York	
West Virg.	Michigan	N.H.	Rhode Island	
Washington	Montana	Ohio	Wash. D.C.	
Wyoming	Nebraska	Penn.		
	Nevada	S. Dakota		
	New Mex.	Tennessee		
	N. Dakota	Vermont		
	Oregon	Wisconsin		
	S. Carolina			
	Utah			

Diversification also becomes an issue for Moody's when looking at "Delinquency to Liquidation Ranking" by state. Ultimate loss for the entity holding the mortgage occurs when it continues to hold a mortgage that is behind on payments or when the mortgagee takes constructive

action to foreclose the mortgage and take possession of the property. However, because of the intertstate differences in foreclosure laws, the incidence of foreclosure varies widely depending on where the defaulted mortgaged property is located. The time and cost to foreclose in some states precludes using a foreclosure proceeding as the preferred course of action initially upon default. The manner in which the foreclosure proceedings can progress (judicial vs. non-judicial), the type of instrument used as security (mortgage vs. deed-of-trust), provisions for redemption by the mortgagor, (statutory right of redemption vs. no statutory right), and provisions for deficiency judgements greatly affect the incidence of foreclosure between states.[27] {See also T.M. Clauretie, AREUEA Journal, Vol.15, No.3, 1987} Moody's Liquidation rankings essentially rank states based on the ease of foreclosing under the laws effective in the given state. The rankings are as shown below:

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[27] T. M. Clauretie and R. J. Aalberts, Empirical Evidence on the Interstate Differences in Foreclosure Rates: Would the Uniform Land Transactions Act Help? Federal Home Loan Bank Board, Research Paper # 135. Office of Policy and Economic Research. February, 1988.

Moody's State Time From Delinquency To Liquidation Rankings

Short	Below Average	Average	Above Average	Long	Very Long
Wash.DC	Alaska*	Arkansas	Delaware	Alabama	N.Mexico
Georgia	Arizona*	Colorado	Indiana	Illinois*	N. Dakota
Miss.	California*	Connecticut	Michigan*	Iowa*	Washington*
Missouri	Maryland	Florida	Minnes.*	Kansas	Mass.*
N.H.	Montana*	Idaho*	New York	Maine	
N.Carolina	Nebraska*	Hawaii	Ohio*	S.Dakota	
Rhode Isl.		Kentucky*	Oklahoma		
Tenn.*		Louisiana	Oregon*		
Texas		Nevada*	Wisc.*		
Virginia		New Jersey	Wyoming		
W.Virginia		Penn.*			
		S.Carolina			
		Utah*			
		Vermont			

Note: States with asterisks may have variations in local and state law.

In summary, when deciding on the riskiness of a pool of loans, Moodys' computes expected losses and attains a rating level on a loan-by-loan basis. After calculating expected loss for each loan (by compiling the various risk weightings, including the two mentioned above), all the expected losses for all the loans in a pool are added up and the total is then adjusted for overall pool characteristics. In calculating overall credit support (quality), adjustments are made for the size of the pool, originator quality, concentration risk, and structural issues.

SMR Research Corporation

SMR Research Corporation (Budd Lake, NJ) in its recent study "Giants of the Mortgage Industry: 1990" establishes a methodology for measuring local mortgage risk. SMR developed databases designed to measure loan credit risk in local markets (each state and each major city in the nation). Their databases rely on six different government sources of information. The most unique government source that they use is personal bankruptcy filings by locality. Other information comes from FDIC call reports on commercial banks and OTS thrift quarterly financial reports (primarily delinquency data). SMR's most recent findings show that oil patch states continue to show high levels of risk, generally, and some New England states (most notably RI and NH) have moved into the high-risk ranks. However, risk is not uniform across New England states. Vermont still shows very low risk figures as opposed to Rhode Island. On the other side of the country, Arizona has surpassed Texas as the riskiest of all home mortgage states in the country. Another interesting finding by SMR is the sheer degree of difference among states in terms of risk. According to SMR, Hawaii is the least risky state. They find that it has 10 times less risk than Alaska.[28] At the city level, the degree of differences is even sharper. The difference in risk between the riskiest city, Corpus Christi, TX and the least, Dubuque, IA, is 25-fold. SMR refers to its risk index as the "Bad News" total for each state.Their scale is based on the cumulative impact of the three measures of risk shown in the chart below. Thus, to some extent, these rankings are arbitrary, as they are weighted towards factors that may or may not have an equal impact

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[28]SMR Research Corporation. Giants of the Mortgage Industry: 1990. Lincoln Plaza, Budd Lake, NJ. Copyright 1990. Page 178.

on the state's riskiness as a home mortgage market. Their methodology and a list of the five safest and riskiest states in terms of 1989 mortgage credit risk follow:

STATES RANKED BY HIGHEST-TO-LOWEST 1989 MORTGAGE CREDIT RISK

State	Pers.Bankruptcy Filings/1,000 Residents-1989 (Natl Avg=2.50)	Thrift 1-4 Loans 60 D+ Delinquent 12/89 (Av.%=1.98)	Bank Morg. All Kinds HighlyDel., Nonacc. or NetCharOff (Av.%=2.82)	"Bad News" Total (Sum of the 3 Columns) (Natl Avg =7.3)
HIGHEST RISK TOP FIVE				
Alaska	2.14	9.90	8.35	20.39
Arizona	3.96	2.12	11.68	17.76
Texas	2.07	4.91	9.62	16.60
Louisiana	2.62	5.96	7.58	16.16
Oklah.	3.87	3.80	5.83	13.50
LOWEST RISK TOP FIVE				
S.Dakota	1.32	1.25	1.14	3.71
Vermont	.28	.82	2.60	3.70
Michigan	1.73	1.01	.80	3.54
Delaware	1.07	.82	.84	1.87
Hawaii	.70	.44	.73	1.87

Fitch Investors Service

An interview with Gregory Raab of Fitch Investors Service, Inc.'s Structured Finance Group was conducted on June 18, 1991. Fitch has developed a default model based primarily on residential mortgage data analyzed from the 1980's Texas Depression. They determine the likelihood of default for individual loans by tracking the performance of two million loans originated throughout the United States from 1981-1986, focusing primarily on Texas. The information was received from HUD (the Department of Housing and Urban Development), Fannie Mae, primary mortage insurers and mortgage servicers and originators. Fitch examined the correlation between default frequency and various borrower and property characteristics and found that the most important variable affecting default is Loan-to-Value (LTV). However, underlying the LTV variable's impact is the diversity and fundamental strengths of a region's economy. The Fitch model evaluates each region of the country separately, dividing the U.S. into six regions based on "economic and geographic cohesiveness"[29]. It uses the Texas experience as a benchmark and "raises or lowers the maximum market value decline in regions as the diversity and fundamental strengths of each region's economy warrants".[30] Again, apparently indicative of Clauretie's research, Fitch's model takes foreclosure and carrying costs in each state into account (which, Fitch points out, may double the losses on the mortgage).

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[29]Fitch Investors Service, Inc. New Standard for Rating Mortgage Securities. Structured Finance Group. June 18, 1990. p. 3.
[30]Fitch Investors Service, p. 3.

Fitch states that a region's underlying economic stability is the most important determinant of the volatility of residential real estate values during an economic downturn. In its study, Fitch focuses on industry diversification and economic interdependency as the two most important indicators of regional economic stability. It follows that regions that are economically well-diversified will not be affected as severely by a contraction in one industry as regions that rely on the health of one or two large industries. Thus, residential real estate values in well-diversified regions are not as volatile as those in regions not that well-diversified. Fitch uses employment distribution and GNP distribution as its basis for determining economic interdependence. Also, they factor in other information such as per capita income per sector.

Employment patterns and annualized growth rates are reliable indicators of a regional economy's long-term viability. To determine the level of economic stability attributed to employment growth in each region, Fitch utilizes data from the U.S. Department of Labor, and state and local government offices.

Fitch makes its point regarding the impact of economic diversification by comparing the experiences of Texas and California in the 1980's. As a result of economic problems[31] in the early 1980's in both Texas and California, real estate values declined, although only slightly in California. Fitch states that due to the California economy's underlying stability, it recovered at a slow stable pace and today has one of the

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[31]Fitch Investors Service, p. 4.

strongest economies in the country. However, Texas "became overheated again and the employment growth declined dramatically soon after"[32]. This volatility caused real estate in Texas to drop further as oil prices declined.

The nature of each region's workforce is also important, Fitch finds. A stable labor force is indicative of a region's overall economic stability. Texas had to some extent a transient workforce who came looking for jobs. When the jobs became redundant, many moved in order to attempt to find work elsewhere. A transient workforce can have a ripple effect on the economy, Fitch states, intensifiying the effects of a depression.

In any securitized mortgage obligations, the primary source of repayment is the mortgage pool. Therefore, an integral part of Fitch's and other rating agencies' analyses is an assessment of the credit quality of the underlying loans. Fitch qualifies expectations of losses and defaults under various economic scenarios based on its default and regional studies. The overall credit quality of the pool (which also includes the pool's underwriting criteria and the servicer's capabilities) determines the amount of credit enhancement necessary to achieve the desired rating. Therefore, it is clear (at least in the case of Fitch) that the worse the perception of the pool's exposure to unattractive residential real estate markets, the more costly it will be for the

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[32]Fitch Investors Service, p. 4.

secondary market packager and ultimately the originator of the mortgage to underwrite these loans.

In analyzing the overall quality of a pool, Fitch assumes that pools with no more than 3% concentration per zip code are "adequately diversified"[33]. For regions with acceptable economic diversity, the maximum level of concentration per zip code is 5%. It's apparent, therefore, that even though economic diversification is considered, deciding on the appropriate mix of properties, based upon economic performance correlations between regions, is not considered. Thus Fitch's approach to geographic diversification can be seen as following more of a naive methodology.

Mortgage Guaranty Insurance Corporation

Norman Christman, Vice President, National Account Manager of Mortgage Guaranty Insurance Corporation (MGIC) in Milwaukee was interviewed on June 25, 1991. MGIC is one of the largest private mortgage insurers in the industry. MGIC has an explicit geographic dispersion methodology. Diversification (geographic) has become a big issue with MGIC since being hurt in the oil patch in the middle 1980's. Christman states that geographic diversification "has become religion" at MGIC over the past few years. Their approach attempts to derive what they feel is an ideal mix. However, they recognize that "factors in the real world will prevent us from completely attaining this mix, but these targets help us in our annual planning process"[34].

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[33]Fitch Investors Service, p. 6.

[34]Interview with Norm Christman conducted on June 25, 1991.

Information below comes from the interview with Norman Christman. It describes in detail MGIC's policy goals for diversification of its residential mortgage insurance portfolio. State rankings (as well as regional and metropolitan areas) are completed based upon four measures of risk: 1.) Industry Diversification; 2.) Employment Stability; 3.) Projected Growth; and 4.) 10 year loss ratio. Depending upon the areas overall performance against these measures, a target concentration of MGIC's business is derived for that area. Margins are allowed against these targets to provide the company some flexibility in operating. Generally, the higher the target concentration %, the higher is the margin allowed. The methodology follows:[35]

MGIC Methodology

I. MGIC's approach as of August 1989 contains three levels of monitoring for its residential real estate mortgage insurance portfolio:

1. Region/Industry: States are grouped regionally and by major industry. A target and maximum concentration of risk is established for each region/industry;
2. State: Each state is monitored and has a customized target concentration of risk as well as a maximum;
3. CMSA/MSA: All major MSA's are monitored. MSA's within a consolidated metropolitan statistical area (CMSA) have been grouped to truly reflect an area's risk.

II. Target Concentration of Risk

1.) Basic Concept: The ideal level of risk or exposure in a geographic area is proportional to the number of households in

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[35] Mortgage Guaranty Insurance Corporation. MGIC Plaza, Milwaukee, Wisconsin. June, 1991.

that area. This is MGIC's starting point. All the adjustments below are made against this "ideal" mix.

2.) Adjustments and Weights:

a. Industry Diversification: The percent of employment in each industry for each area is calculated and compared. Relative scores of Strong, Above Average, Average, Below Average and Poor are assigned. This is the same approach used by Moody's (discussed earlier in this paper). This component has a 40% weight in determining the overall adjustment.

b. Employment Stability: The variation in an area's unemployment rate is analyzed for the past ten years. The coefficient of variation for each area is calculated and relative scores are assigned. This component has a 20% weight.

c. Projected Growth: The growth in employment over the next three years as projected by Wharton Econometrics is used to rank each area. Projected growth is given a weight of 10%.

d. 10 Year Loss Ratio: MGIC's 10 year loss ratio for each area is the final component analyzed. This component reflects an area's historic profitability and how well each area weathered the economic cycles of the past ten years. A weight of 30% is assigned to this component.

e. Overall Adjustment: The score and weight of each of the above components are used to determine the overall adjustment. An overall score of "Strong" increases the target concentration by 40% over the percent of households. An overall score of "Above Average" increases the target concentration by 24% over the percent of households. Scores of "Poor" and "Below Average" have similar effects as those above but reduce the target concentration. No adjustment is made for a score of "Average".

III. Maximum Concentration of Risk

1. Maximum concentration is the target concentration plus a margin;

2. Margins vary with level of target concentration and range

from 0.5% - 2.0%;

3. Margins are designed to provide sufficient room to operate yet avoid excessive concentration of risk.

IV. Adjusted Risk In Force

1.) RiskAdjustments:

a.) Seasoning: As a loan ages, risk is reduced as equity and appreciation build.

b.) Product: 95% LTV and non-fixed loans are more financially volatile (risky) even though they are priced higher.

2.) Adjusted risk in force equals the loan amount times coverage times the relative risk factors for seasoning and product.

V. Guide for Year-to-Year Operations:

The target concentrations above are viewed as long term goals. Concentration within a given policy year may be higher or lower than target depending upon the strength of the market during that year. In strong economic periods, an area's actual concentration of risk for that policy year should be above target while in weak periods, the actual concentration should be lower. MGIC believes this will lead to a near target concentration of risk over all the policy years.

The above methodology is the most complex one found for deriving a diversification strategy in the residential mortgage industry. However, it is still a naive strategy as no attempt is made to determine how the performance in one region, state, or city is correlated with the performance of any other.

Chapter 5: Analysis of Primary Foreclosure and Delinquency Data

In this chapter, data on the incidence of foreclosure and delinquency was compiled from two sources: 1.) the Mortgage Bankers Association of America's "National Delinquency Survey"[36] ; 2.) the Office of Thrift Supervision's "Savings & Home Financing Source Book"[37].

The data analysis supports the findings in other studies that were discussed earlier in this paper. Upon analyzing the Mortgage Bankers Association data and the Office of Thrift Supervision data, the results are in line with the Quigley and Van Order research discussed in Chapter 3: the Northeast delinquency and foreclosure data are uncorrelated or negatively correlated with those from other regions in the country. Based on the results of the data analysis, hypothetical mortgage portfolios were built and an analysis of their respective performances conclude (agreeing with the findings of Corgel and Gay) that mean-variance/efficient portfolio strategies outperform naive strategies.

Additional findings derived from the OTS and MBA data include: 1.) The fact that the OTS data supports the traditional tenet that the LTV ratio is the most important factor contributing to default; 2.) Delinquency and foreclosure data, as expected, are significantly

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[36] Mortgage Bankers Association of America. National Delinquency Survey: Historical Trends. Economics Department. 1125 Fifteenth Street, Washington, D.C. April, 1991.

[37] Office of Thrift Supervision. Savings & Home Financing Source Book. 1700 G Street, Washington, D.C. 1989.

positively correlated; and 3.) Residential mortgage performance data may serve as a useful proxy for the commercial office market in given regions.

MORTGAGE BANKERS ASSOCIATION DATA

The Mortgage Bankers Association of America (MBA) conducts an annual delinquency survey of its member institutions. The survey includes approximately 15.3 million mortgage loans on 1 to 4-unit residential properties totalling an estimated $850 billion of debt. More than 350 member reporters compile the information annually for MBA. Reporters include mortgage bankers, commercial banks, savings banks, savings and loan associations, and life insurance companies. A loan is considered 30 days delinquent if the December 1 installment is unpaid as of December 31, etc. The data analyzed for this paper included the period from the fourth quarter of 1972 through the fourth quarter of 1990.

MBA breaks down its available data by large Census Regions, consisting of the North East, North Central, South, and West regions The information provided for these census regions is 90 day delinquency rates. The data is further broken down by loan type, including FHA, VA, conventional loans, and all loans. The present study analyzed the "all loan" and the "conventional loan" breakdown by census region. (The MBA does provide state by state reports. However, this is provided on a quarterly basis by state. No historical series exists by state.)

Correlation coefficients were computed for each paired combination of the census regions mentioned above. In the "all loans" category, all the paired combinations were positively correlated with the exception of the Northeast/South pairing which showed a low enough correlation (.06213) so as to be considered to have little correlation during the 1972-1990 period represented by the MBA data. Delinquency rates for all the other pairings were positively correlated in the "all loans" category.

In the "conventional loans" category, the relationship between the Northeast and the South delinquency rates is more pronounced than in the "all loans" category. The correlation coefficient for Northeast/South is -.2637, indicating that a somewhat inverse relationship may exist between these two regions. This relationship can be seen to result from the impact of the Northeast 80s boom cycle juxtaposed to the oil bust in what MBA classifies as the "South" region (includes Texas, Oklahoma, and Louisiana). Also, as the data includes early 1970s statistics, it is true that the national recession induced by the oil embargo impacted the Northeast to a much greater extent than any other region in the country due to its dependence on imported oil. The South region was least affected by these economic shocks as it was a net exporter of oil to the rest of the country.

The next lowest correlation coefficient in the "conventional loans" category was produced by the Northeast/West pairing (.2637). This turned out to be the next lowest coefficient in the "all loans" category

as well. However, the "all loans" category for this pairing displayed a less significant coefficient of .4096.

Annualized average delinquency rates for the four regions, which served to minimize quarterly deviations in the data, produced similar correlation coefficients in all categories.

OFFICE OF THRIFT SUPERVISION DATA

The Office of Thrift Supervision data was obtained from its "Savings & Home Financing Source Book" published in 1989. The foreclosure data is for thrift institutions (savings and loan associations and saving banks) whose deposits are insured by the Savings Association Insurance Fund (SAIF), formerly the Federal Savings and Loan Insurance Fund (FSLIC). All SAIF-insured thrift institutions are Federal Home Loan Bank System members. The primary sources for the data compiled in the "Source Book" are Office of Thrift Supervision (OTS), formerly the Federal Home Loan Bank Board, monthly or quarterly supervisory reports for SAIF-insured institutions and annual state supervisory reports for non-SAIF-insured savings associations, all of which provide data on a calendar basis.

The OTS data was analysed using three distinct approaches. The first approach was to transpose the OTS data into a format similar to data that was presented in a study published in 1987 by The Journal of Real

Estate Research and written by Hartzell, Shulman, and Wurtzebach.[38] Entitled "Refining the Analysis of Regional Diversification for Income-Producing Real Estate", this study concluded that the traditional four-region analysis (East, Midwest, West, and South) does not capture as much of the impact of regional diversification as the authors' proposed eight-region categorization (see Exhibit 1 on following page). The suggestion made based on their results is that benefits (higher returns for a given level of risk) might be obtained if a commercial real estate portfolio manager was to pursue diversification based upon their eight-region classification system. Hartzell, Shulman, and Wurtzebach (HSW) compiled data on a portfolio of over 200 commercial properties with a net market value of approximately $3 billion at the end of the second quarter of 1987. The sample period begins in the fourth quarter of 1973 and extends through the second quarter of 1987. Quarterly asset returns were analyzed after breaking the data into eight regions based upon geographic/economic location. The eight regions consisted of New England, Mid-Atlantic, Old South, Industrial, Farm Belt, Mineral Extraction, Southern California, and Northern California. The regions were chosen based upon HSW's assessment of longer-term regional

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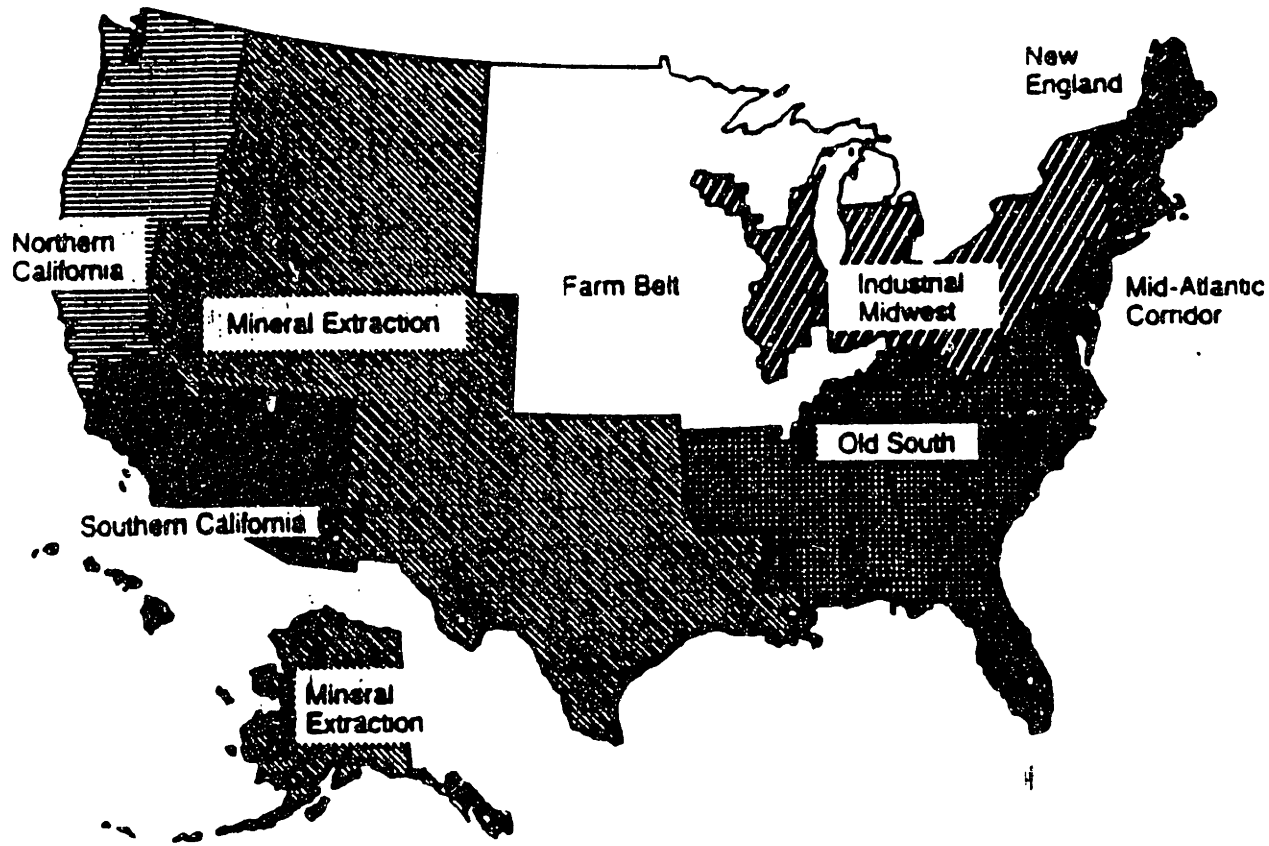
[38] D.J. Hartzell, D.G. Shulman, and C.H. Wurtzebach. Refining the Analysis of Regional Diversification for Income-Producing Real Estate. The Journal of Real Estate Research. Volume2. Number2. Winter 1987.

Exhibit 1
Eight-Region Segmentation



economic performance and their belief that each region possesses similar underlying economic fundamentals.

The OTS data did not allow for as specialized a classification system as the HSW data. For example, the HSW data had parts of one state in two different regions. California, Pennsylvania, Arizona, and Nevada (among others) were segmented into more than one region. Unfortunately, the OTS data did not allow for this study to ignore state boundaries. Thus, for simplification purposes, the data for California was divided into two equal components with half being added to the Northern California region and half being added to the Southern California region. The decision on what region to put other HSW segmented states was made based upon population concentrations. For example, since the eastern portion of Pennsylvania has a higher population than the western part, the OTS Pennsylvania data was included in the Mid-Atlantic corridor region. Some of the differences in correlation coefficients may be accounted for by these geographical differences in the two data sets.

The premise that these two distinct data sets could exhibit similar patterns and relationships is based in common economic theory. Overbuilding and oversupply in the commercial office market and the residential home market are grounded in similar economic fundamentals. Job growth leads to inmigration, which leads to a demand for new office space and new housing. Similarly, job loss leads to a softening in both the local commercial office market and the residential home market.

Consequently, returns on commercial office property in a given region should ordinarily move in an inverse relationship to delinquency and foreclosure rates on residential home mortgages in that same region. If this is true, local residential home mortgage performance might be seen as a proxy for returns on commercial real estate in the same area.

The following are the correlation coefficients presented by HSW for their commercial real estate portfolio broken down into the eight region classification system for the period from the fourth quarter 1974 through the second quarter 1987:

HARTZELL, SHULMAN, and WURTZEBACH

	NEG	MAC	IMW	SCA	NCA	FMB	SOU	MEX
NEG	1.0	-.154	-.030	.131	.039	.010	.226	-.212
MAC	-.154	1.0	.396	.373	.268	.304	.241	.092
IMW	-.030	.396	1.0	.564	.372	.389	.228	.351
SCA	.131	.373	.564	1.0	.312	.307	.359	.195
NCA	.039	.268	.372	.312	1.0	.069	.089	.198
FMB	.010	.304	.389	.307	.069	1.0	.209	.308
SOU	.226	.241	.228	.359	.089	.209	1.0	.182
MEX	-.212	.092	.351	.195	.198	.308	.182	1.0

The abbreviations above stand for the following: **NEG=New England, MAC=Middle Atlantic Corridor, IMW=Industrial MidWest, SCA=Southern California, NCA=Northern California, FMB=Farm Belt, SOU=Old South, and MEX=Mineral Extraction Region.**

The chart below represents the correlation coefficients for the OTS data:

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	NEG	MAC	IMW	SCA	NCA	FMB	SOU	MEX
NEG	1.0	.586	-.182	-.061	-.183	.034	.230	.110
MAC	.586	1.0	.268	.645	.546	.742	.846	.837
IMW	-.182	.268	1.0	.810	.857	.760	.518	.504
SCA	-.061	.645	.810	1.0	.983	.946	.875	.874
NCA	-.183	.546	.857	.984	1.0	.935	.794	.822
FMB	.034	.742	.760	.946	.935	1.0	.874	.932
SOU	.230	.846	.518	.875	.794	.874	1.0	.942
MEX	.110	.837	.504	.874	.822	.932	.942	1.0

The strong relationship that exists in the HSW study between New England and the rest of the regions is mimicked in the OTS correlation coefficients. With the exception of the Mid-Atlantic Corridor/New England pairing, the other six pairings exhibit insignificant positive and negative coefficients. Thus, it appears that the residential foreclosure incidence and commercial real estate performance in New England is not correlated to any other region in the country. The deviant results for the OTS data with respect to the New England/Mid-Atlantic Corridor pairing might be explained by the fact that the composition of the MAC region is different from the the HSW data. The metropolitan Philadelphia area was included in the OTS data as part of the Industrial MidWest region, as it was impossible to split the state data into more meaningful components. Also, the OTS data for the MAC region included all of New York State, whereas the HSW MAC region only included the Metro New York City area. The remaining part of

New York State and most of the state of Pennsylvania was included in HSW's Industrial MidWest data.

With the exception of the New England pairings, all the other regional pairings exhibit significantly positive correlation in the OTS chart. The HSW chart on the other hand demonstrates many other regional pairings that do not have significantly positive correlations. It is suggested that the deviation in the results between the OTS data and the HSW data may be caused by the defective California data that was used for OTS. California foreclosures dominate the data for both the Southern California region and the Northern California region. Because we were unable to make any distinctions in the OTS data between the foreclosure experience in northern versus southern California, this impacted approximately 30-40% of the remaining correlation coefficients (excluding the New England pairings). Therefore, as California represents by far the largest concentration of existing and future residential mortgages in the country, it is recommended that further studies be conducted that would allow for true distinctions to be made between the foreclosure or delinquency experience between southern and northern California.

Building Hypothetical Portfolios with the OTS Data

The OTS data provides the opportunity to build hypothetical mortgage portfolios. Four portfolios are formed that contain OTS foreclosure data for the years 1976-1989: one is based on a passive indexed strategy, one on a naive strategy, and two on a scientific diversification approach (similar to those in the Corgel and Gay study discussed in Chapter 3).

The foreclosure experience for these four strategies are graphed in Appendix A (begins on page 85). A description of the strategies for the portfolios are as follows:

1.) **United States Market Basket Portfolio** (graph pg. 86): This passive indexed portfolio holds "the market" of residential mortgage loans as reported to OTS. For example, if one were to invest $1 billion in this portfolio, and 15% of the total number of OTS outstanding loans in a given year were California mortgages, then this portfolio would hold $150 million of California mortgages in that year, etc. (thus, $150 million of "the market" portfolio would be subject to California's foreclosure rate in that year). Each year, from 1976-1989, the composition of the market portfolio changes as the number of loans outstanding from every state change annually. All 50 states and the District of Columbia are represented in this portfolio.

2.) **The Western States Strategy** (graph pg. 87): This naive portfolio holds an equal percentage of its portfolio in each of 13 states included in the Western Census Region. Approximately $77 million (7.692%) in mortgages are held each year from each of these states.

3.) **New England/Industrial Midwest/Southern California/Northern California Strategy** (graph pg. 88): This scientific diversification strategy was chosen based upon the results of the mean-variance analysis completed on the OTS data (see chart on page 53 of this chapter). The foreclosure data for the Industrial Midwest, Northern California, and Southern California regions for the period 1976-1989

exhibited negative correlation coefficients when each were individually paired with the similar data from the New England region. This portfolio contains 25% of the total available funds invested in each region.

4.) **New England-Northern California Strategy** (graph pg. 89): This scientific diversification portfolio is invested 50% in New England and 50% in Northern California. New England and Northern California exhibited the most negative correlation coefficient (-.183) of any of the regional pairings contained in the chart on page 53.

The performance results for the four portfolio strategies outlined above follows:

PORTFOLIO STRATEGIES

STRATEGY #	MEAN	VARIANCE	STANDARD DEVIATION
1-Mark. Bask.	.3559	.0634	.2374
2-West. U.S.	.3558	.0771	.2884
3-NE-IMW-SCA-NCA	.2865	.0432	.1618
4-NE-NCA	.2567	.0362	.1354

The results in the chart above demonstrate that the two scientific diversification strategies outperformed the passive indexed (U.S. Market Basket) and naive strategy (Western U.S.) for the period 1976-1989. The mean foreclosure rate for strategy number 4, New England-

Northern California, was approximately 28% superior to the passive indexed and naive strategies. Further strengthening the optimum scientific diversification strategy, the standard deviations of strategies # 1 and #2 were 75% and 113% higher, respectively, than the standard deviation of strategy #4. Thus, foreclosures were significantly more volatile for the two strategies that did not utilize scientific diversification methods. To a similar degree, the performance of scientific diversification strategy #3 was superior to the passive indexed and naive strategy. Therefore, our findings support the findings of Corgel and Gay as discussed in Chapter 3, i.e., scientific diversification methods such as mean-variance strategies outperform naive strategies and "market basket" strategies.

CORRELATION BETWEEN DELINQUENCY AND FORECLOSURE

The OTS and MBA data provides the opportunity to test the common belief that a positive relationship exists between the incidence of serious delinquency (90 or more days past due) in a given region's residential mortgage portfolio and the incidence of foreclosure in that same region. This study compares OTS foreclosure data and the MBA delinquency data to determine if that relationship in fact exists. Both MBA "conventional loans" and MBA "all loans" were analyzed against the OTS data. The data for both MBA and OTS was broken down into the major census regions of Northeast, North Central, South, and West. As anticipated, strong relationships existed. In the North Central region "all loans" category, a correlation coefficient of .75 was computed. In the North Central "conventional loans" category, a coefficient of .76 was computed. Likewise, significant coefficients were

computed for the South (.94 and .96), and the West (.82 and .72) regions. However, the Northeast exhibited surprising results. In the "all loans" category, a negative correlation coefficient of .60 was computed. Fortifying this result, a negative .61 coefficient was computed in the "conventional loans" category. We believe that the Northeast's results may be due to lagging factors that may be present due to the generally onerous foreclosure laws in most of the states that are included as part of this region. Burdensome costs of foreclosure preclude expeditious repossession of residential property by lending institutions practicing in this region. Perhaps the insertion of lagging variables might provide the opportunity to discover a stronger relationship between the Northeast foreclosure and delinquency data.

Additional Observations from OTS Data Analysis

The research discussed in Chapters Two and Three of this study underscore the presence of definable patterns that have been discovered via analysis of historical delinquency and foreclosure data on residential mortgage portfolios. A couple of these accepted tenets appear to be borne out in the OTS foreclosure data. Many studies have concluded that the higher the loan-to-value ratio, the higher is the likelihood of default and foreclosure for a given loan. Also, studies have concluded that the "newer" the mortgage, the higher is the chance of default and forclosure. Furthermore, it has been suggested in studies that the larger the mortgage, the greater is the risk of default and foreclosure. These apparent truths are shown both on a national basis in the OTS data and on a state by state basis. Generally, on a state by state basis, the total dollar amount of mortgages foreclosed as

a percent of total dollar amount of mortgages outstanding is two to five times greater than the number of mortgages foreclosed as a percent of the total number of mortgages outstanding. For the United States as a whole in 1989, there were 74,901 SAIF-Insured mortgages foreclosed (.591%). These foreclosures represented $18,191 billion or 2.504% of the total dollar amount of SAIF-Insured mortgages outstanding. Thus, the dollar amount of mortgages foreclosed (as a percent of total) was 4.24 times greater than the number of mortgages foreclosed (as a percent of the total number of mortgages outstanding). While this information does not lead us to conclude the relative importance of the factors which lead to larger mortgages being foreclosed, it is reasonable to conclude (based on the overwhelming amount of reinforcing research that has been completed on this variable) that the loan-to-value ratio is the single most important variable and: 1. The more recent the origination of the mortgage, the higher is the loan-to-value ratio; and 2. Due to rates of appreciation during the past twenty years in housing prices, the more recent the origination of the mortgage, the higher the purchase price (and thus generally the higher the mortgage amount). Therefore, the finding that the dollar amount of morgages being foreclosed is larger as a percentage than the number of mortgages being foreclosed is not surprising, but rather it is a consistent output of this study and those studies that have preceded it.

The following table shows data for states with high dollar amount of mortgages foreclosed as a percent of total dollar amount of mortgages outstanding. This data was also found in the OTS "Financing Source Book":

States with High Incidence of SAIF-Insured Foreclosures
(Millions of Dollars)

ALASKA YEAR	# of Foreclos.	% of Total	$ Amount Foreclos.	% of Total $ Outstanding
1988	88	2.305	20	6.510
1989	116	3.169	39	14.736
ARIZONA				
1988	1,530	1.222	904	7.551
1989	1,993	2.263	2,103	19.609
ARKANSAS				
1988	809	0.869	276	7.147
1989	626	0.859	937	28.706
COLORADO				
1988	2,109	1.782	577	7.674
1989	1,900	1.614	761	12.471
KANSAS				
1988	1,781	1.038	268	3.272
1989	1,352	0.895	691	8.292
NEW MEXICO				
1988	1,031	1.189	170	6.343
1989	597	0.784	205	8.107
OKLAHOMA				
1988	2,843	2.988	419	8.205
1989	2,736	2.965	299	6.850
TEXAS				
1988	19,030	3.215	7,814	18.065
1989	12,697	1.843	5,309	14.986

The above eight states accounted for $10.344 billion (56.9%) of the total $18.191 billion in SAIF-Insured foreclosures in 1989. Texas alone

accounted for $5.309 billion (29.2%) of the total. Five of the eight states above are from the mineral extraction region and most were high growth areas during the 1980s. High growth led to higher incomes and ultimately to higher home prices in the mid-1980s. Because there were a great amount of new mortgages with relatively high loan-to-value ratios on higher priced homes, those mortgages were affected most when the economic bust came in these states.

Chapter 6: Regional Trends in Foreclosure Rates via Analysis of State Graphs

The graphs of state foreclosures located in Appendix B (beginning on page 90) of this study can be utilized as a tool to discover trends in foreclosure rates between states and between regions. The OTS data is shown in graph form in Appendix B for all the fifty states and the District of Columbia. The Hartzell, Shulman, and Wurtzebach eight region classification system was used to make some general comments about what trends the OTS data exhibits. Therefore, the graphs for the states are preceded by a summary graph for the region in which they are located. Appendix B begins with a graph showing the OTS data for the entire United States for the period 1975-1989.

New England Region (graph page 92)

Generally, a common theme is painted by the New England region states. All states show relatively sharp reductions (Maine not as distinct) in both number of foreclosures and foreclosures as a percent of total loans coming out of the recession in the early 1970s. With the exception of Massachusetts, all the remaining New England states appeared to have suffered to different degrees during the early 1980s recession (1981-1983) as foreclosure rates and numbers of foreclosures jumped dramatically. The divergence in Massachusetts experience is probably attributable to the beginnings in the early 1980s of a high technology boom in the state, often referred to as the "Massachusetts Miracle". In addition, Vermont, Maine, and New Hampshire have a high

percentage of non-standard housing types/stock, and this could also account for some of the difference in their foreclosure experience. For the period 1976-1989, all the states with the exception of Vermont experienced their lowest rates of foreclosure in the 1985-1986 period Vermont's experience is clouded by the extremely small number of observations recorded throughout the time period. By 1989 the great majority of the states (Maine being the one exception) show evidence of the New England regional recession taking hold. Massachusetts was the most dramatic example of this deterioration as it experienced a greater than five-fold increase in the number of foreclosures from 1988 to 1989 and a greater than six-fold increase in the percentage of total loans being foreclosed. New Hampshire was not far behind Massachusetts in terms of deteriorating foreclosure results and exhibited the most commonality with Massachusetts.

Mid-Atlantic Corridor (graph page 99)

The Mid-Atlantic Corridor appears to exhibit some commonality with the New England region although in general the peaks and valleys of data points are not as severe. The states with the most dominating number of observations are New York, New Jersey, and Maryland. New York demonstrates in common with the New England region a low point in both total number of foreclosures and percentage of mortgages foreclosed in 1985. However, its deterioration in foreclosure results is not nearly as severe as Massachusetts and New Hampshire in 1989 (actually, total number of foreclosures went down slightly in 1989 and the percentage of total loans foreclosed went up slightly). In New Jersey, total number of foreclosures went up 46% in 1989 and the

percentage of loans foreclosed went up 61% (to .88%). Maryland's results were less dramatic, as its respective increases were 33% and 38%. Therefore, although the Mid-Atlantic Corridor region appears to move in a similar direction as New England, the less severe results in the later 1980s suggest that a portfolio manager might be able to cushion his overall loss rates by diversifying away from New England only and into a portfolio consisting of exposure in New England and the Mid-Atlantic Corridor regions.

Industrial Midwest (graph page 105)

The behavior of the Industrial Midwest region states look substantially different from both the Northeast and the Mid-Atlantic Corridor. The recession of the early 1980s took a much heavier toll on the Industrial Midwest than on the other two east coast regions. Every state in this region shows a more dramatic upward swing in foreclosures in the early 1980s than any of the states in the two east coast regions. The automobile and steel industries were both severely impacted by the early 1980s recession and these states have the highest proportion of their workforce employed in these industries. However, for the most part, these states began to exhibit dramatic recovery in the incidence of foreclosures after 1983-1984 and by the end of the 1980s were faring far better than their counterparts on the east coast.

Old South (graph page 112)

A gradual decrease in the percent of total mortgages forclosed is seen as the region comes out of the early 1970s recession and then an upward slope leading into the early 1980s recession. Again, a slightly

reduced rate of foreclosures is seen as the regional economy is impacted positively by the recovery of the national economy. However, the rate of foreclosures then seems to depart somewhat from the results in the other three regions discussed above. The rate of foreclosures rises significantly from 1985 to 1988 (from .40% to .74%). These results can not be explained easily by movements in the national economy. However, it is believed that the stock market crash in 1987 together with high growth in this region and an overheated housing market contributed to these results. The region as a whole witnessed a recovery in the foreclosure rate to .55% in 1989 at a time when the New England and Mid-Atlantic regions saw a sharp increase in their rates of foreclosure. It should be noted that the Florida and Virginia numbers dominate the 11 state Old South region as they represent almost 13,000 incidents of foreclosure in 1988. This data is somewhat suspect as the number of foreclosures in Virginia increased to 8,040 in 1988 from 1,627 in 1987 (a 494% increase) and then decreased to 1,274 foreclosures in 1989. Even more suspect is the increase in the foreclosure rate to 3.11% in 1988 from .58% in 1987 and then the fall in the rate to .51% in 1989. Virginia's foreclosure rate of 3.11% in 1988 significantly skews the overall Old South results as it is weighted much higher than any other state due to the number of observations. The OTS data should be reviewed for accuracy.

Farm Belt (graph page 125)

The Farm Belt appears to have been affected more by the early 1980s recession than most of the other regions in the U.S. The region's overall foreclosure rate continued to rise throughout most of the 1980s

after the 1982-83 recession. Significant increases in the foreclosure rate occurred in 1986 and 1987. Foreclosure rates levelled off in 1988 and 1989 at a time when foreclosures were rapidly rising in the east and elsewhere throughout the national economy. This data suggests that this region's economy is more driven by internal economic forces than by the national economy. The agricultural economy that has dominated this region is impacted by international factors of supply and demand for its products that are subject to wide swings as a result of international politics and weather/crop related factors. By comparing this region's graph to some of the other regions', one might reasonably conclude that because its trend line does not move in line with the national trend, there are positive diversification benefits to be realized by holding a mortgage portfolio that has Farm Belt representation.

Mineral Extraction (graph page 132)

The Mineral Extraction region has a trend line that also does not move in concert with the national trend line. The oil bust of the middle 1980s accounts for much of the divergence in this region's trend analysis from that of other regions. Oil related businesses drove this region's economy through much of the 1970s and 1980s. In fact, as the region's foreclosure graph demonstrates, the recession years of 1981-1982 did not create the magnitude of foreclosures that their internal economic problems induced in the years from 1984-1988. The lack of industry diversification within the region results in a dilemma for those institutional mortgage holders outside the region who consider trying to diversify their mortgage portfolios by investing in this region. The severity of intra-regional shocks, proven to be the reason for the

demise of hundreds of banks and savings and loan institutions making loans in the Mineral Extraction region, is a strong enough justification for outside investors to be wary of their exposure in this region.

Northern California/Southern California (graph pages 143 & 147)
The OTS data, as mentioned above, did not allow for a breakout of Northern and Southern California foreclosure results. Therefore, we were unable to test for correlation or distinct trends between Northern California and Southern California as was suggested in the Hartzell, Shulman, and Wurtzebach article. Thus, the graphs for the Northern California and Southern California regions are dominated by the state of California results. However, as California represents such a large component of the overall housing market in the Western United States, its presence in any major mortgage portfolio may be desirable and unavoidable. Furthermore, the graph trend results for both the Northern California and Southern California regions demonstrates that they essentially move in line with the national economy as a whole. This may essentially mean that by either holding a "market basket" of national mortgage loans or a well diversified state of California mortgage portfolio, one should be no better or worse off from a risk and return standpoint.

Chapter 7: Observations on a National "Jumbo" Residential Mortgage Portfolio

Data was compiled from the Boston Safe Deposit and Trust Company's (BSDT) residential jumbo mortgage portfolio as of July 1, 1991 (see Chapter 4 for additional information on BSDT and its mortgage portfolio) with the following breakdown of BSDT's direct jumbo mortgage portfolio:

BSDT Past Due Summary as of July 1, 1991

STATE	# of Loans	30 Days	60 Days	90 Days
Massach.	3,275	72/2.2%	8/.2%	24/.7%
Rhode Island	38	2/5.3%	0/0%	1/2.6%
New Hampsh.	97	2/2.1%	0/0%	3/3.1%
Maine	35	0/0%	0/0%	0/0%
Vermont	34	1/2.9%	0/0%	0/0%
Connecticut	504	6/1.2%	1/.2%	4/.8%
New Jersey	216	5/2.3%	1/.5%	0/0%
New York	2,021	45/2.2%	4/.2%	11/.5%
Pennsylvania	36	1/2.8%	0/0%	1/2.8%
Delaware	5	0/0%	0/0%	0/0%
Wash. D.C.	40	1/2.5%	0/0%	0/0%
Maryland	28	0/0%	0/0%	0/0%
Virginia	41	0/0%	0/0%	0/0%
W.Virginia	1	0/0%	0/0%	0/0%
N.Carolina	2	0/0%	0/0%	0/0%
S.Carolina	12	1/8.3%	0/0%	0/0%
Georgia	9	1/11.1%	0/0%	0/0%
Florida	122	3/2.5%	0/0%	2/1.6%
Tennessee	2	0/0%	0/0%	0/0%
Ohio	4	0/0%	0/0%	0/0%
Michigan	12	1/8.3%	0/0%	0/0%
Minnesota	1	0/0%	0/0%	0/0%

STATE	# of Loans	30 Days	60 Days	90 Days
Illinois	42	1/2.4%	0/0%	0/0%
Missouri	3	0/0%	0/0%	0/0%
Texas	8	0/0%	0/0%	0/0%
Colorado	48	1/2.1%	0/0%	0/0%
Idaho	3	0/0%	0/0%	0/0%
Arizona	11	0/0%	0/0%	0/0%
New Mexico	3	0/0%	0/0%	0/0%
Nevada	3	0/0%	0/0%	0/0%
S.California	281	4/1.4%	0/0%	0/0%
N.California	225	1/0.4%	1/0.4%	0/0%
Hawaii	20	0/0%	0/0%	0/0%
Washington	4	0/0%	0/0%	0/0%
TOTAL	**7,186**	**148/2.1%**	**15/0.2%**	**46/0.6%**

Though the portfolio above reflects mortgage activity throughout the United States, there are concentrations in the New England, Tri-state, and California regions. It should be noted that the above results are far superior to the national delinquency average for today. In the first quarter of 1991, the Mortgage Bankers Association reported that the percentage of homeowners behind 30 days or more on their mortgage payments climbed to 4.95 percent of the 45.6 million mortgages on which their member institutions reported. For the Northeast, the MBA reported that the delinquency rate jumped to 4.58 percent from 3.88 percent in this region in the first quarter of 1990.[39]

The Boston Safe Deposit and Trust Company's success in achieving such a low delinquency rate can be explained by the conclusions reached in the research discussed earlier in this study as well as by the Bank's internal underwriting standards. The composite profile of

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[39] The Boston Globe. Mortgage Defaults on the Rise. Business section. May 31, 1991.

the Bank's average borrower is the envy of any prudent underwriter. The average borrower is a corporate executive with a fortune 500 company and professionals (such as a medical doctor or attorney). As discussed earlier in this study, research has shown that the least risky borrowers are those that are well represented in the BSDT jumbo mortgage portfolio. The most risky borrowers, entrepreneurs and commission-based salespeople, are not well represented in the BSDT porfolio.

BSDT's underwriting standards also contribute to the Bank's low delinquency rate. Generally, the highest loan-to-value ratio that the Bank will underwrite is 70%. However, for loans in excess of $500,000, the Bank's target market, the Bank's policy is to maintain an LTV of not higher than 60%. Therefore, its easy to see that the average borrower has a substantial amount of equity in their homes that they will seek to preserve if they are having financial problems. The literature that exists on the LTV ratio being the leading contributory factor of default was discussed in length in previous chapters in this study. The BSDT portfolio delinquency breakdown as of July 1, 1991 appears to support the research that the LTV is in fact one of the primary delinquency factors as indicated by BSDT's results relative to the industry averages. The Bank had an overall delinquency rate of 2.9% as of July 1, 1991 versus an industry average of close to 5.0%. Also, BSDT's delinquency rate for Massachusetts and the Northeast as a whole (3.1% and 3.0%, respectively) is significantly better than the respective averages for the industry in these two areas (approximately 4.6%).

It should be noted that the great majority of the BSDT jumbo mortgage portfolio has been originated in the past five years. Mortgage portfolio delinquency theory has found that generally the more recent the origination of the mortgage, the higher the risk of delinquency and default. This in part is due to the higher LTV's present in recently originated loans, as appreciation benefits have not been afforded the recent borrowers. In the severe recession afflicting the Northeast, one would expect that the more recently originated portfolios would be experiencing the higher degrees of delinquency and default. However, the low delinquency and default rate exhibited by BSDT's jumbo mortgage portfolio indicate that advantageous borrower characteristics and underwriting standards (i.e., low LTV ratios) can positively offset the risks associated with a recently originated portfolio.

The BSDT delinquency chart points to the advantages of even a naive approach to the benefits of diversification. It is quite clear that the national recession has impacted regions to various degrees. The BSDT delinquency numbers are evidence of this fact. Assuming that the Bank's California loans provide a statistically significant sample (506 loans in total) for this region, a large mortgage portfolio of California loans with BSDT's characteristics of low LTV and low-risk borrower profiles should be experiencing a delinquency rate of 1.2% (6 loans greater than 30 days past due in a portfolio of 506 loans). Because of the benefit of loans in other regions in the country that are not experiencing as severe an economic downturn as New England, BSDT's delinquency rate improves to 2.9% for all loans greater than 30 days past due (from 3.1% in New England alone). Thus, if BSDT had a

50/50 proportional presence in New England and California, its delinquency rate for July 1, 1991 might have been only 2.15% (New England's 3.1% plus California's 1.2% divided by 2).

Chapters 5, 6, and 7 demonstrated the benefits of both statistical methods and naive methods of diversification for residential mortgage lenders by analyzing three different sets of primary delinquency data. More research needs to be completed on the degree to which the holding of mortgages from different regions of the country can contribute to lowering risk in a residential mortgage portfolio. However, based upon the prior research that has been conducted on this topic and the results of the analysis completed in these chapter, diversification between New England mortgage investments and mortgage investments in other areas of the country is a desired outcome for any portfolio manager.

Chapter 8: Conclusions

The purpose of this study was to validate the assumption that economic and geographic diversification can be an important element in the success of a large residential mortgage lender. We have shown by way of existing research, industry practices, and this study's own data analysis that appropriate diversification provides benefits that all prudent loan originators, particularly those who portfolio loans, should attempt to achieve. This chapter serves to tie some of the information and analysis in the previous chapters together. We conclude with a comment on the rapid changes occurring in the U.S. banking industry and the implications of these changes for the study of the benefits of diversification.

The second chapter of this study discussed the existing research that has been conducted on delinquency, default, and foreclosure. Von Furstenburg was one of the pioneers in the study of the incidence and nature of delinquency in residential mortgage portfolios. Among several of his conclusions was the finding that the price of a home is not positively correlated with the risk of default. While the present study did not have the benefit of statistical analysis on a broad range of high value home mortgage portfolios, a "snapshot" was taken of Boston Safe Deposit and Trust's (BSDT) jumbo mortgage portfolio as of July 1, 1991 at a point in time which represents the severest recession in a quarter century in its New England based property market. The low delinquency rates in the present BSDT portfolio lend support to von Furstenburg's findings. In fact, due to the far superior results in this

portfolio at this time, it might appear that there might be a negative relationship between home value and risk of default. The limited data available to this study, however, makes such a conclusion premature.

Some of von Furstenburg's other findings are supported less conclusively by the present study. As recounted in Chapter 2, von Furstenburg found that high growth regions precipitated higher levels of default on residential mortgage loans. Nothing in the data that was analyzed for this study supports this conclusion. Some high growth states such as Arizona have high default rates, but others such as California do not appear to have higher than average levels of default. It appears that the lack of supply constraints in high growth markets contributes more to defaults than the high growth parameter itself. Arizona has limited supply constraints, whereas California has considerably more.

Another finding by von Furstenburg is not borne out by the findings in this study. Von Furstenburg concluded that naive diversification does not provide protection against default in a residential mortgage portfolio. This study indicates that naive diversification between states and/or regions can provide some benefits which may limit the default experience in a mortgage portfolio. The analysis in Chapter 6 regarding given states' and regions' historical foreclosure experience, as graphed in Appendix B, showed this to be true. Today's recession in the United States is being felt in varying degrees throughout the country. The Northeast has been most severely impacted to date and thus its delinquency rate has increased by a higher amount than any

other region in the past two years. It was shown in Chapter 7 that even a naive approach to diversification with respect to the BSDT portfolio could decrease delinquency rates substantially.

A number of studies discussed in Chapters 2 and 3 found that borrower occupation is an important factor that contributes to delinquency and foreclosure. Although we looked at only one mortgage portfolio, the BSDT borrower characteristics appear to bear out the earlier findings that professionals, corporate executives, and managers are the least risky of borrower profiles. Along these lines, the Vandell and Thibodeau study discussed in Chapter 2 indicates that properties located in "excellent" neighborhoods (as denoted by appraisers) seemed to have a lower level of default than those located in "good" neighborhoods. As the BSDT mortgage portfolio is supported by properties generally located in "excellent" neighborhoods, it is hard to refute this earlier finding based on the levels of delinquencies present in this portfolio today.

Vandell and Thibodeau also found, contrary to von Furstenburg, that the age of the mortgage does not matter as a factor contributing to defaults in residential mortgage portfolios. Again, as the Boston Safe portfolio is principally a recently originated one, its low delinquency would lend support to Vandell and Thibodeau's findings.

Notwithstanding the findings regarding other default factors, the central thesis of the present study is that economic and geographic diversification does matter when managing risk in residential mortgage

portfolios. In Chapter 3, we discussed Corgel and Gay's mean-variance approach to building an efficient portfolio of residential mortgage loans. They show that by using more sophisticated statistical methods, optimal portfolios can be built that outperform portfolios formed using naive methods. Also in Chapter 3 we reviewed Clauretie's local economic diversification argument. He concluded that a key to understanding risk in residential mortgage portfolios is to know the level of diversification of the local economy in which the mortgaged properties are located.

Chapter 4 detailed current industry practices regarding the use of diversification techniques. Though originators were well versed in the benefits of diversification, they has little practical basis to use its benefits as they are for the most part regionally entrenched. Rating agencies such as Fitch Investors Service and Moody's Investors Service practice diversification techniques in analyzing the riskiness of residential mortgage pools. However, their methods are not meant to derive an efficient frontier representing mortgage loans by matching mortgages located in one state with mortgages located in states that are not correlated or that are negatively correlated. Rather, they look at within state industry diversification and rank states based upon the degree to which industry diversification is present. Pools are then rated by virtue of the component of high ranking states present in the pool. Based upon the recent run-up in delinquency rates in previously high ranking states (Massachusetts was always one of the top ten industrially diversified states), this approach may need revisiting.

Perhaps the industry players that are most exposed today to loss on residential mortgage loans are private mortgage insurers. MGIC, one of the largest private mortgage insurers, used one of the most detailed diversification methodologies for computing their level of exposure to potential loss nationally. Nonetheless, the methodology was demonstrated to be naive.

In chapter 5, original statistical analysis on two distinct sets of residential mortgage data was performed. The Office of Thrift Supervision historical foreclosure data was analyzed in much the same manner as a previous study by Hartzell, Shulman, and Wurtzebach (HSW) conducted on commercial real estate property. The findings were consistent with the earlier study by HSW. Significant negative correlations were found between foreclosure rates in the New England region and other regions throughout the United States. As a similar relationship existed for commercial property in the HSW study, it appears that the residential mortgage market might serve as a useful proxy for the commercial office market. Also in Chapter 5, hypothetical portfolios were built (using the OTS data) employing a passive indexed diversification strategy, a naive diversification strategy, and scientific diversification strategies. Supporting the Corgel and Gay findings, it was concluded that scientific diversification methods such as mean-variance analysis outperform both passive market indexed and naive strategies.

A rational hypothesis is that rates of foreclosure in given regions of the country should be highly correlated with rates of delinquency in

those same regions. In order to prove this (and in so doing demonstrate the quality of the two sets of primary data that we analyzed in Chapter 5), the correlation between the Mortgage Bankers Association data (delinquency) and the Office of Thrift Supervision data (foreclosures) was tested. Not surprisingly, the foreclosure data and delinquency data for three of four regions was significantly positively correlated. However, the Northeast delinquency data and foreclosure data exhibited the opposite relationship, as it was significantly negatively correlated. We suspect that due to the Northeast's burdensome foreclosure laws, there may be significant lagging factors present in this region's data.

The single most important study reviewed in relation to the relevance of the diversification topic was the Quigley and Van Order study. This study's conclusions are very timely, as it directly linked the sufficiency of a financial institution's capital level to the degree to which its portfolio of mortgage loans is appropriately diversified. The Quigley and Van Order conclusions are implicitly supported in Chapter 7 of the current study, as it was demonstrated, in a naive fashion, that delinquency rates in a given Bank's portfolio for the current period could have been cut significantly if the portfolio was diversified to a greater extent. Also, analysis of the OTS and MBA data revealed that significant negative correlations in foreclosure and delinquency rates exist between the Northeast/New England region and other regions of the country.[40] Given the debate continuing in Congress and within the

[40]The Quigley and Van Order study, our statistical analysis on the OTS and MBA data, and a review of the BSDT portfolio all suggested that

regulatory agencies regarding the appropriate capital levels for financial institutions of all types, the policy implications of the Quigley and Van Order study and the supporting conclusions reached in the present study are potentionally enormous.

Perhaps equally as important is the potential influence of the Quigley and Van Order work and the present study on the national debate currently raging on the need for interstate banking and an overhaul in the banking industry. These studies emphasize the practical benefits of geographic diversification in a manner that allows industry participants to think strategically about where they should be doing business. In summary, these two studies show that geographic diversification clearly matters when attempting to manage risk in a residential mortgage portfolio.

In recent days the news headlines have announced merger agreements between some of the largest commercial banks in the United States. After the anticipated year end merger between Chemical Banking Corporation and Manufacturers Hanover, a $135 billion banking giant will emerge. Also, the pending merger of NCNB Corp. and C&S-Sovran will create a $118 billion enormous Southeast bank.[41] The new name of this Southern institution, NationsBank, and the recent spate of mergers (with the anticipation of more to come) suggest that true interstate banking is coming with or without new legislation seeking to facilitate

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delinquency and foreclosure rates in the Northeast and Western regions of the country were significantly negatively correlated.

[41]The Boston Globe. Sovran, NCNB hit on $4.3b merger. Business Extra section. July 23, 1991.

it. As more geographically dispersed institutions are formed, de facto diversification of mortgage portfolios and other consumer loan products will be accomplished to some extent. Thus, with the aggregation of the banking industry, institutions will obtain the resources to realize true geographic and economic diversification for the first time, and sophisticated scientific diversification techniques will be developed in the industry.

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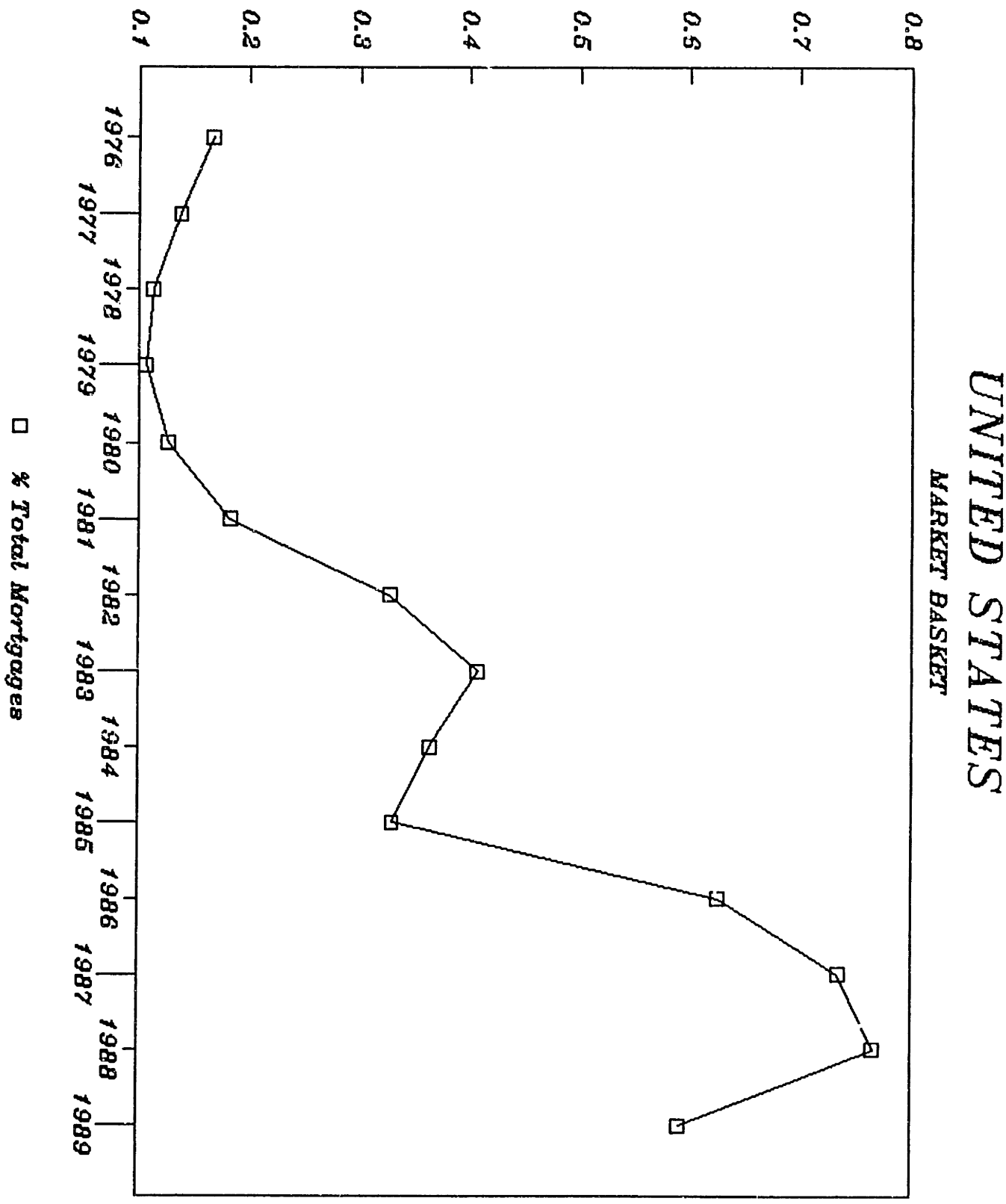
Wolf, Marge. Telephone interview. 7 June 1991.

Appendix A

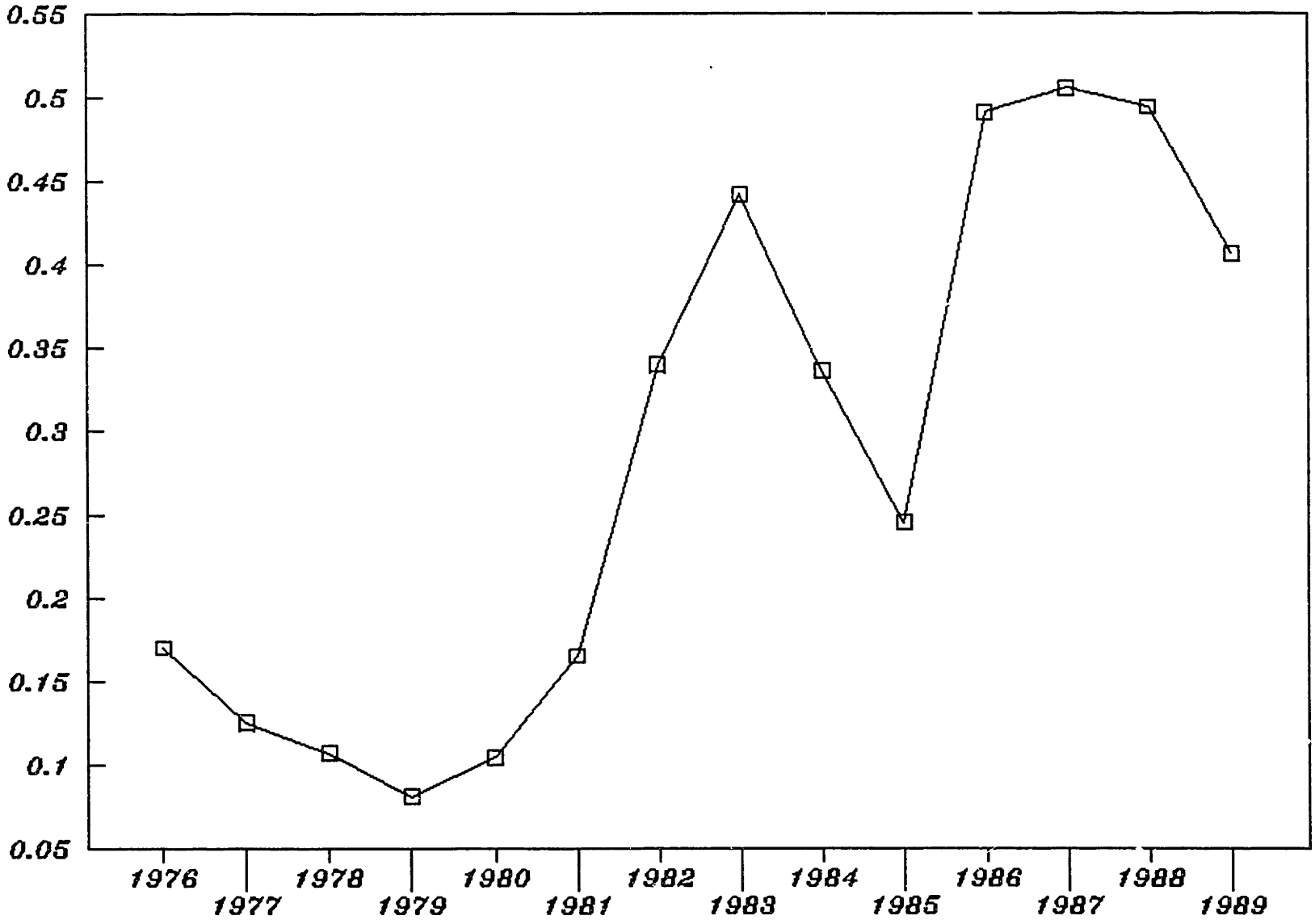
Hypothetical Portfolios
(see also Chapter 5)


UNITED STATES
MARKET BASKET
% Total Mortgages
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989


WESTERN U.S.
PORTFOLIO
% FORECLOSED
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
% Total Mortgages

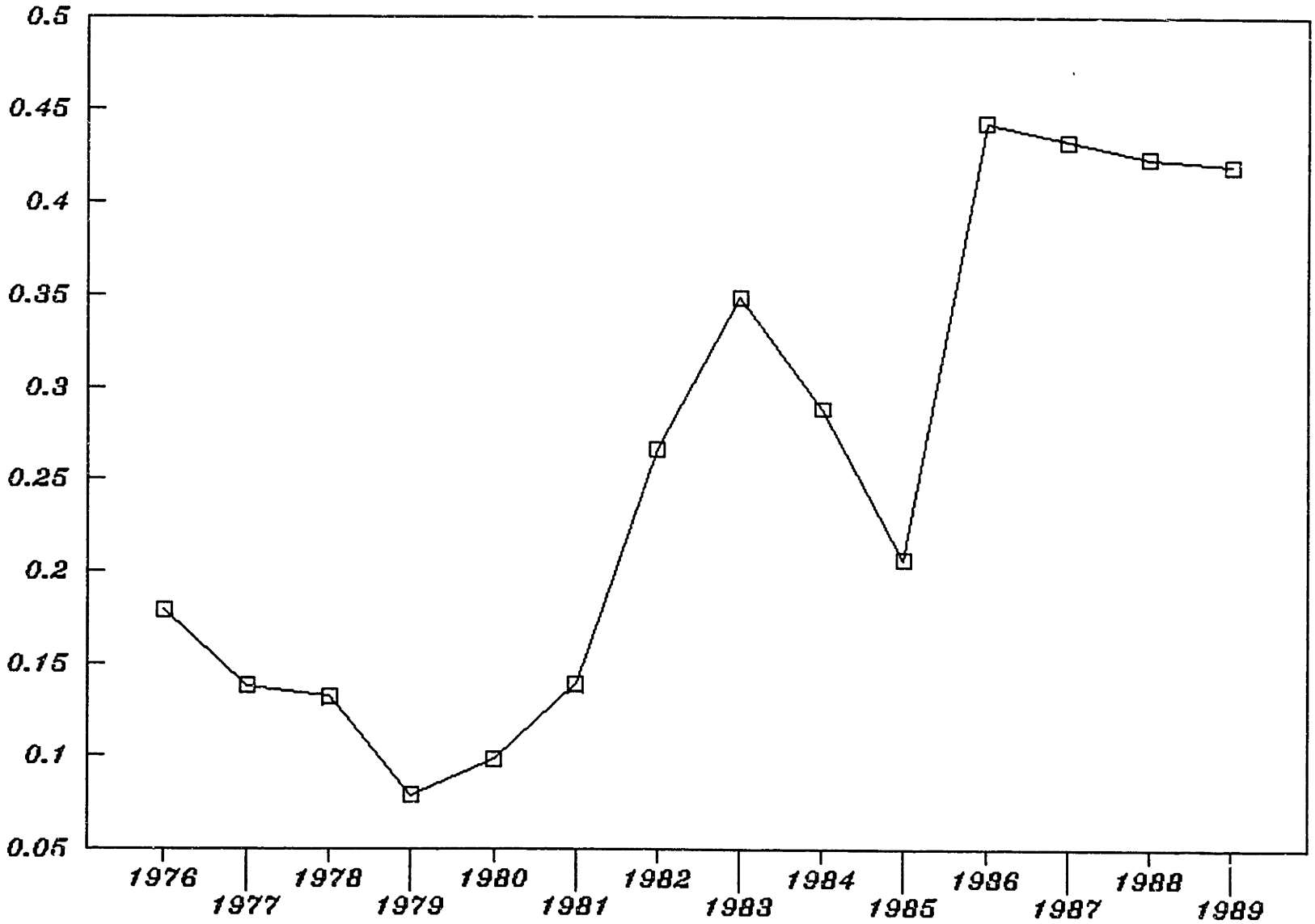
NEW ENG/INDUSTRIAL/

N.CALIF./S.CALIF.



NEW ENGLAND & NORTHERN

CALIFORNIA PORTFOLIO



% FORECLOSED

□ % Total Mortgages

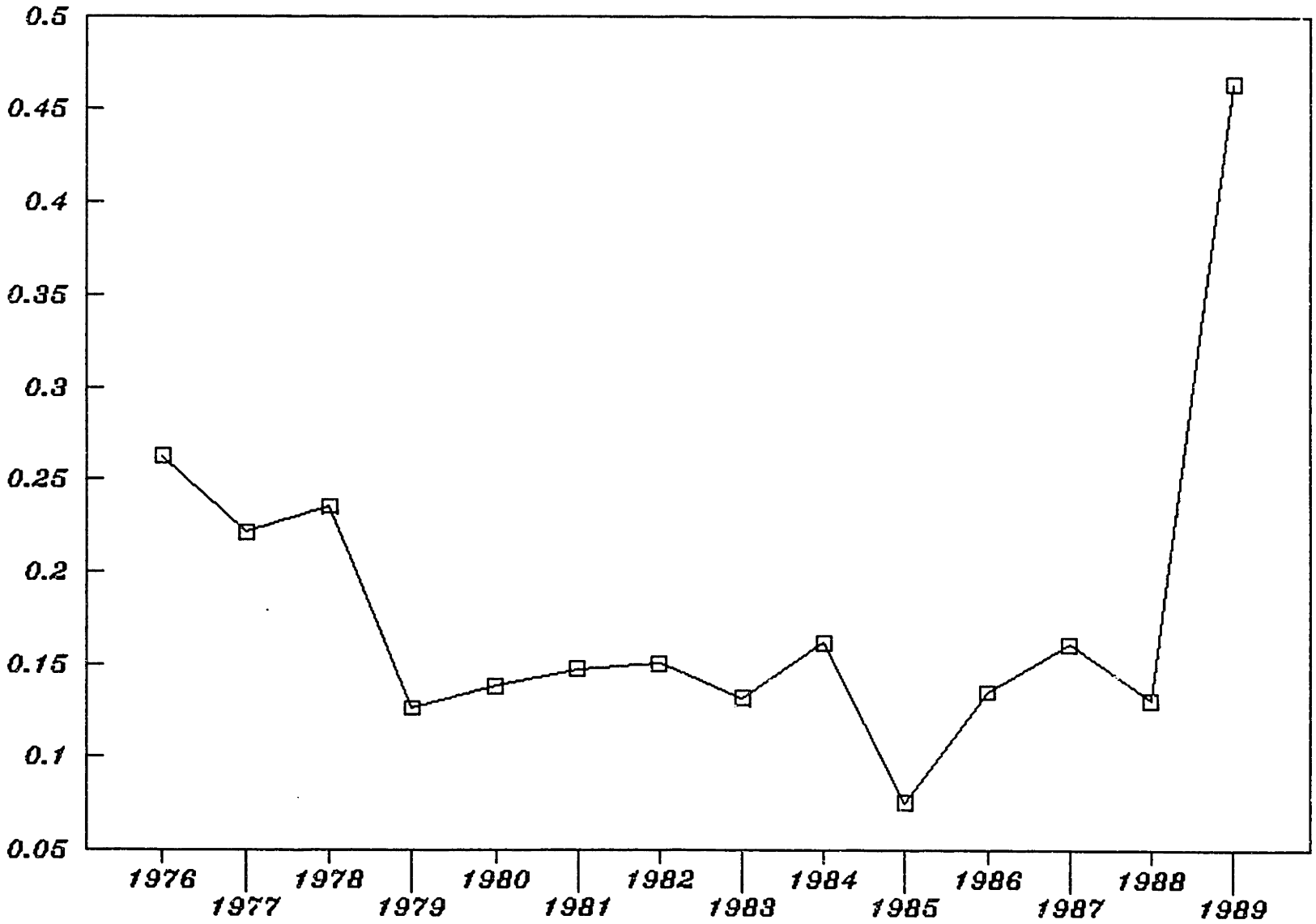
Appendix B

OTS Foreclosure Data Graphs
(see also Chapter 6)

UNITED STATES
FORECLOSURES
% Total Mortgages
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

NEW ENGLAND

FORECLOSURES



CONNECTICUT
FORECLOSURES
# of Foreclosures
% of Tri Mtg x 1000
80
100
120
140
160
180
200
220
240
260
280
300
320
340
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

MAINE
FORECLOSURES
0
100
200
300
400
500
600
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tot Mtg x 1000

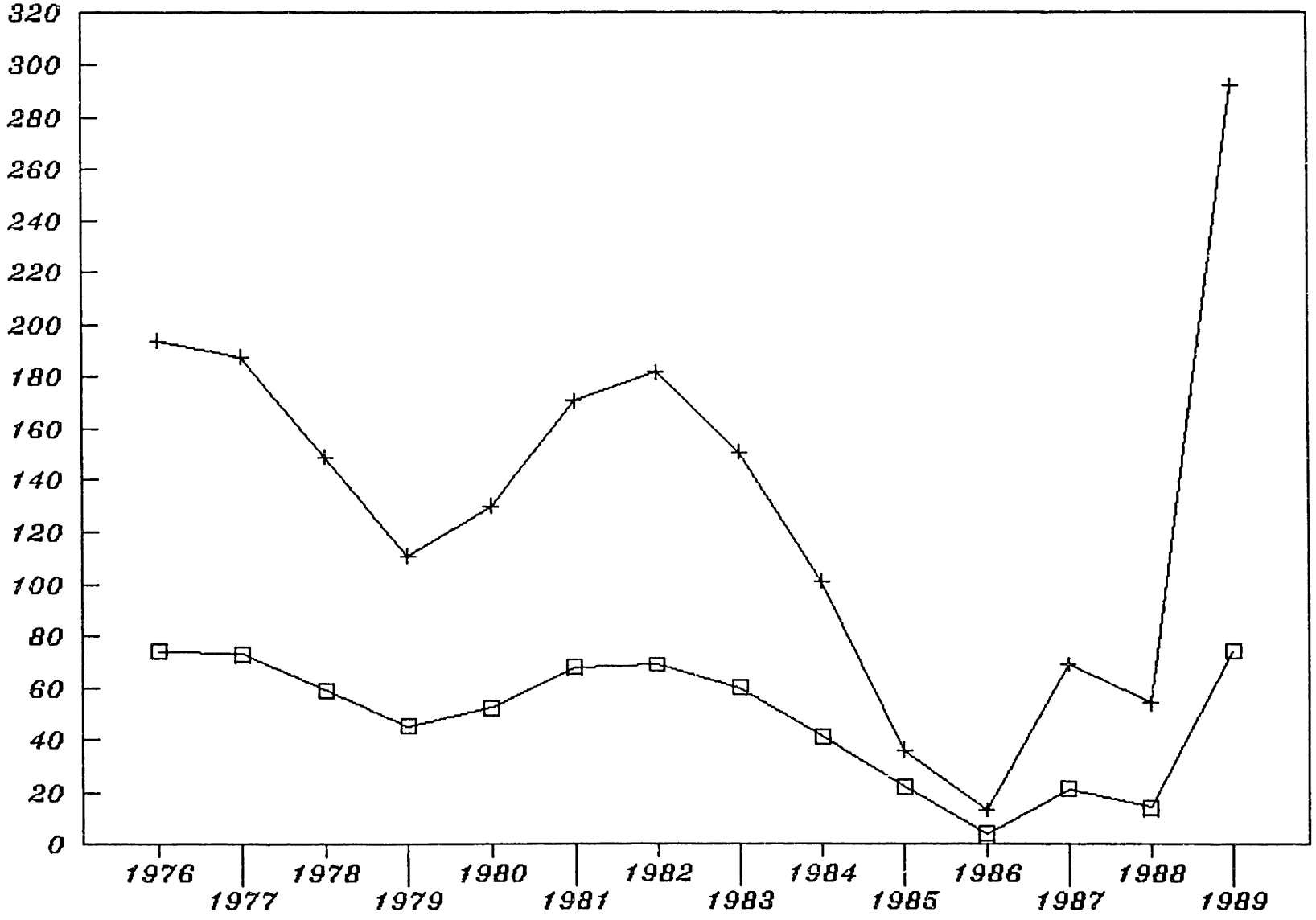
MASSACHUSETTS

FORECLOSURES

(Thousands)

NEW HAMPSHIRE

FORECLOSURES



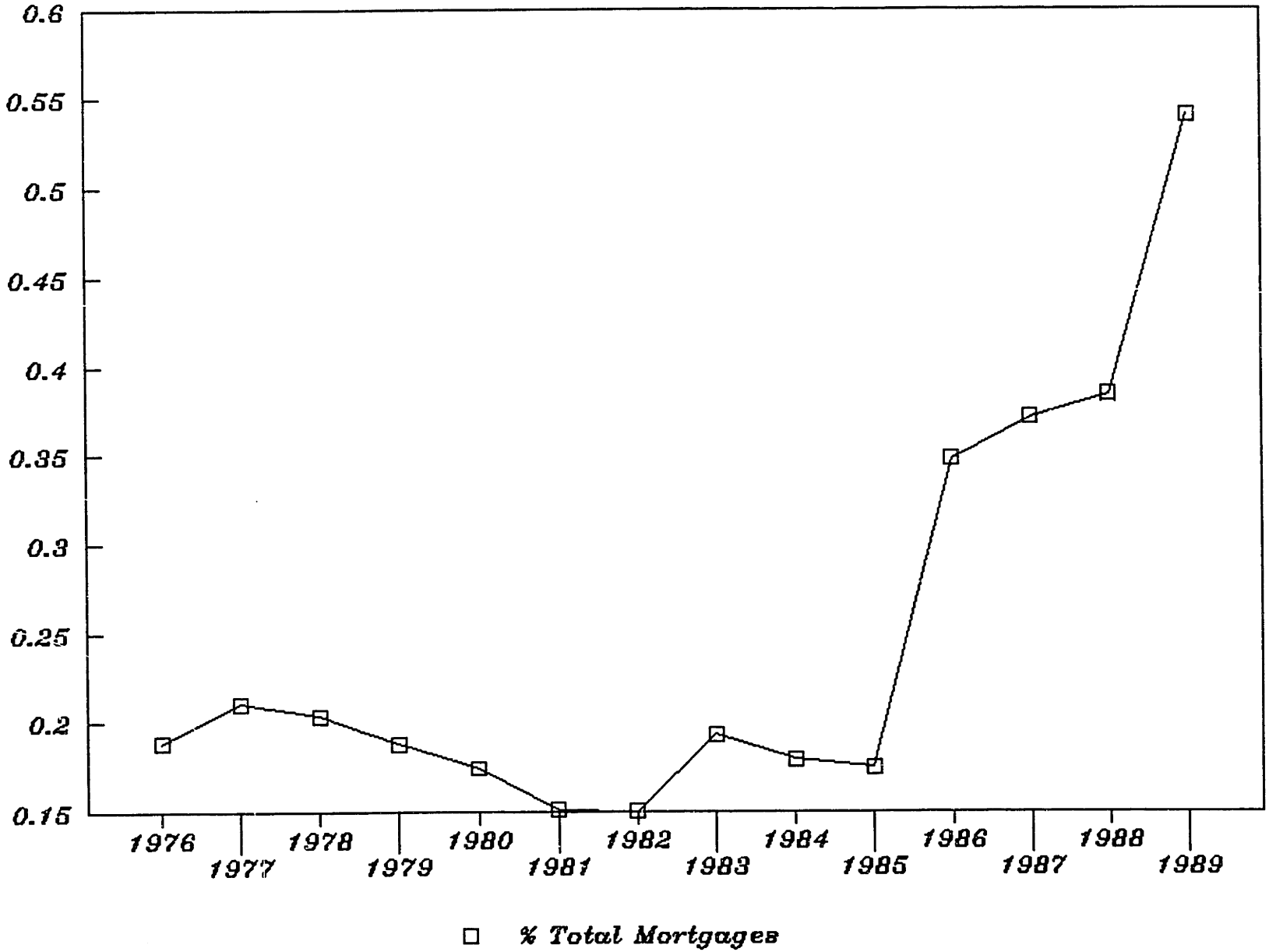
RHODE ISLAND

FORECLOSURES

VERMONT

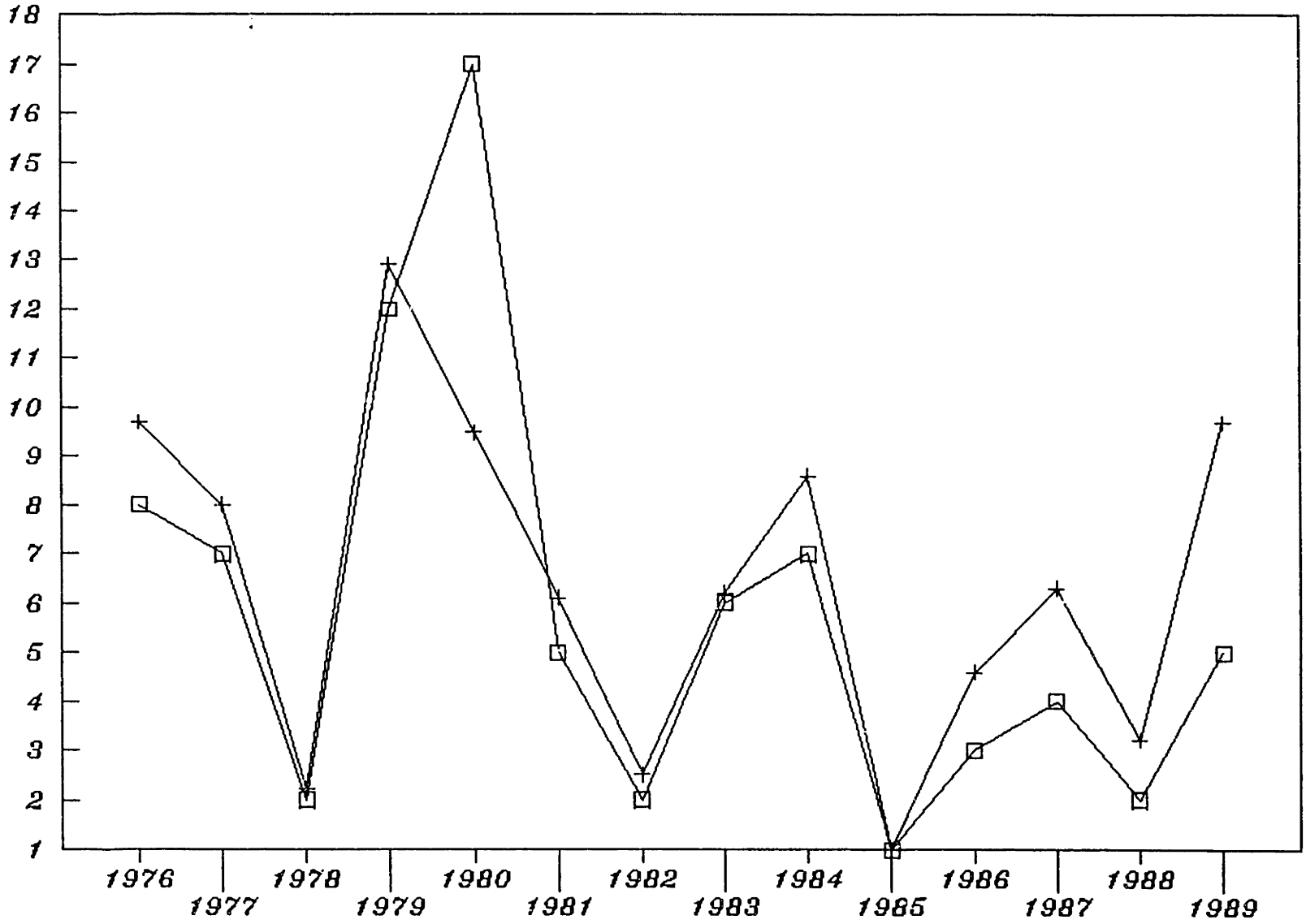
FORECLOSURES

Mid-Atlantic Corridor



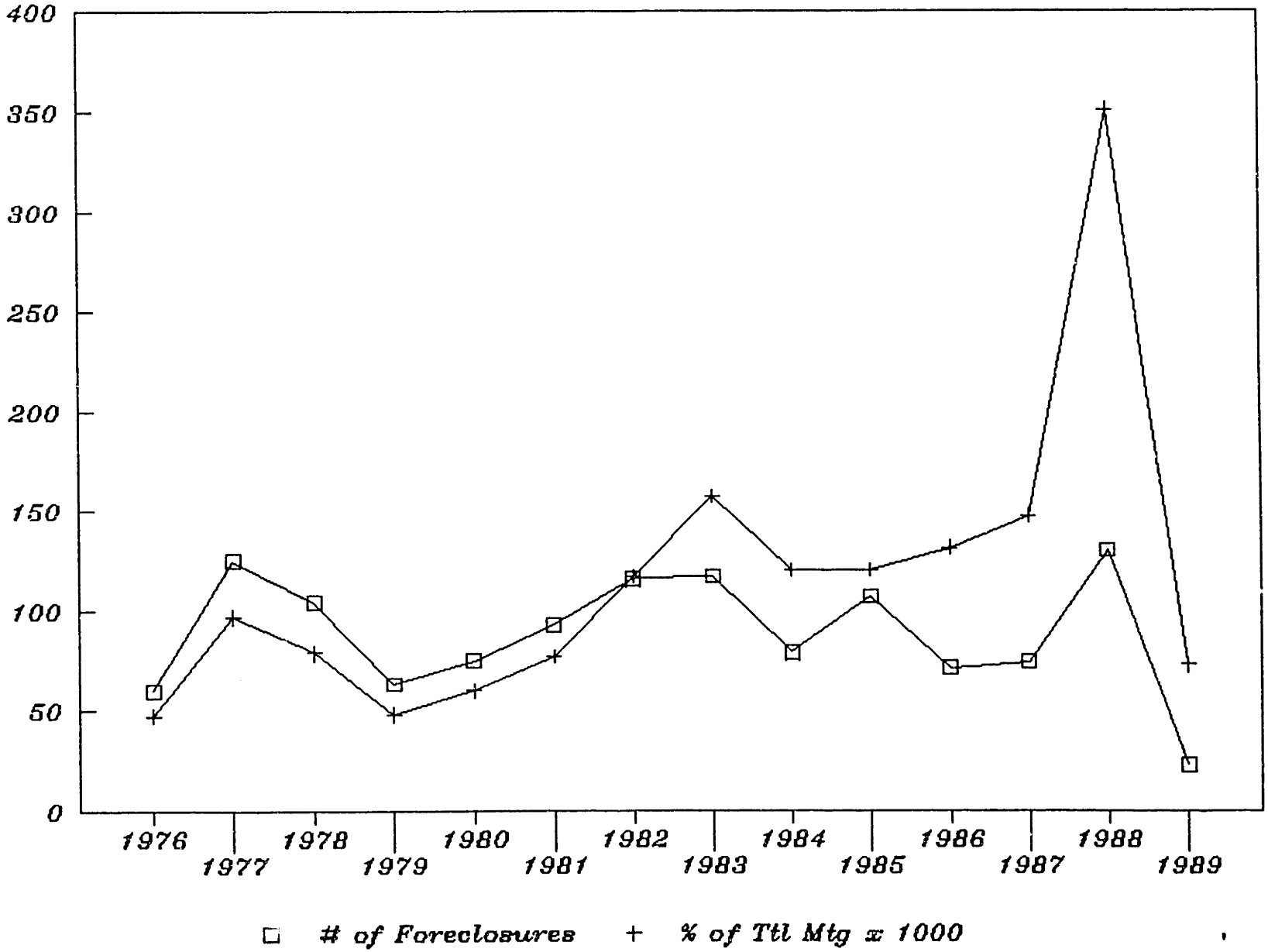
DELAWARE

FORECLOSURES



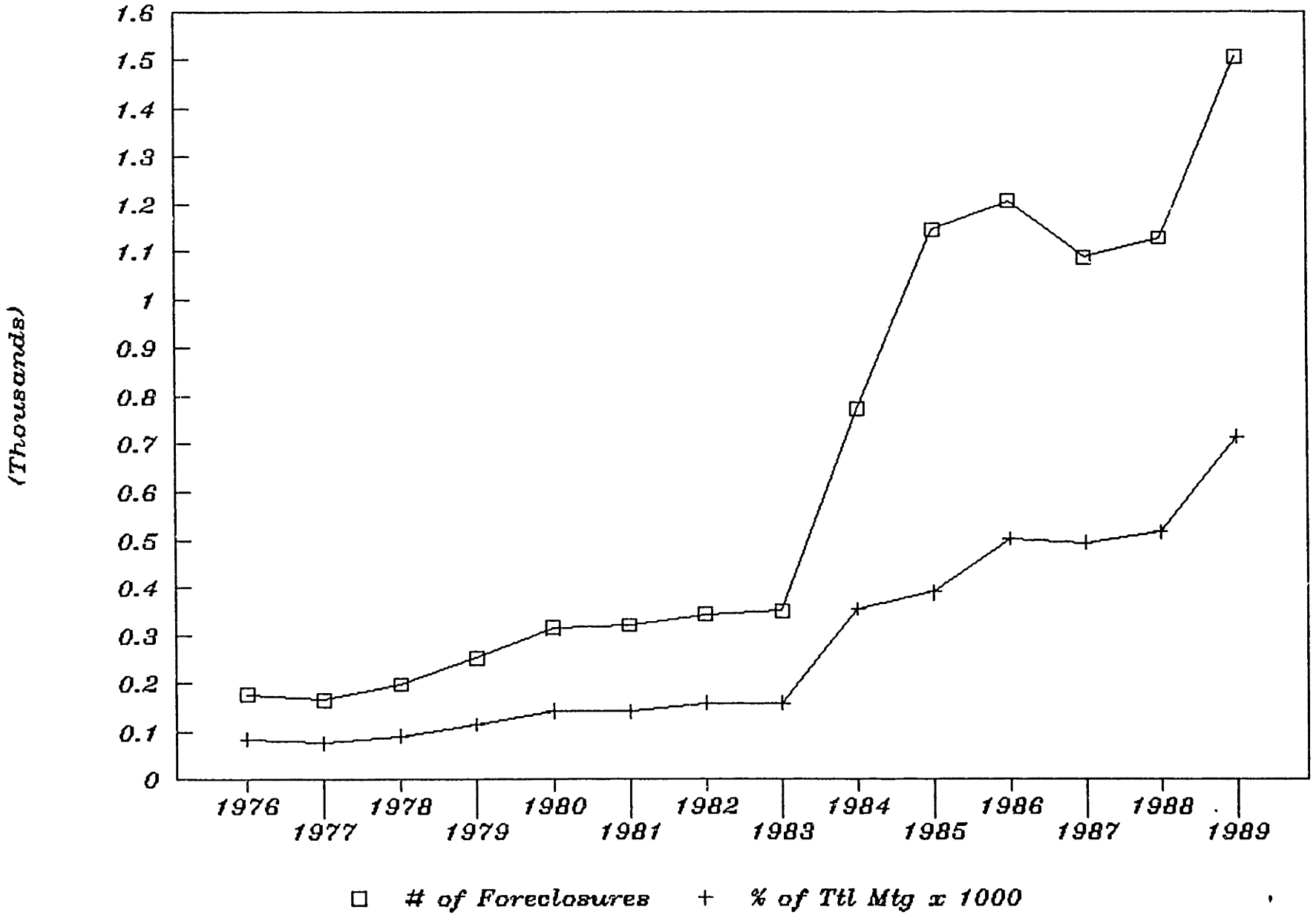
DISTRICT OF COLUMBIA

FORECLOSURES

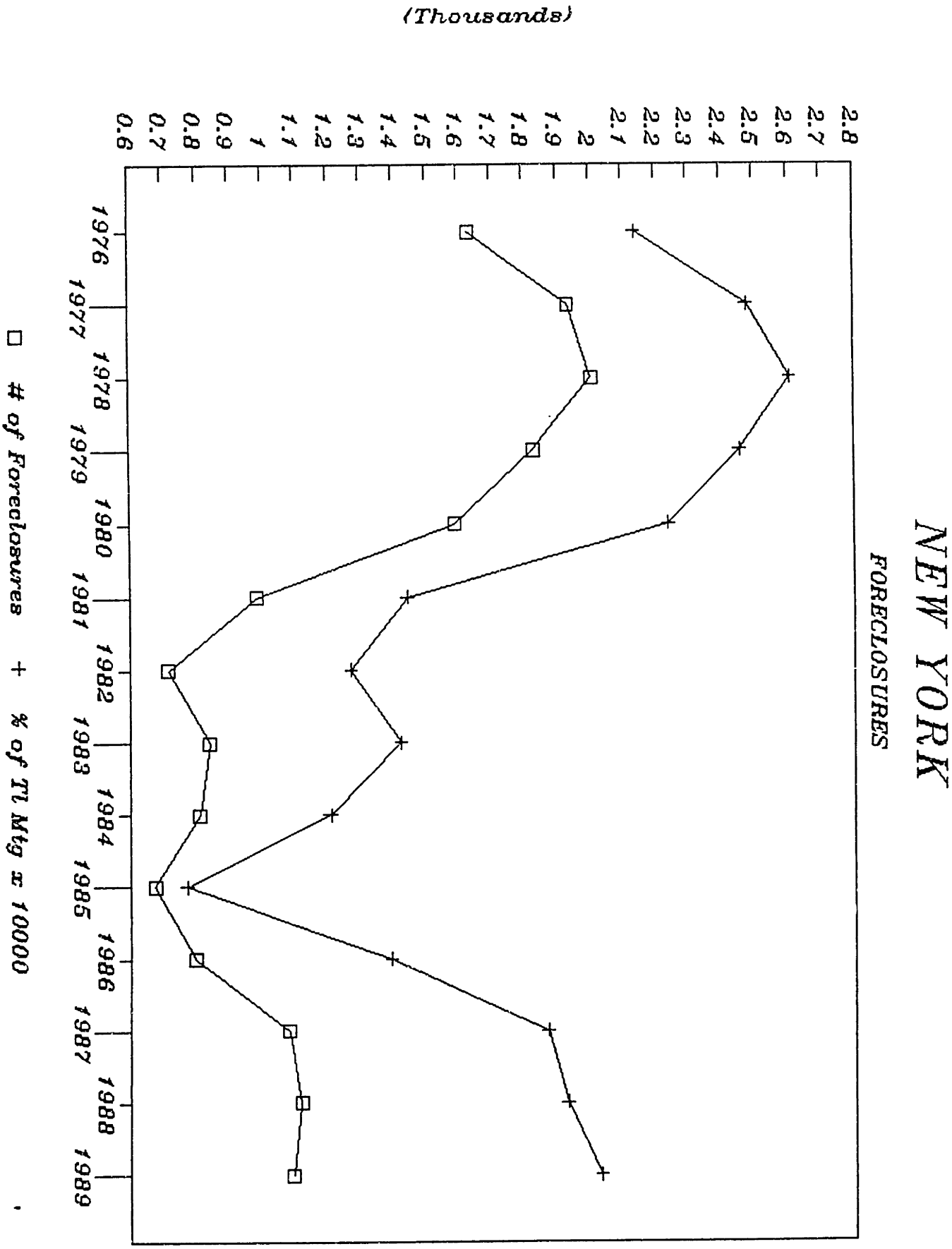


MARYLAND

FORECLOSURES



NEW JERSEY
FORECLOSURES
(Thousands)
0
1
2
3
4
5
6
7
8
9
10
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tr Mtg x 10000

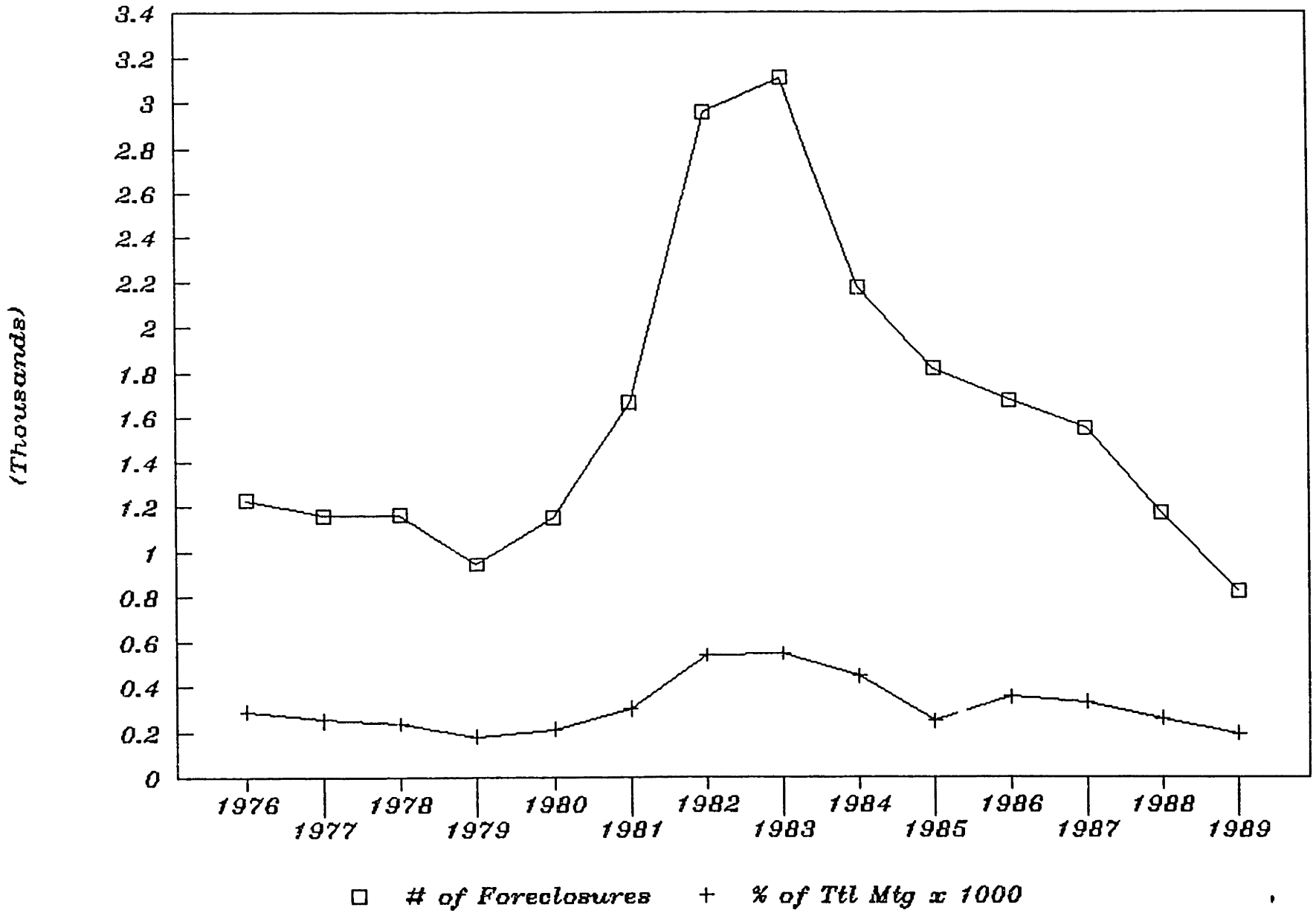

NEW YORK
FORECLOSURES
(Thousands)
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tl Mtg x 10000

Industrial Midwest
FORECLOSURES
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
% Total Mortgages

ILLINOIS
FORECLOSURES
(Thousands)
1
2
3
4
5
6
7
8
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tr Mtg x 10000

MICHIGAN

FORECLOSURES

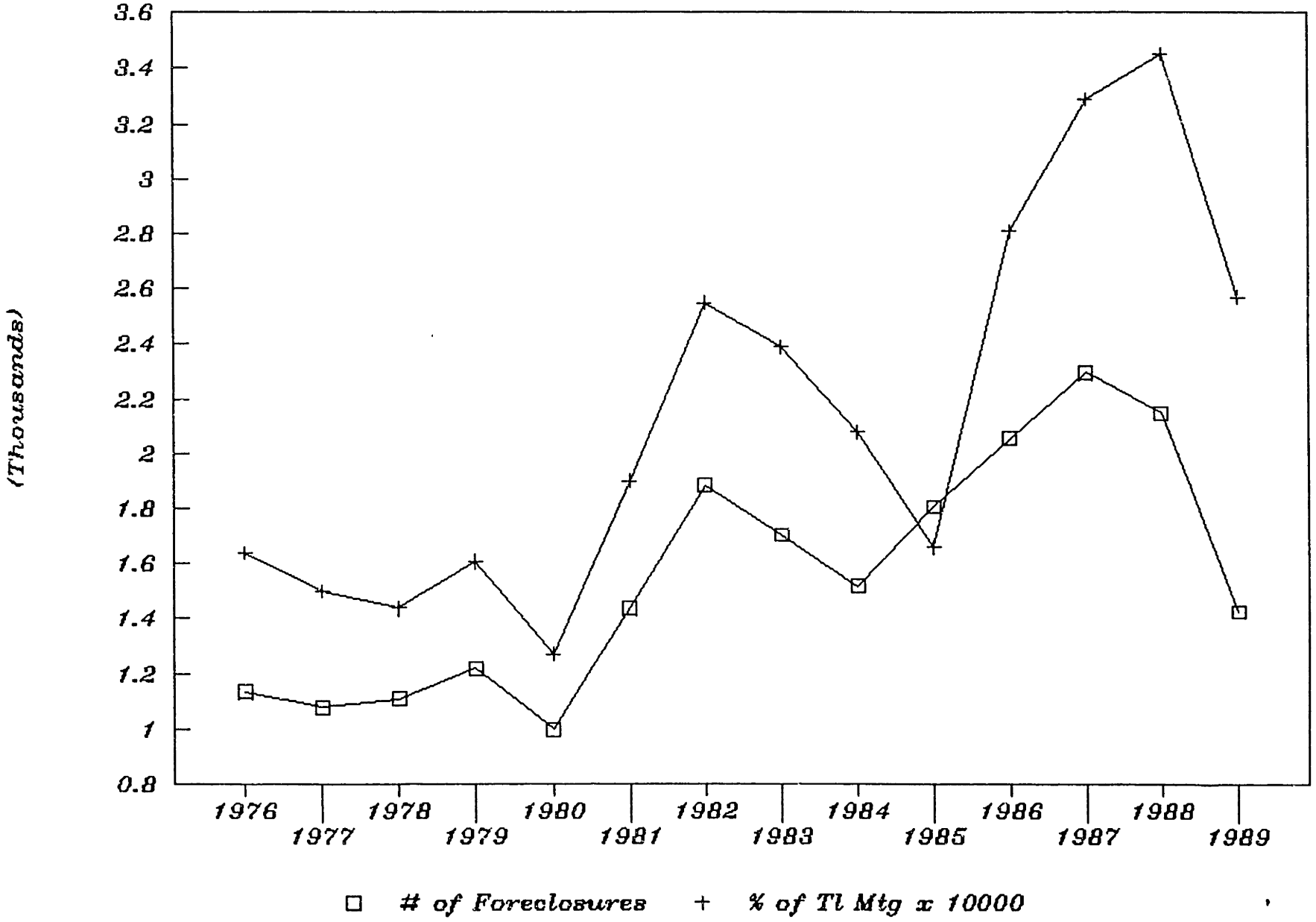


MINNESOTA
FORECLOSURES
(Thousands)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
# of Foreclosures
% of Ttl Mtg x 1000

(Thousands)
1
2
3
4
5
6
7
8
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tl Mtg x 10000
OHIO
FORECLOSURES

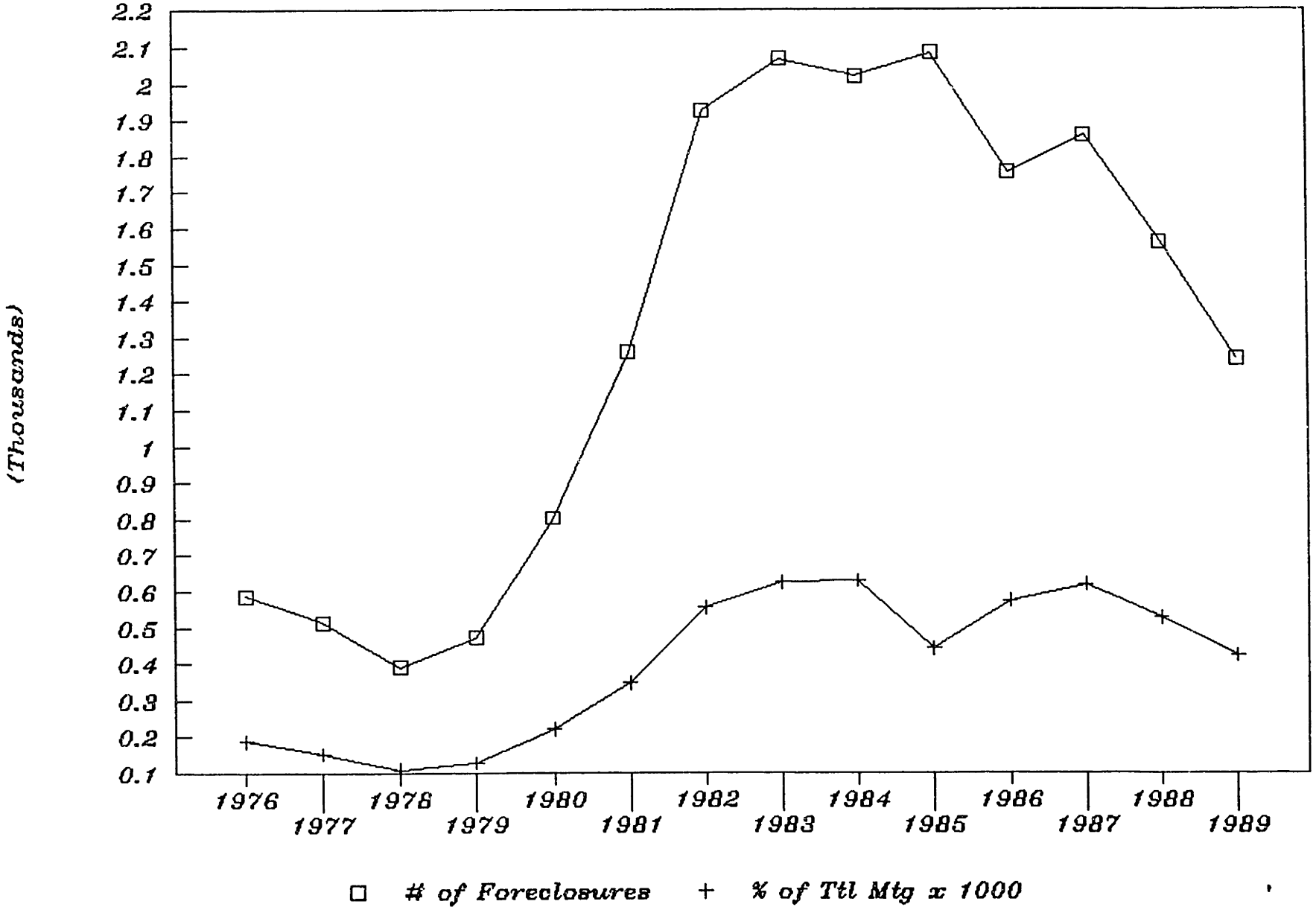
PENNSYLVANIA

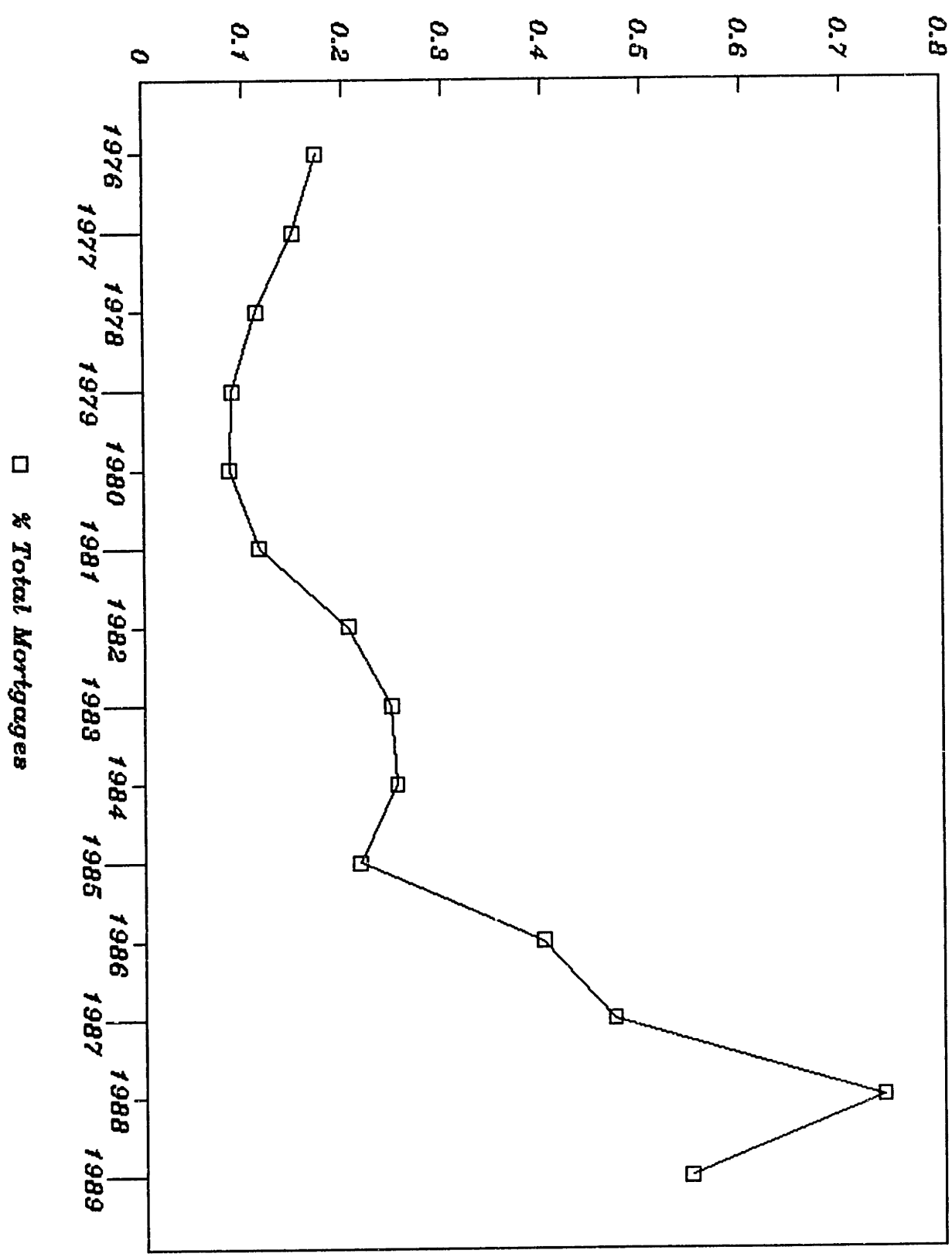
FORECLOSURES



WISCONSIN

FORECLOSURES




Old South
FORECLOSURES
% Total Mortgages
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

ALABAMA

FORECLOSURES

(Thousands)

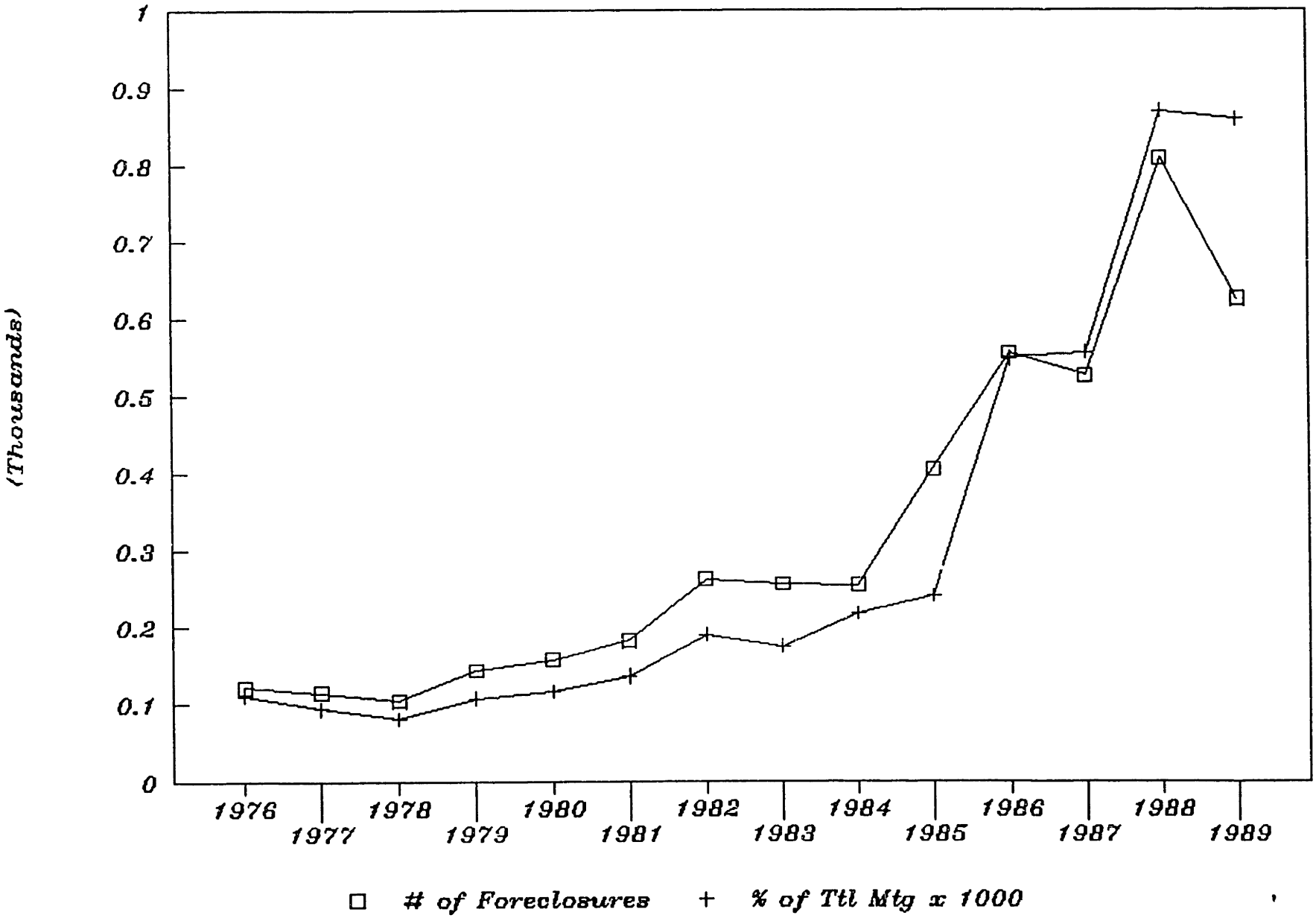
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989

□ # of Foreclosures + % of Tri Mtg x 1000

ARKANSAS

FORECLOSURES

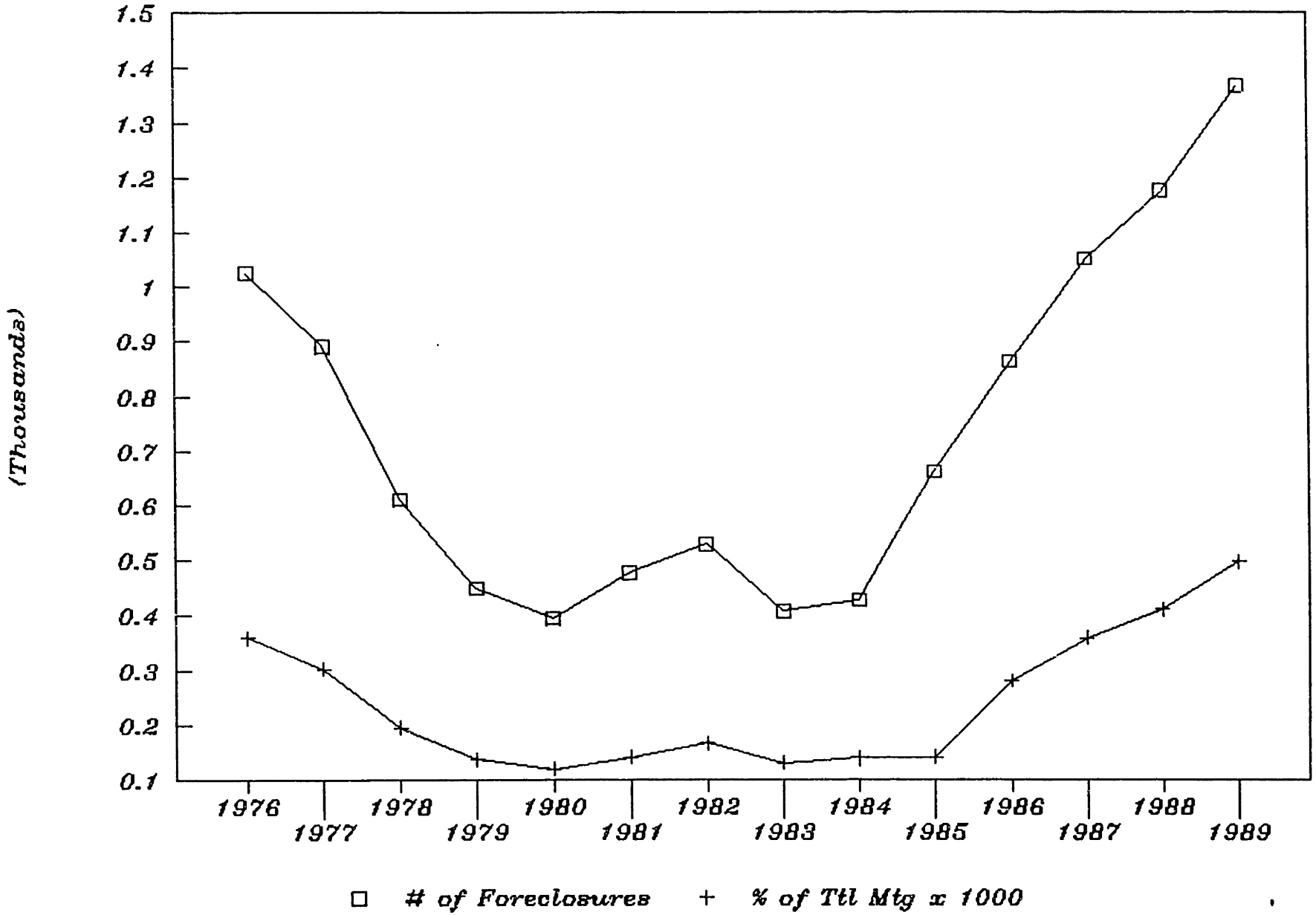


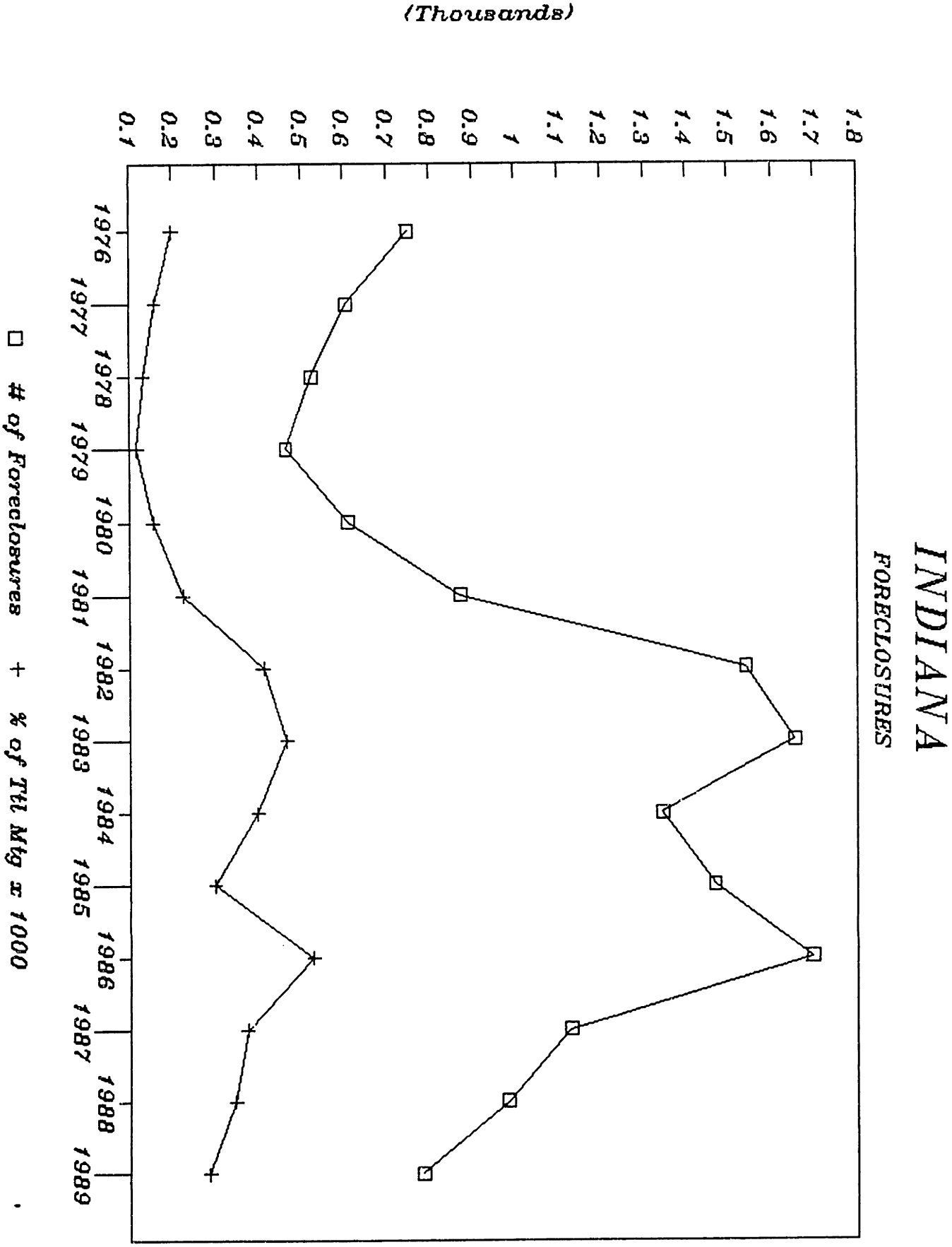
FLORIDA

FORECLOSURES

GEORGIA

FORECLOSURES



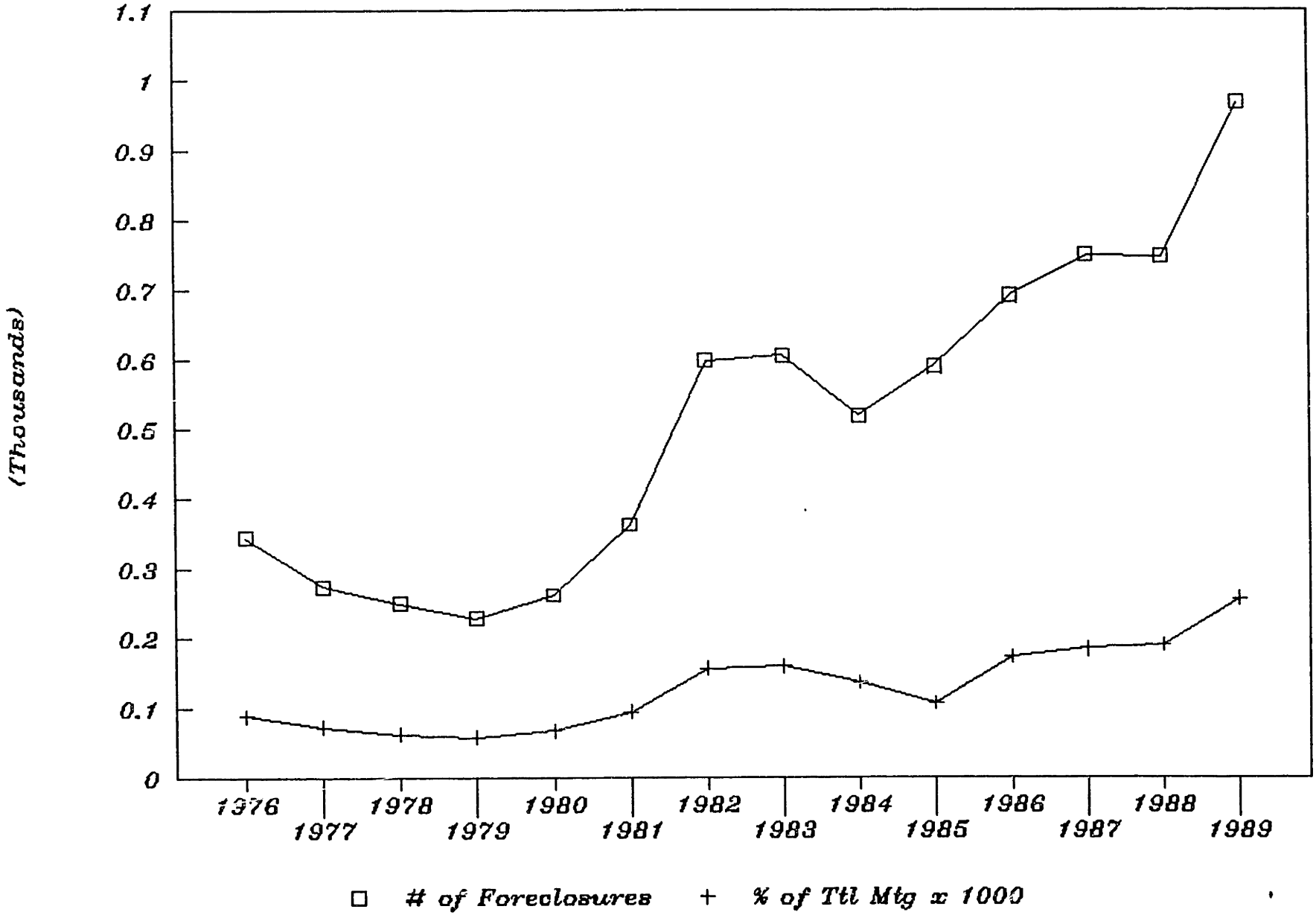

INDIANA
FORECLOSURES
(Thousands)
# of Foreclosures
% of Tri Mtg x 1000
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8

KENTUCKY
FORECLOSURES
# of Foreclosures
% of Tri Mtg x 1000
0
100
200
300
400
500
600
700
800
900
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

MISSISSIPPI
FORECLOSURES
(Thousands)
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
# of Foreclosures
+ % of Ttl Mtg x 1000

NORTH CAROLINA

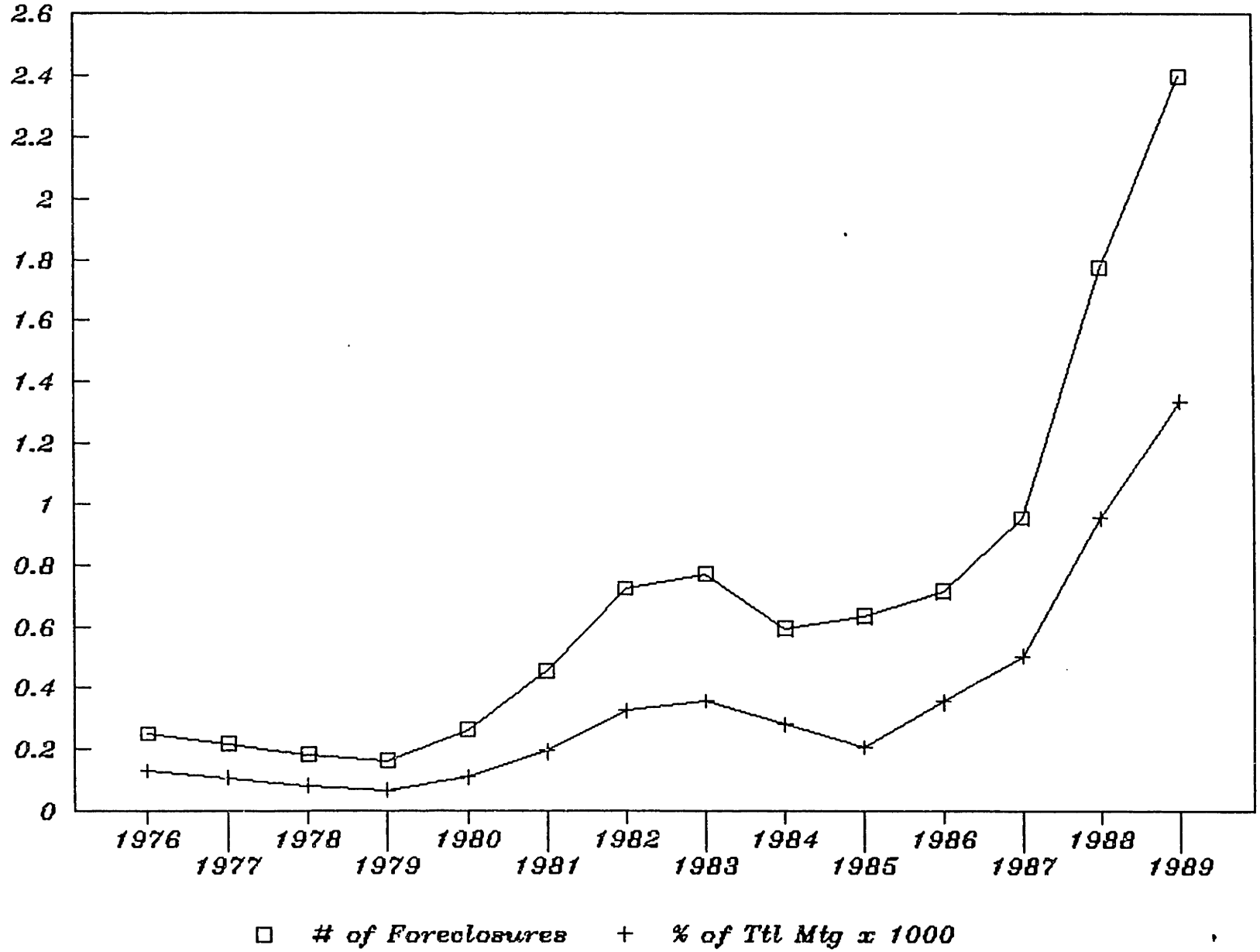
FORECLOSURES

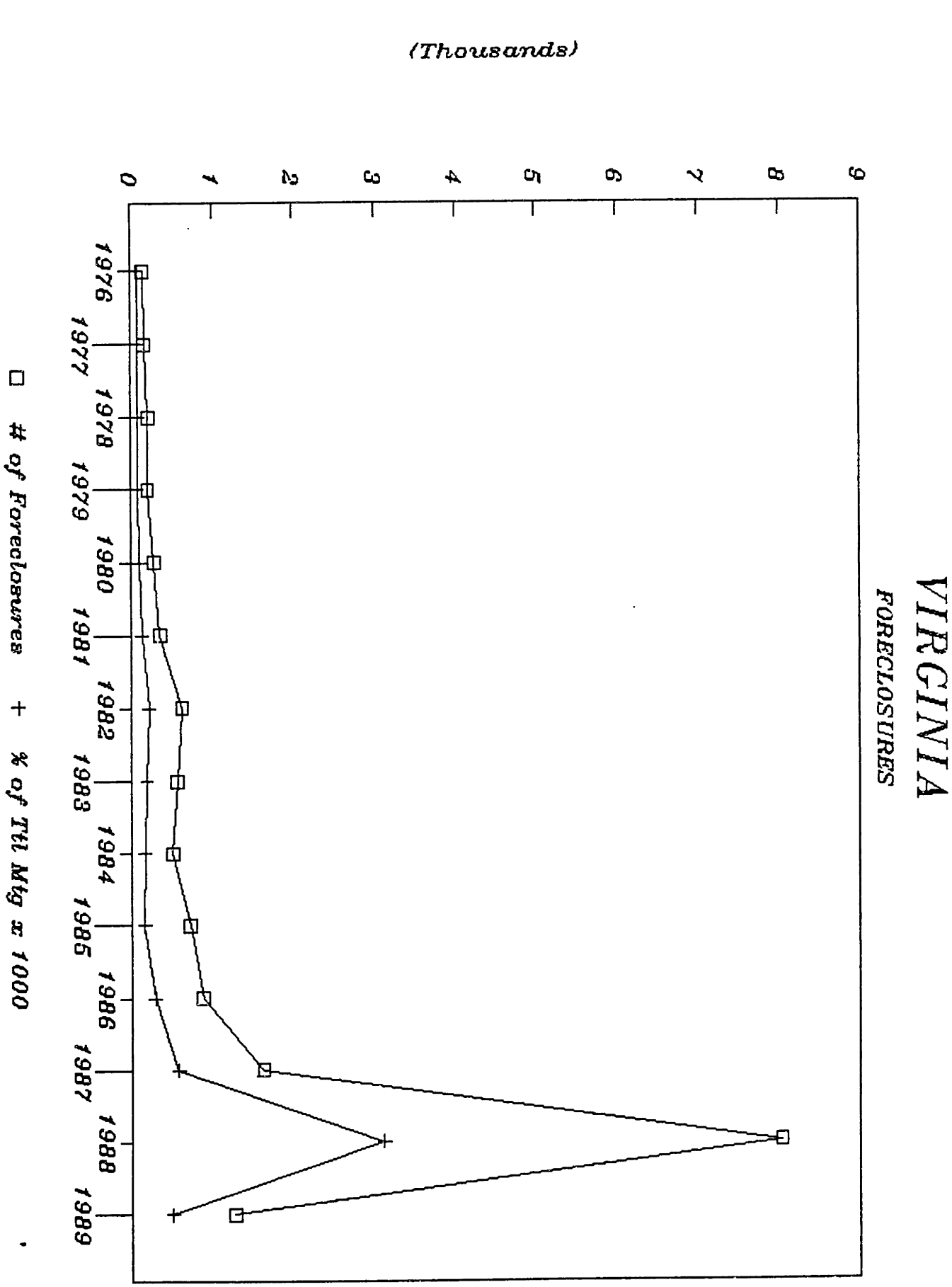


SOUTH CAROLINA
FORECLOSURES
0
100
200
300
400
500
600
700
800
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
# of Foreclosures
% of Tot Mtg x 1000

TENNESSEE

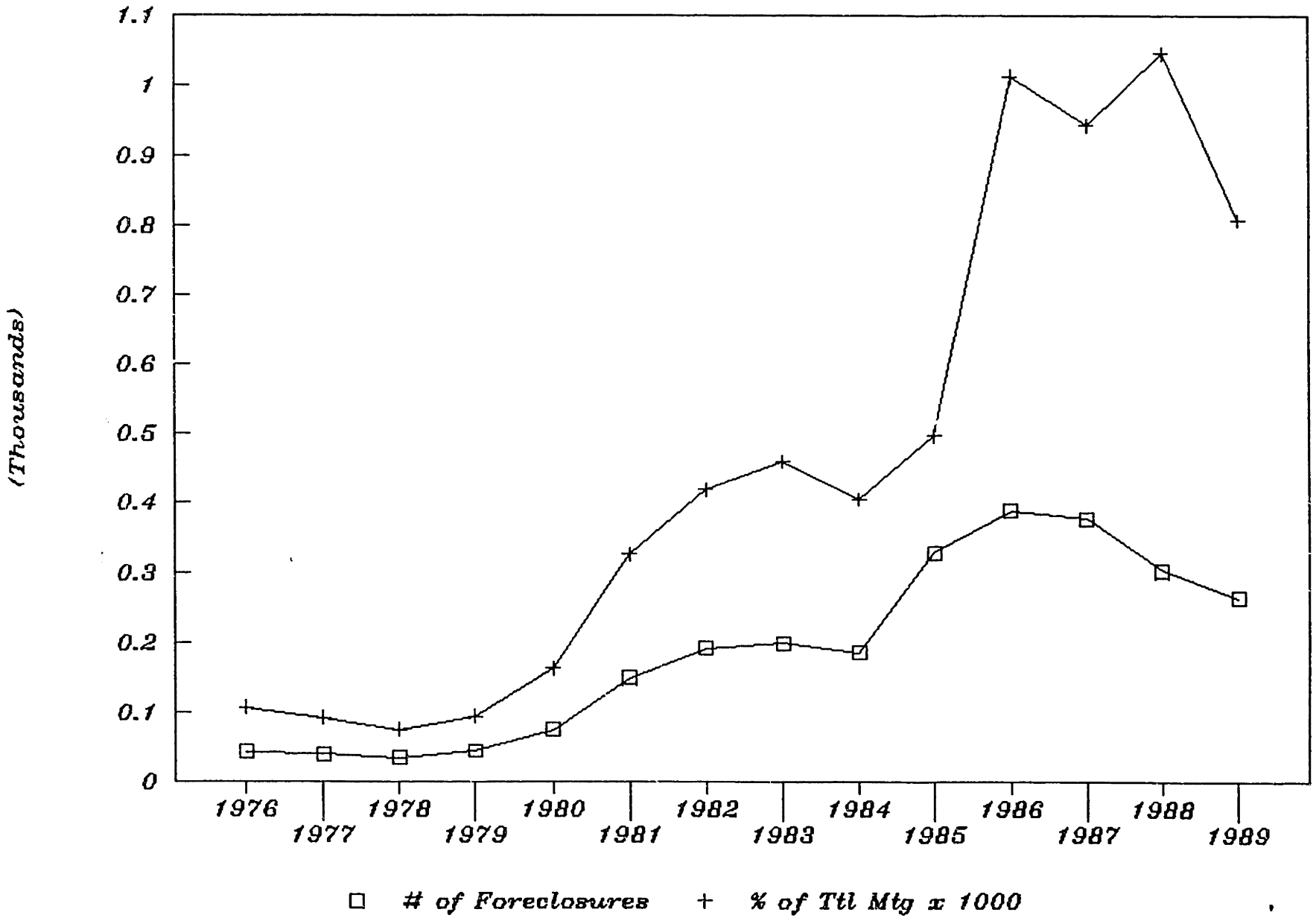
FORECLOSURES




VIRGINIA
FORECLOSURES
(Thousands)
0
1
2
3
4
5
6
7
8
9
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tl Mtg x 1000

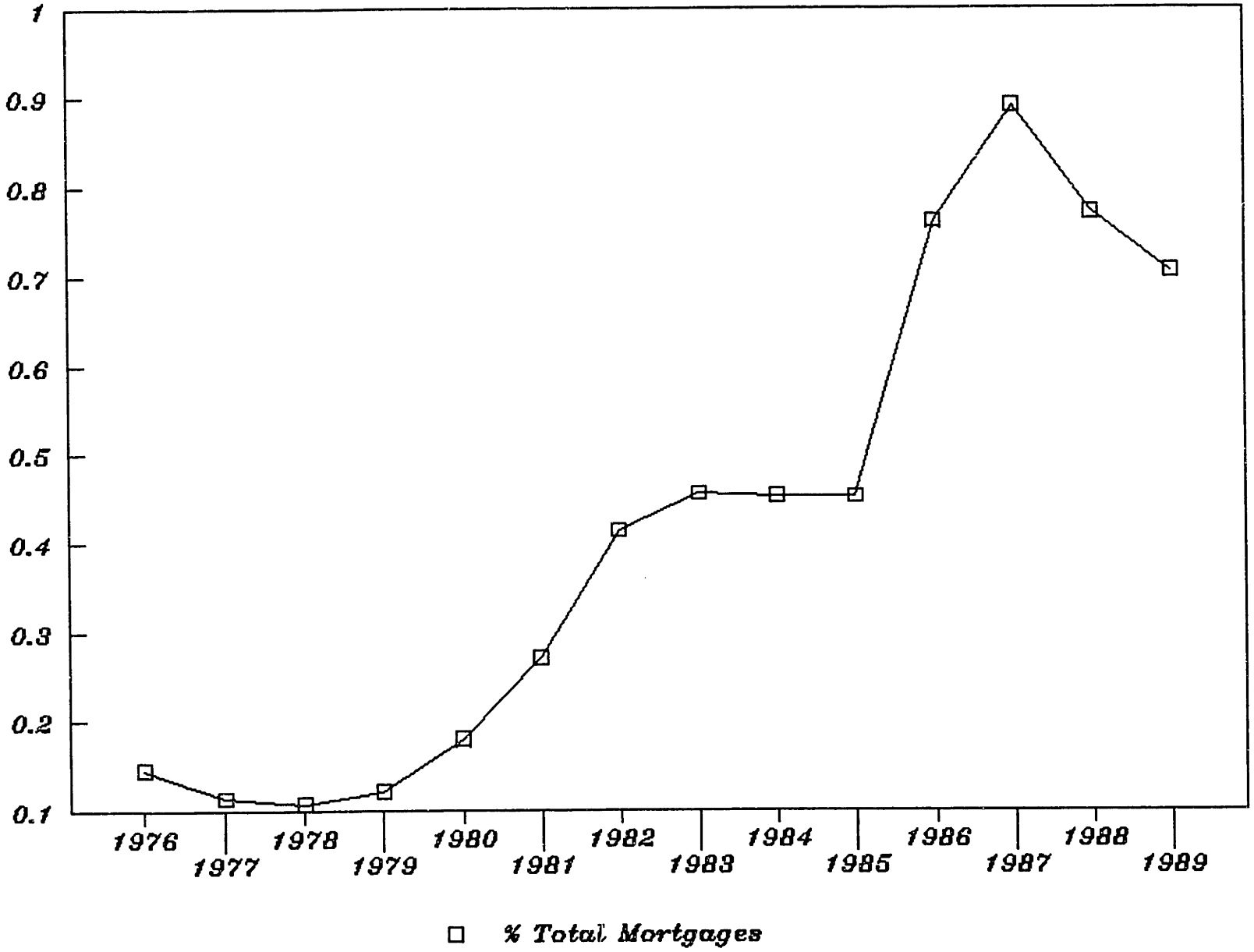
WEST VIRGINIA

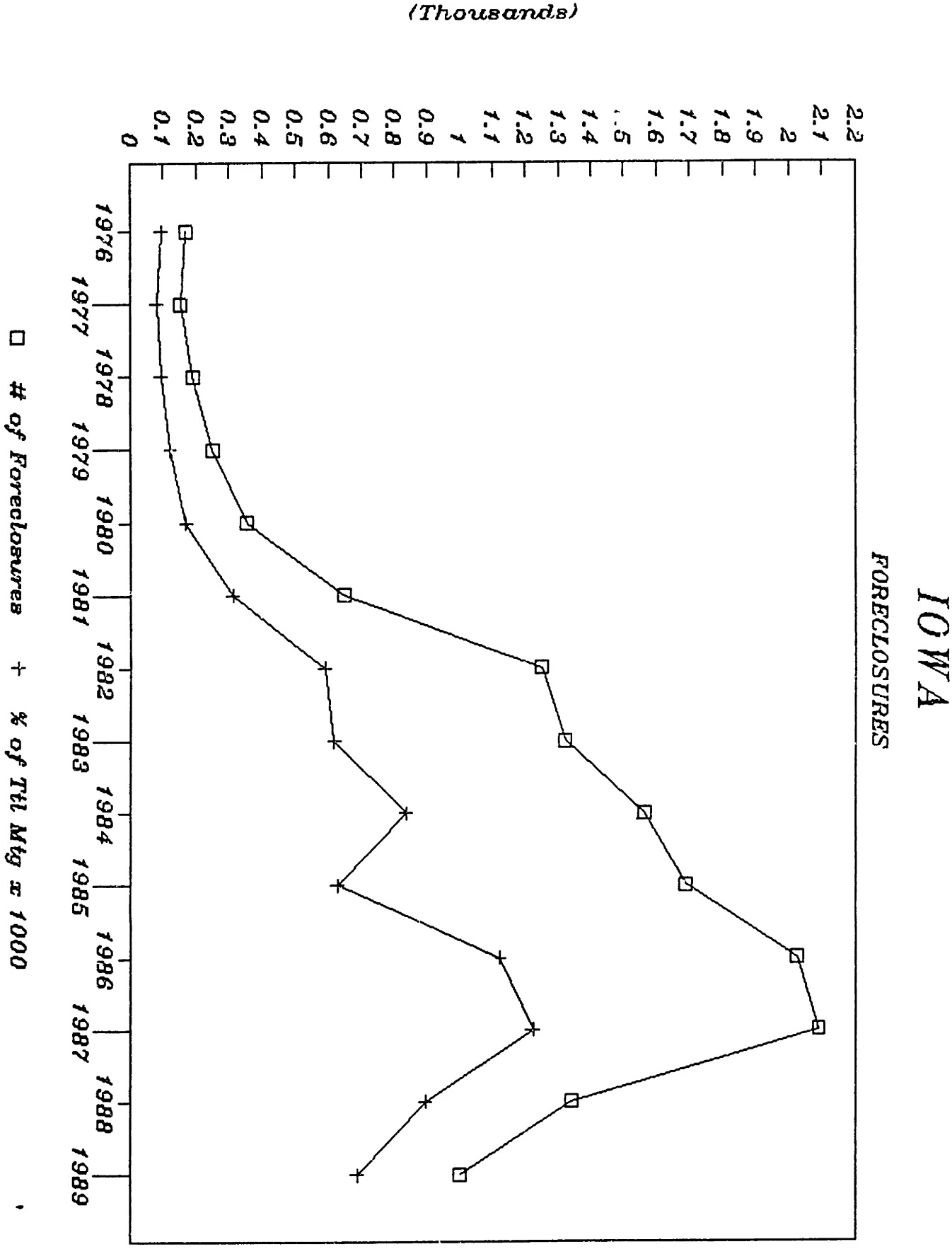
FORECLOSURES

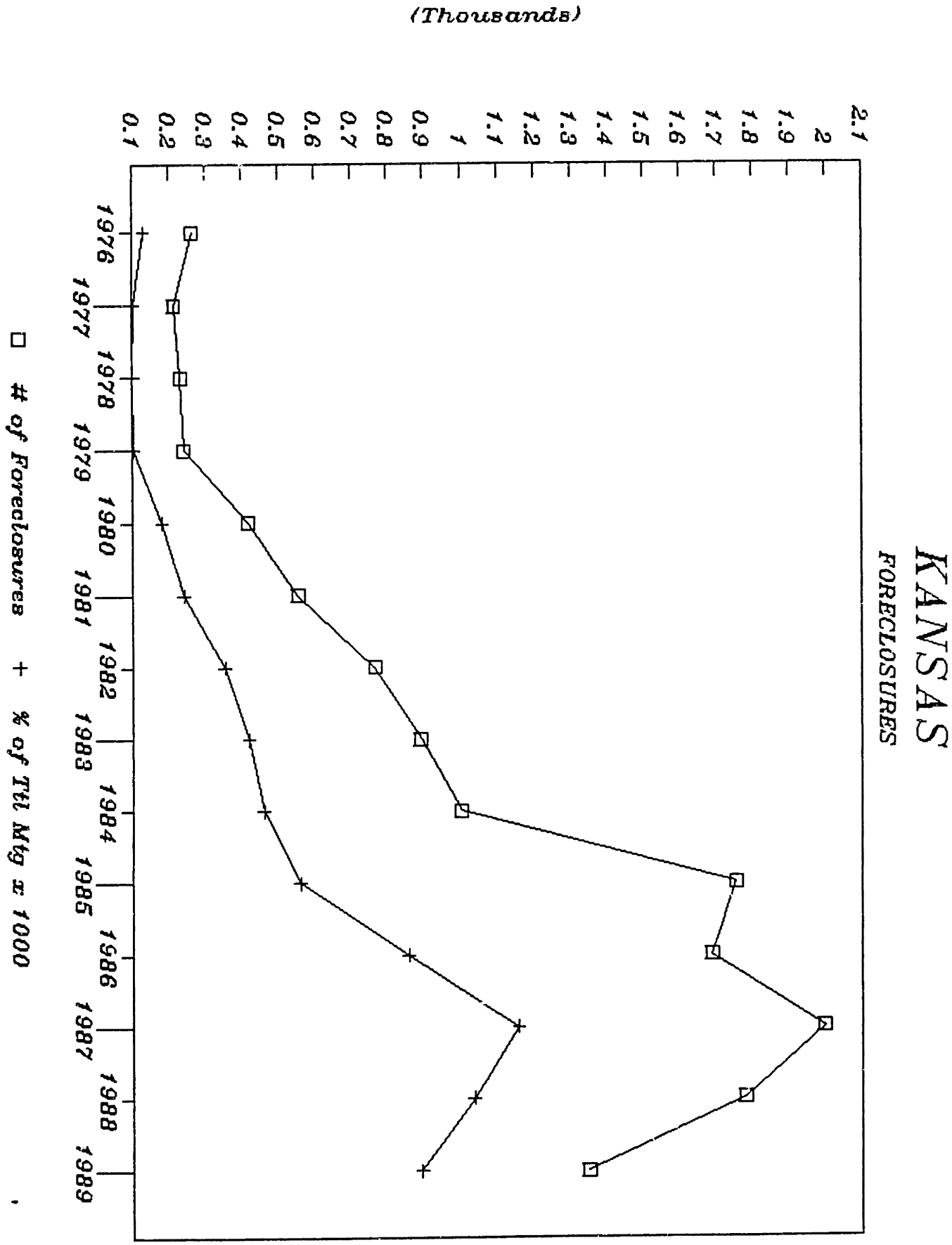


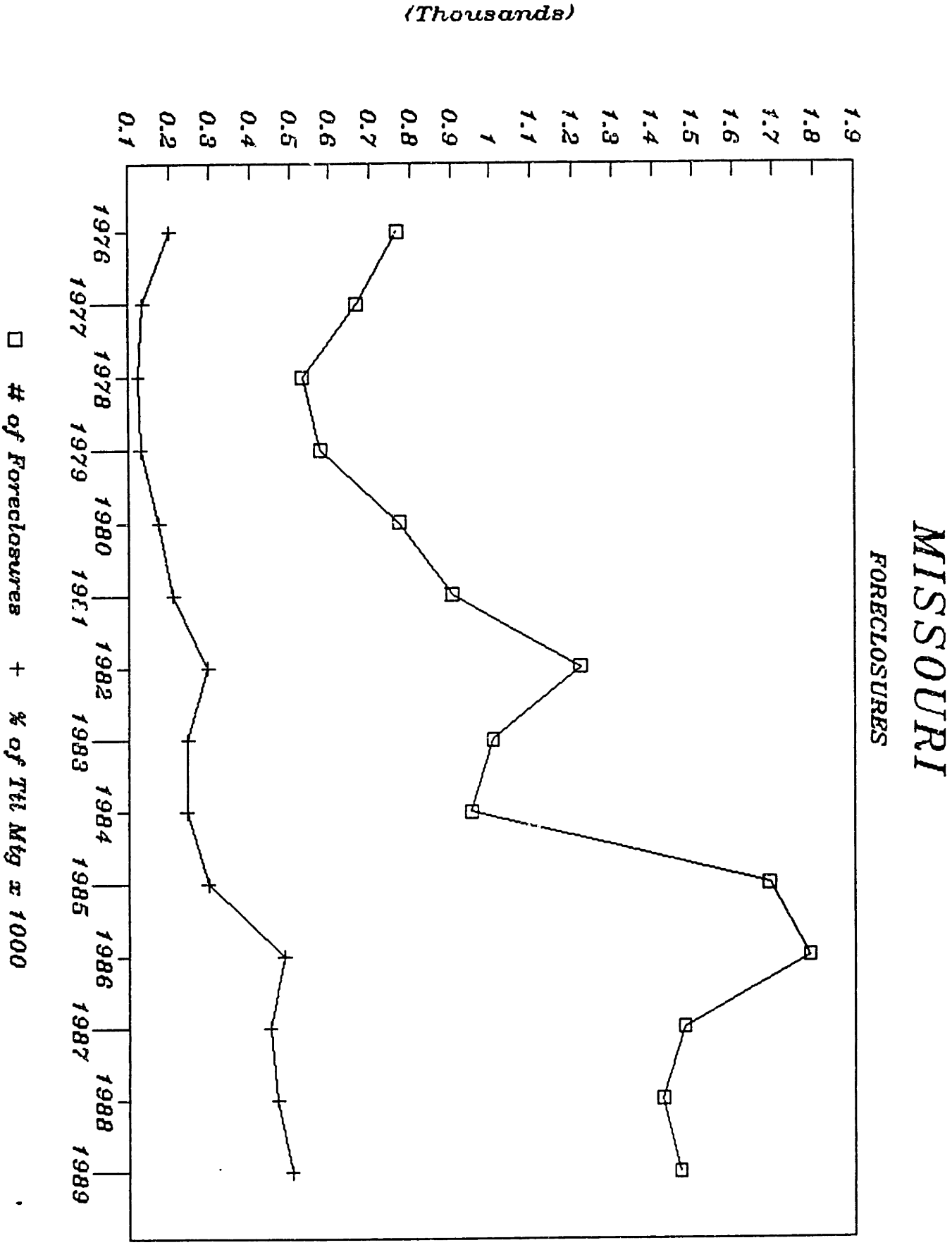
Farm Belt

FORECLOSURES



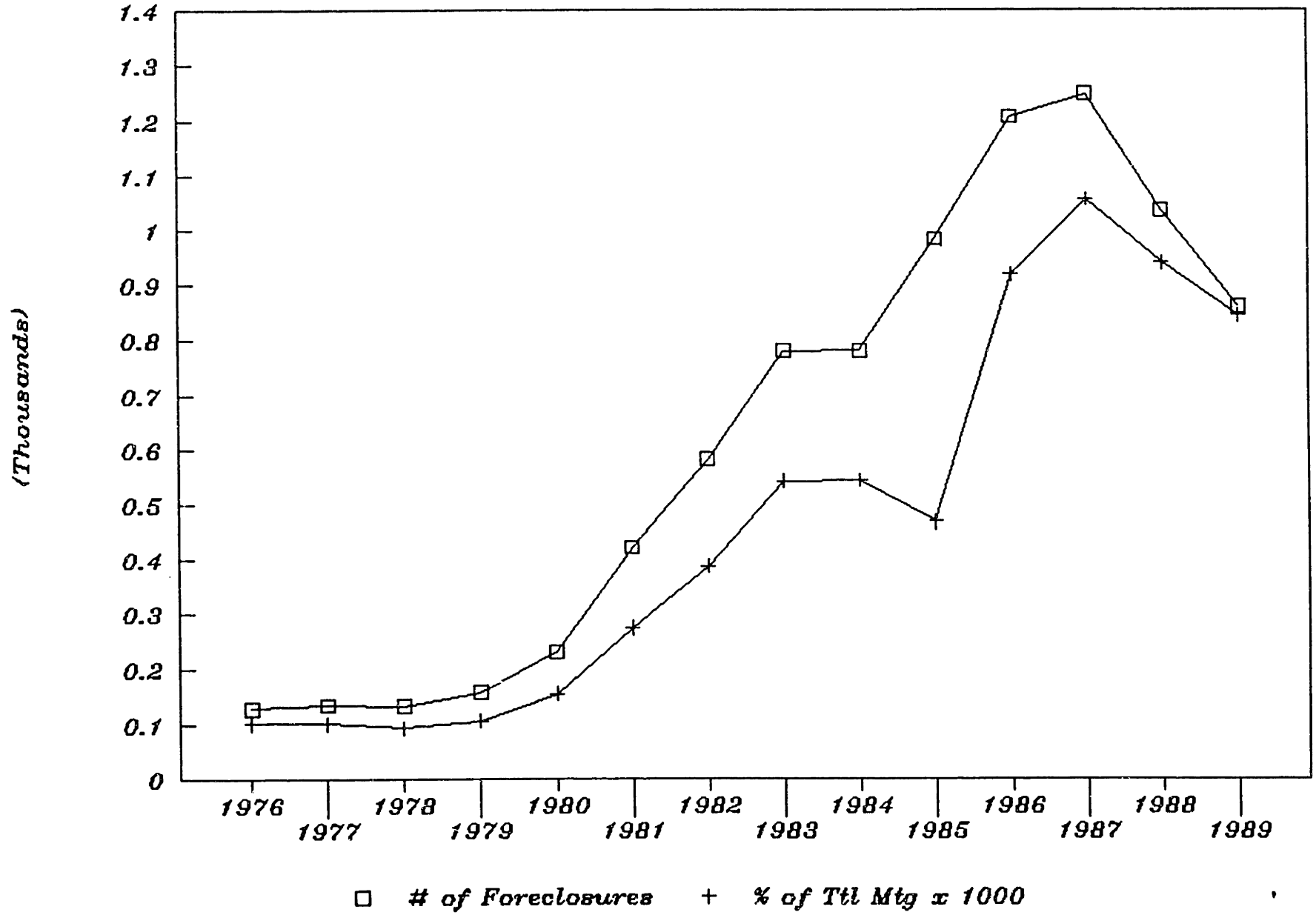

IOWA
FORECLOSURES
(Thousands)
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tl Mg x 1000

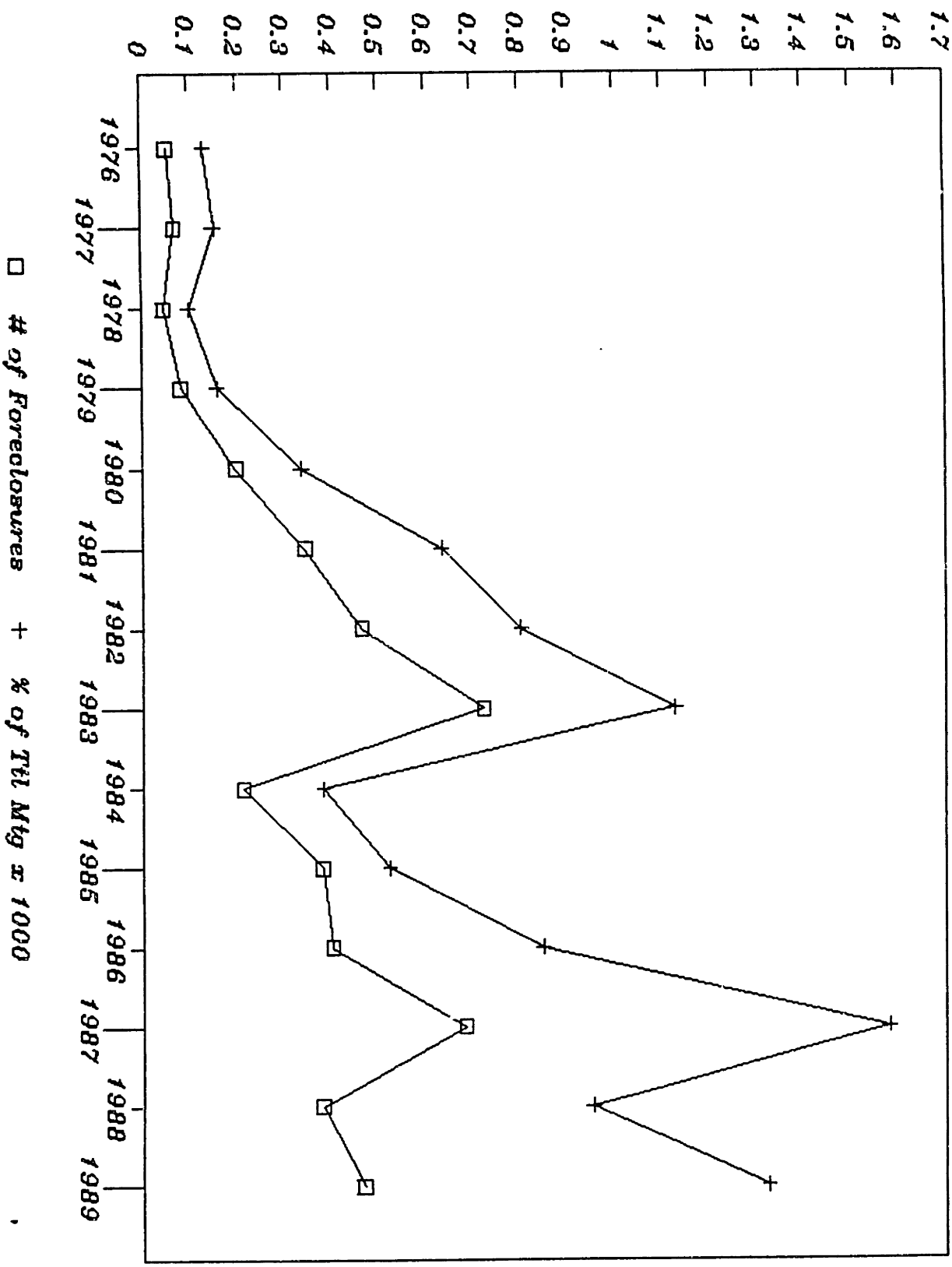

KANSAS
FORECLOSURES
(Thousands)
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tit Mtg x 1000


MISSOURI
FORECLOSURES
(Thousands)
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
# of Foreclosures
% of Tri Mtg x 1000

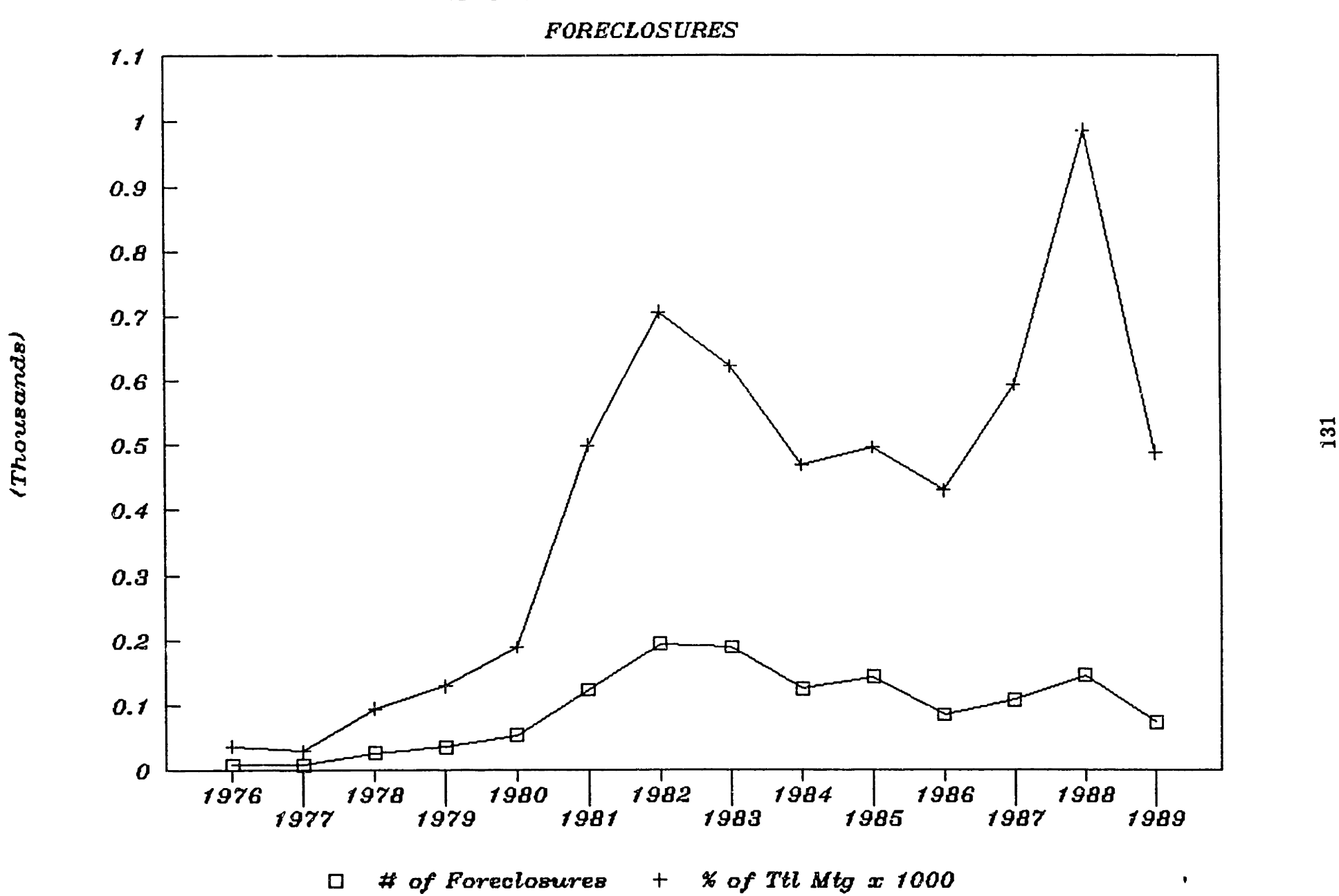
NEBRASKA

FORECLOSURES



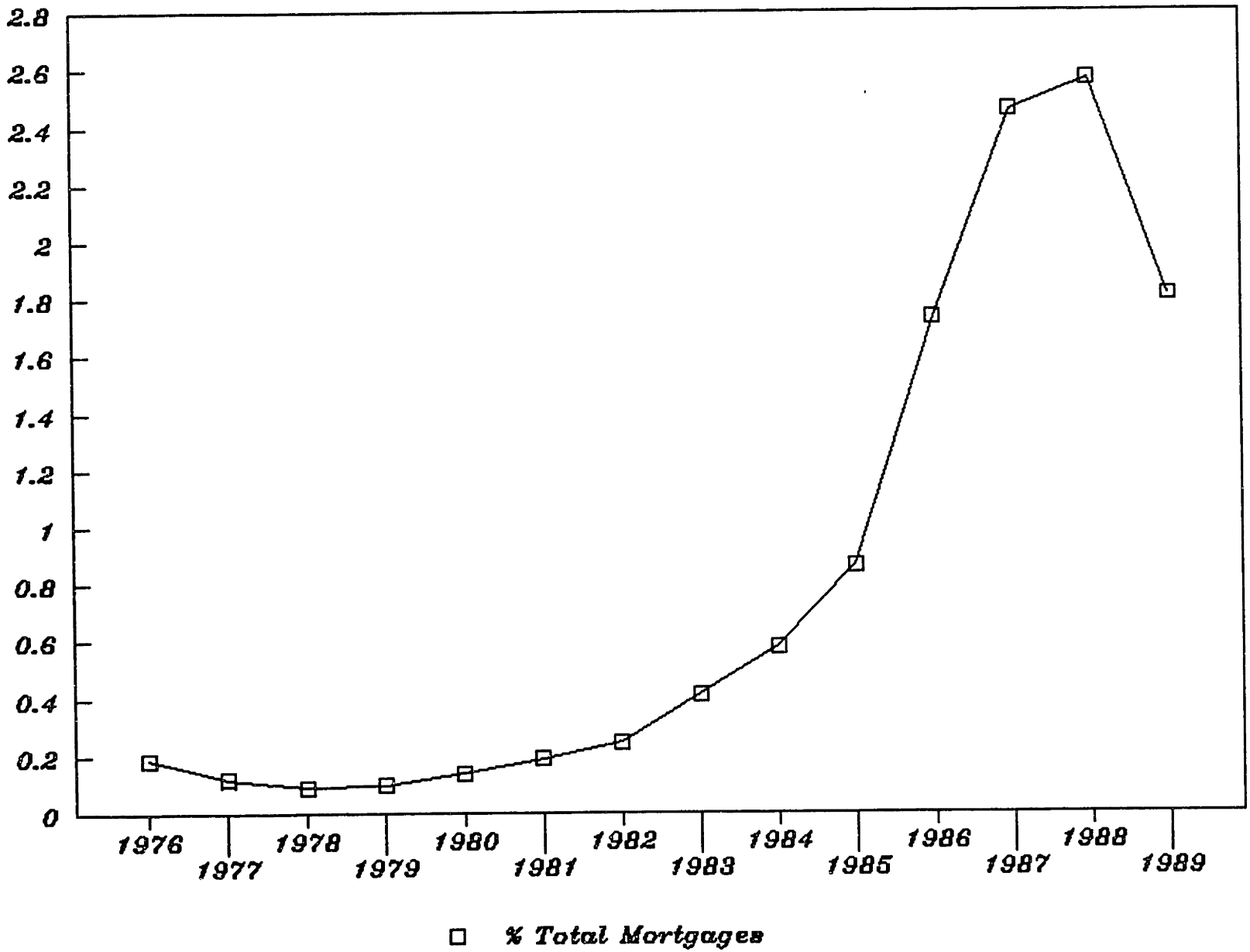

NORTH DAKOTA
FORECLOSURES
(Thousands)
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tit Mtg x 1000

SOUTH DAKOTA



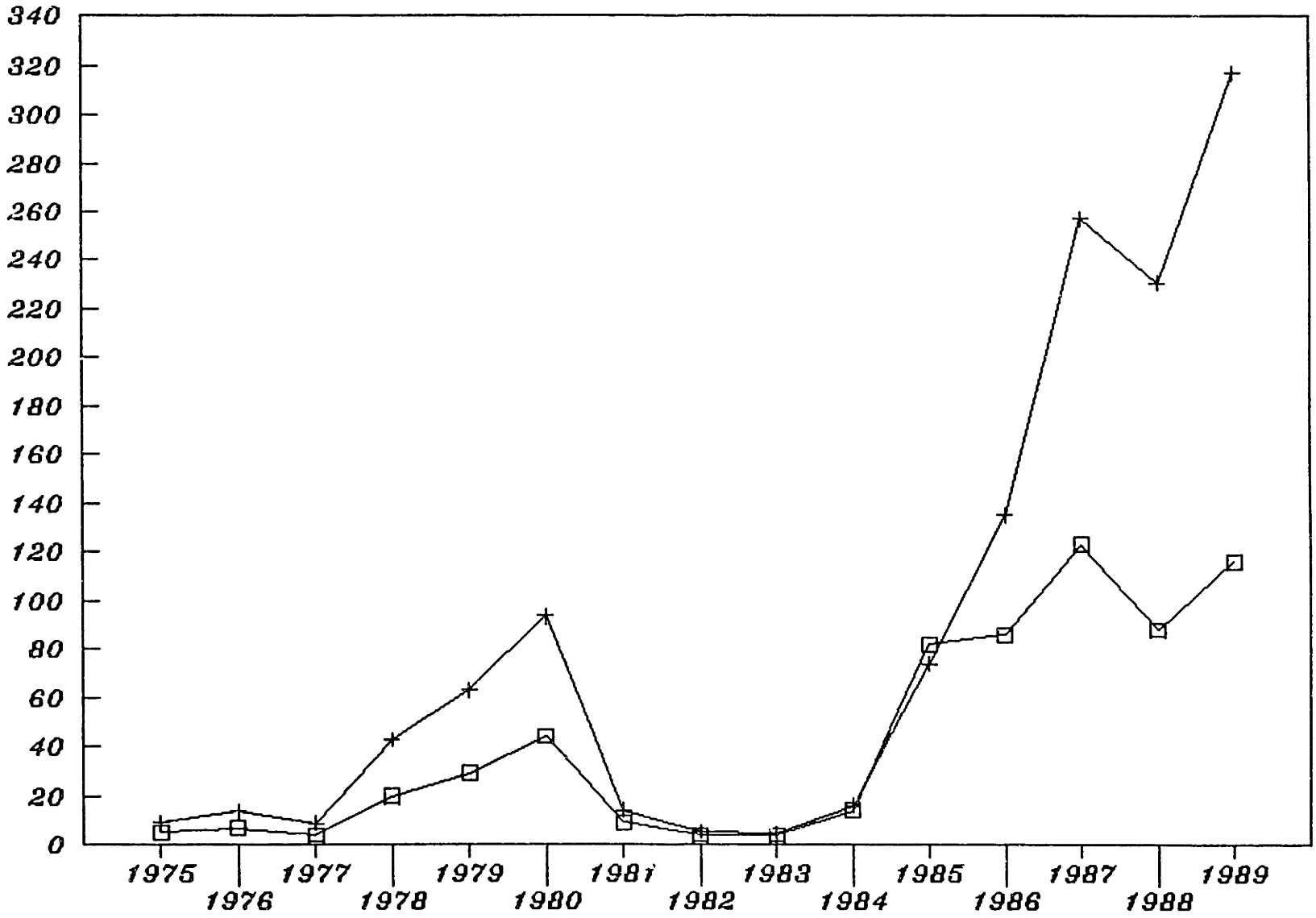
Mineral Extraction

FORECLOSURES



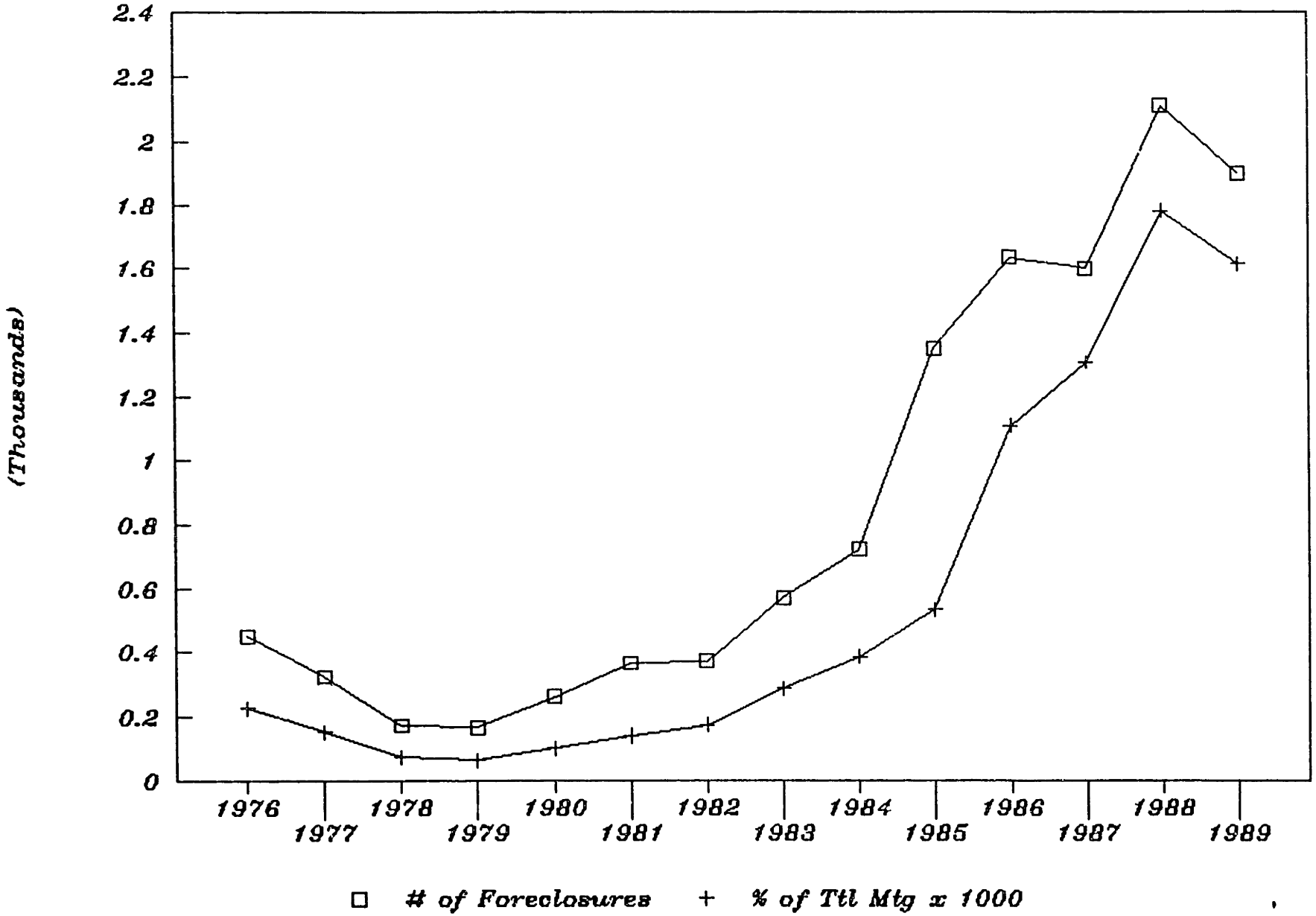
ALASKA

FORECLOSURES



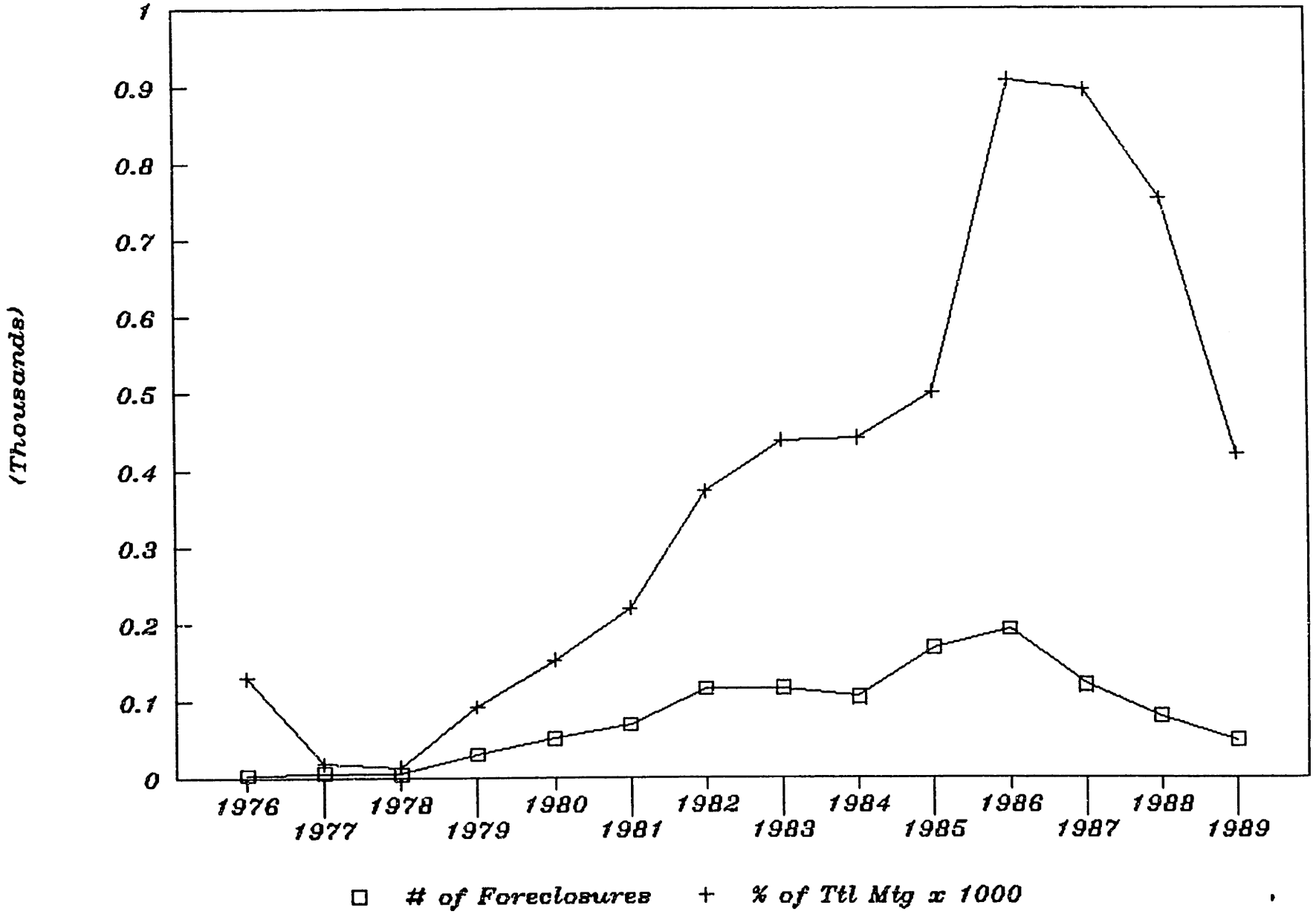
COLORADO

FORECLOSURES



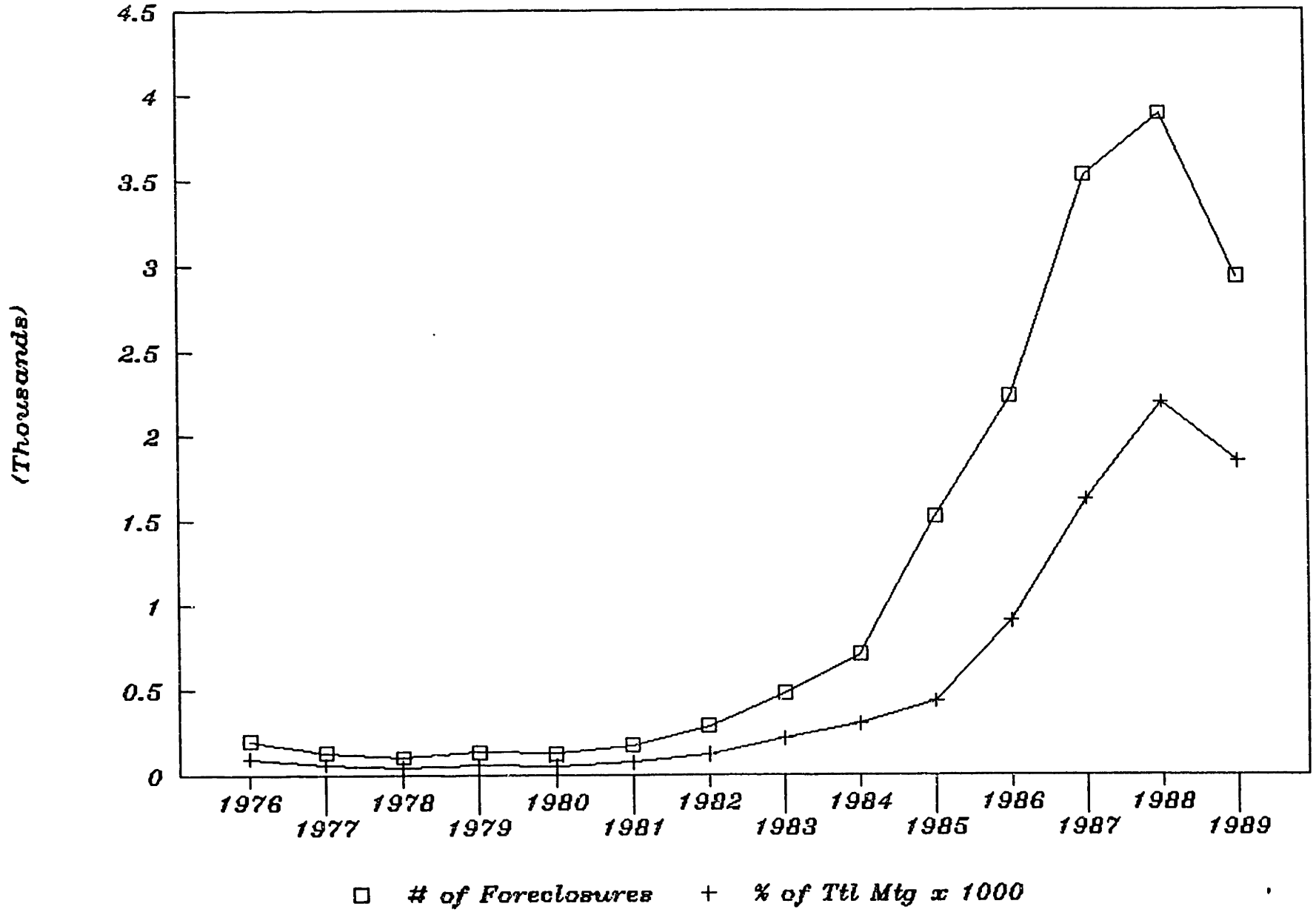
IDAHO

FORECLOSURES



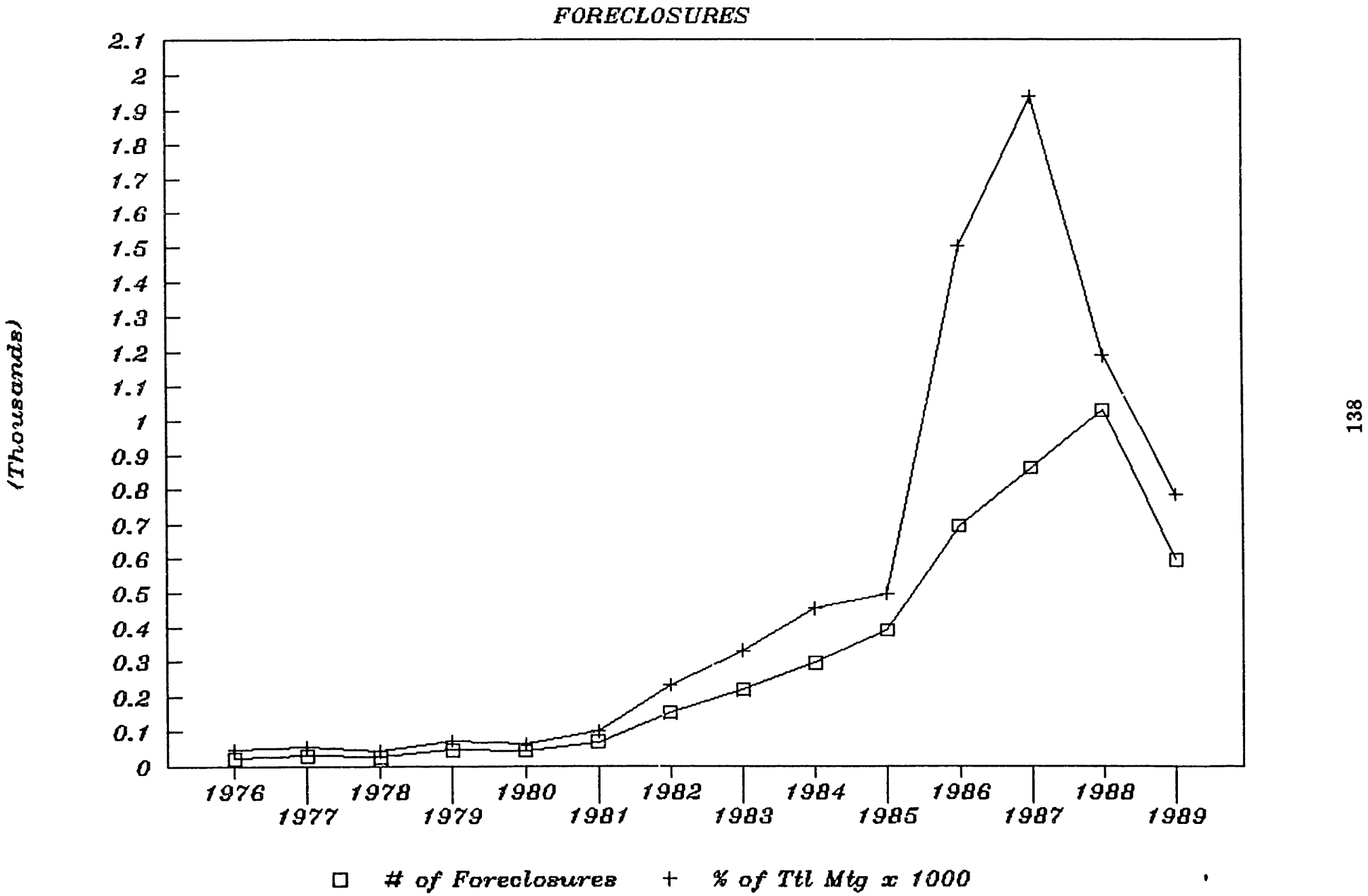
LOUISIANA

FORECLOSURES



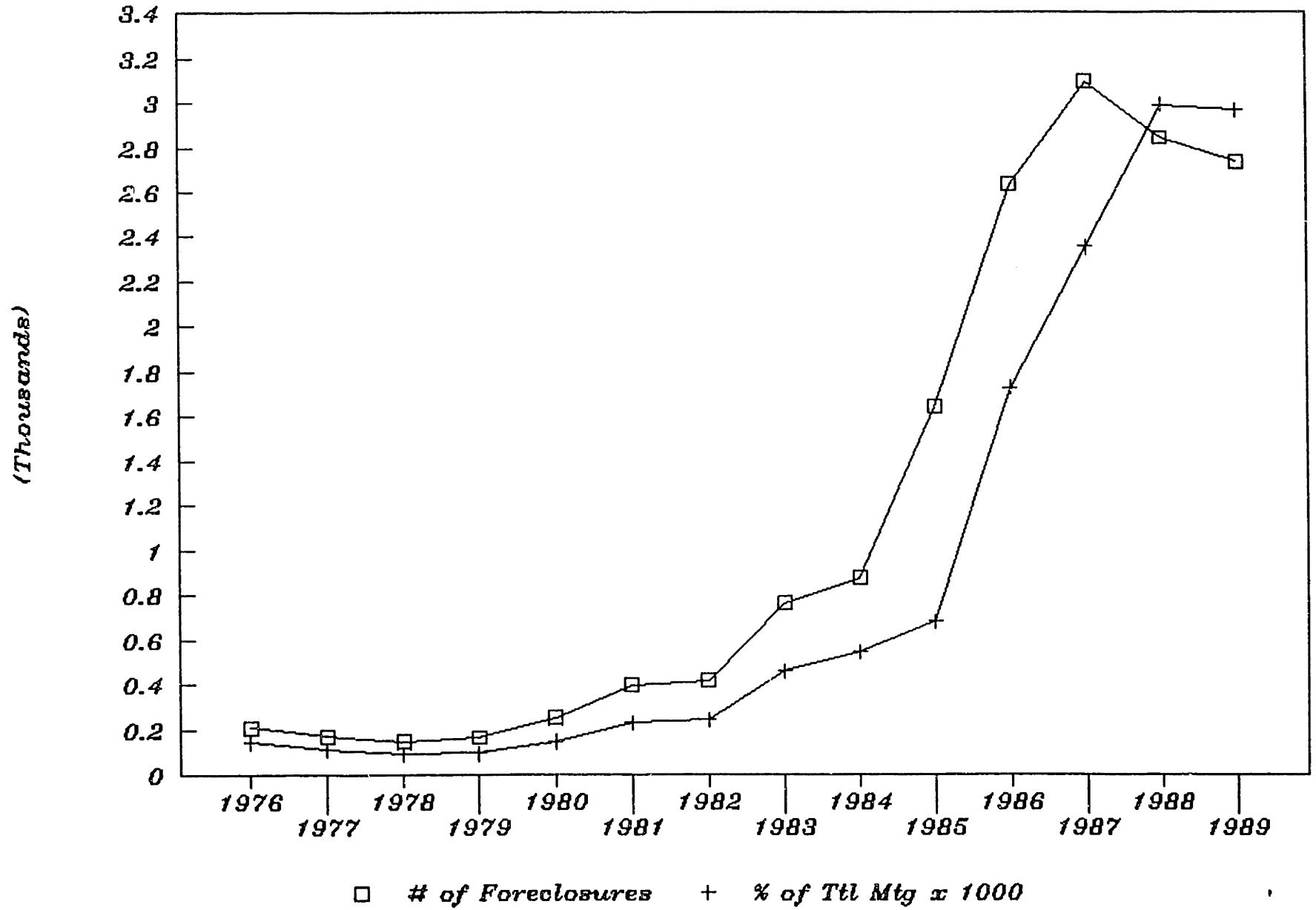
MONTANA
FORECLOSURES
(Thousands)
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Ttl Mtg x 1000

NEW MEXICO


FORECLOSURES
(Thousands)
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
# of Foreclosures
% of Ttl Mtg x 1000

OKLAHOMA

FORECLOSURES



TEXAS

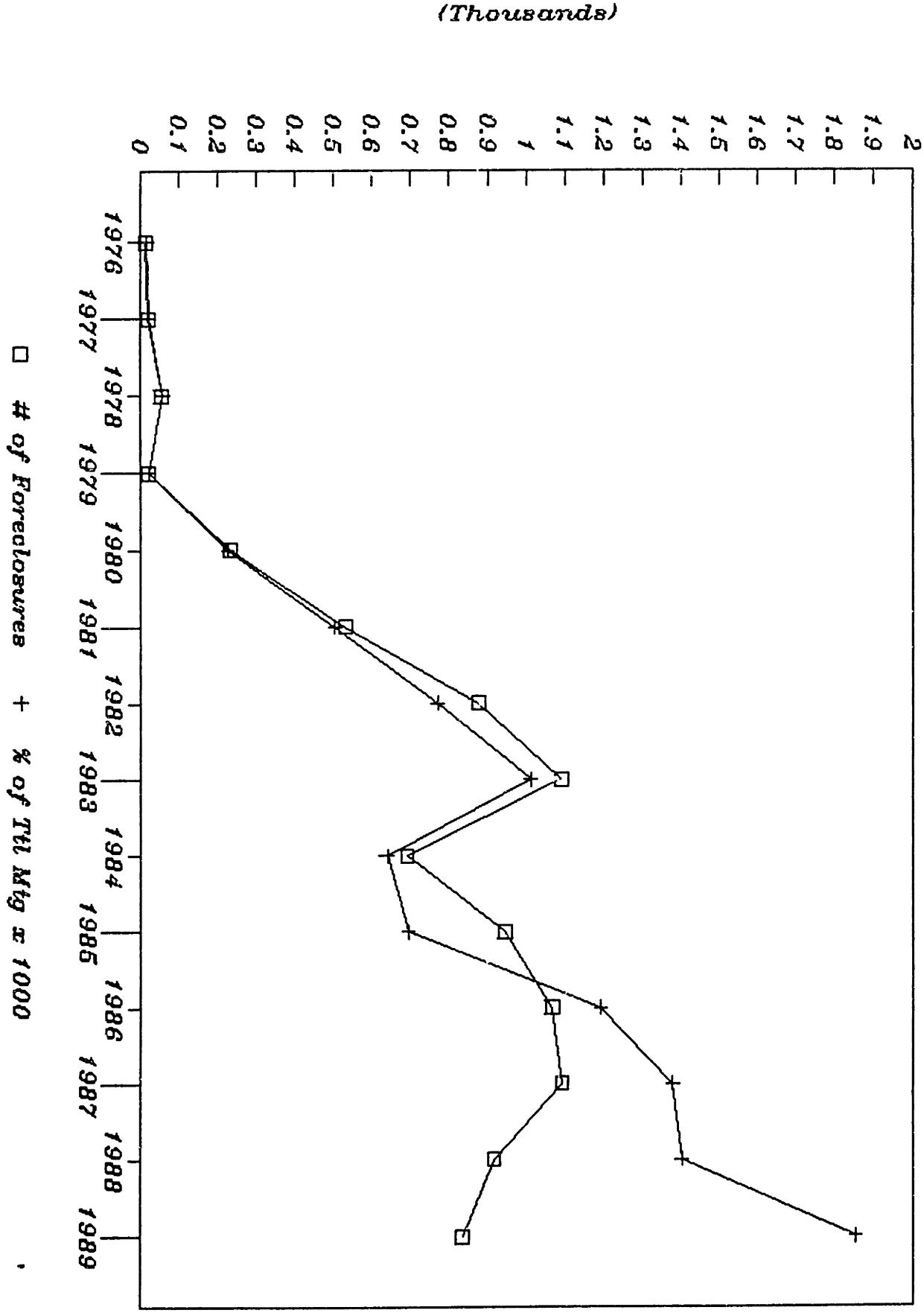
FORECLOSURES

(Thousands)

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34

1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989

□ # of Foreclosures + % of TL Mtg x 10000

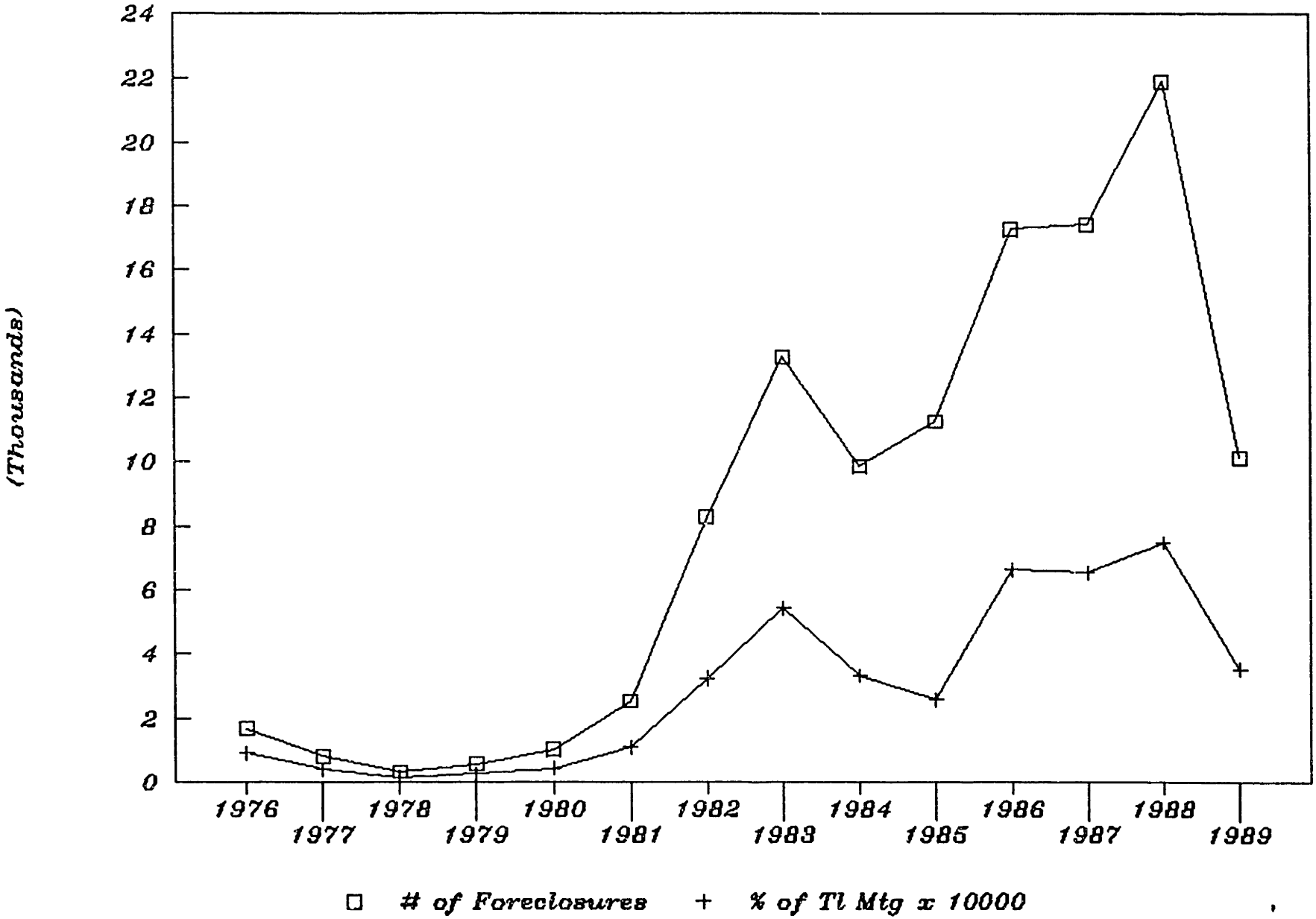

UTAH
FORECLOSURES
(Thousands)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tit Mtg x 1000

WYOMING
FORECLOSURES
# of Foreclosures
% of Tri Mtg x 100
0
100
200
300
400
500
600
700
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

Northern California
FORECLOSURES
% Total Mortgages
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

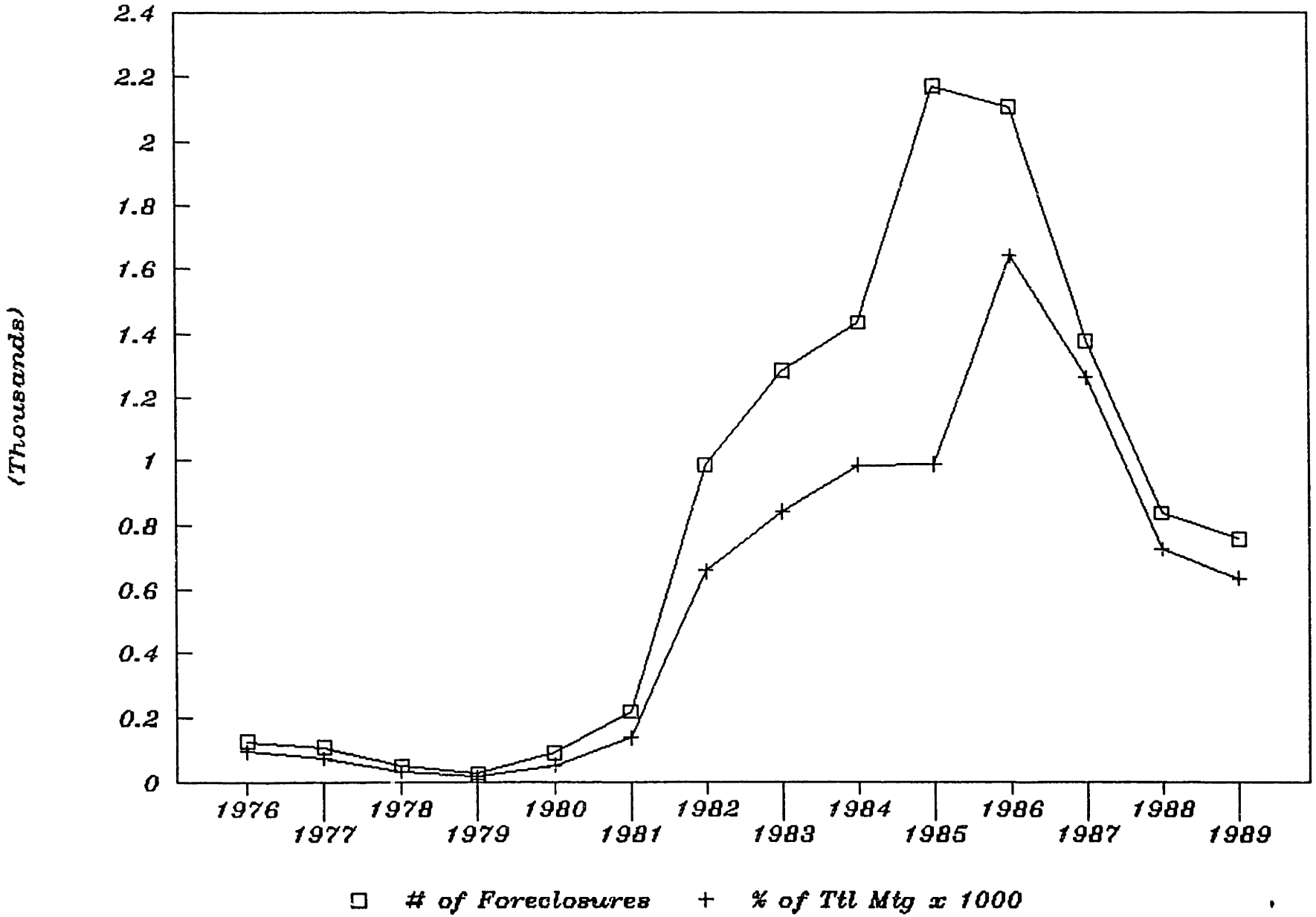
CALIFORNIA

FORECLOSURES



OREGON

FORECLOSURES

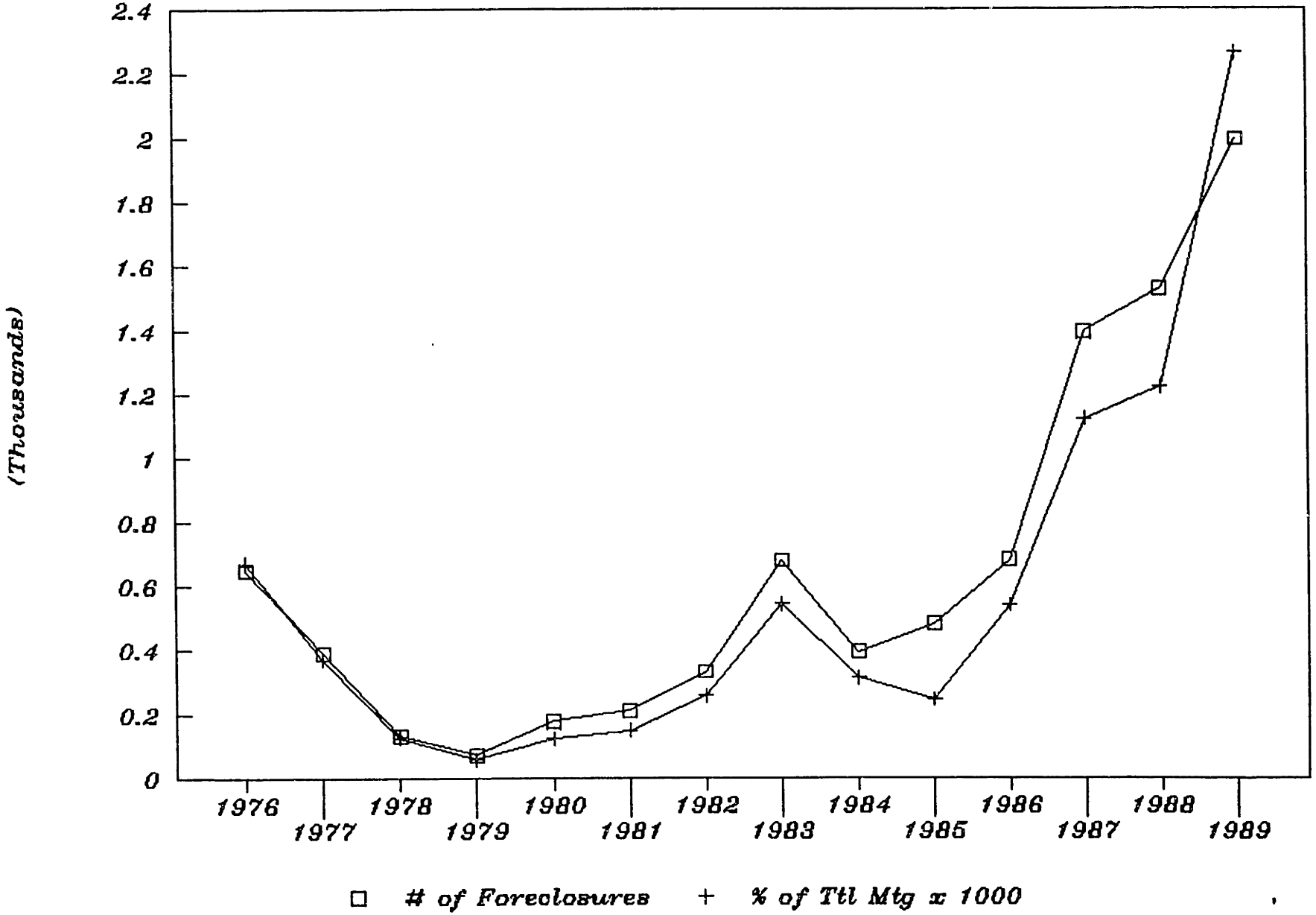


WASHINGTON
FORECLOSURES
(Thousands)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
# of Foreclosures
% of Ttl Mtg x 1000

Southern California
FORECLOSURES
% Total Mortgages
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989

ARIZONA

FORECLOSURES



CALIFORNIA
FORECLOSURES
(Thousands)
0
2
4
6
8
10
12
14
16
18
20
22
24
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of TL Mtg x 10000

HAWAII
FORECLOSURES
(Thousands)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
□ # of Foreclosures + % of Tl Mtg x 1000

NEVADA

FORECLOSURES