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Actuarial Aspects of Loan Guarantees

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Summary: Actuaries have increasingly gotten involved in various loan guarantee programs, both public and private. The objective of this session is to familiarize more actuaries with this field, including a general description of actuarial models that have been developed and their application to certain types of loans, such as guarantee programs associated with mortgage, educational and small business loans.

This session deals with the range of loan guarantee programs, program design, pricing and costing of benefits, classification of risks and underwriting, available experience, experience studies and claims management.

Mr. Sam Gutterman: This is not a widely discussed topic within the actuarial community because few actuaries have been significantly involved in the analysis of loan guarantee business. Some reasons for this lack of involvement include the fact that governments have been the primary provider of loan guarantees, and most government agencies have not gotten actuaries involved. In my experience, this is gradually changing. There is an increasing awareness of the need for actuaries in those areas of the private sector that provide such guarantees. To date, the private sector has primarily provided mortgage guarantee cover as opposed to more general loan guarantees, but that may be changing in the future. Financial guarantee insurance provides risk coverage similar to that offered by some property and casualty insurance companies. However, there has been limited involvement of the actuarial community. Limited actuarial involvement occurred at an insurance

company I'm familiar with because the primary risks focused on were the financial risks of an individual institution or individual limited partnership. Since actuaries have not been trained in financial analysis of an individual firm or real estate development, actuaries generally have not been prepared, nor have they been asked to become involved.

One reason why some actuaries have become involved in the private sector has been due to regulatory requirements of having an actuary for a property and casualty company sign an opinion for loss reserves. However, in some cases I've seen traditional actuarial approaches applied where they may not have been the best approach to take under those circumstances. This is an area in which techniques not often used by actuaries are appropriate.

WHAT ARE LOAN GUARANTEES?

Loan guarantees are typically provided by third parties with an arm's-length relationship to the parties directly involved in the loan. Thus, the government or private mortgage loan guarantee insurers provide insurance to the lender to cover their risk of default on the loan by the lender. That is, they provide credit risk coverage to protect the person, organization, or financial institution which provides that loan against their risk of loss due to default. The objective is to increase the ability and incentive of those institutions to provide loans in higher risk situations.

In the housing market, it enables a financial institution to underwrite mortgages with high loan-to-value ratios which it otherwise would not underwrite or would not be able to saturate. Hank Hansen will delve into this example in more detail.

In summary, the guarantee covers the default risk, affecting the mix of loans written in an institution's loan portfolio and their overall loan loss experience. Thus, the public or private insurer might underwrite the financial institution providing such loans because its overall effectiveness and its own underwriting capability may be more relevant than the characteristics of the individual lender. Overall, availability of such loan guarantees increases the probability of acceptance of a loan. Governments have gotten involved because they often wish to increase the availability of loans in what otherwise would be a relatively high-risk area. For instance, in the mortgage market, the Housing and Urban Development Agency (HUD) in the U.S. has offered such loan guarantees to promote its primary purpose of increasing home ownership, in a time when and in areas where the private sector was very conservative in providing such guarantees.

Due to promotion of home ownership, which is often important to society, such programs are now common and often required before a financial institution

provides such loans. I will briefly discuss a few other types of loan guarantees a little later.

SOCIETY OF ACTUARIES' (SOA) STUDY

Before I introduce our other panel member, I'd like to mention the recent study that was sponsored by the SOA and conducted by Price Waterhouse to evaluate the size and scope of the public loan guarantee market. Surveys of U.S. and Canadian government sponsorship of loan guarantees were conducted to get a feel for how large these off-balance-sheet governmental liabilities might be. In addition, single states and provinces were studied to develop a sense for the size of the loan guarantee market on a nonfederal government basis. This study will be a monograph in the SOA Monograph Series ["Study of Public Financial Guarantee Programs," M-F196-2]. It should be of interest in trying to provide some perspective on the overall loan guarantee area.

We are fortunate to have Hank Hansen with us. He's a Fellow of the Society of Actuaries (FSA), an actuary with Private Medical Insurer (PMI) Mortgage Insurance Company in San Francisco. PMI Mortgage Insurance Company is one of the largest private mortgage guarantee insurance companies. His corporate experience is interesting in that PMI has both life and casualty actuaries.

I personally have been involved in the actuarial analysis of a wide variety of loan guarantee programs, provided by both government and the private market, including loan guarantees of real estate, education, and business investment. In the private market, I've been involved in the analysis of mortgage loan guarantees and private mortgage insurance. Real estate loans guaranteed can include residential mortgages (as the primary focus of today's private market), multifamily housing, and hospitals. I've primarily reviewed business investment loan guarantees which provide protection against political risk. In the past, such risks were primarily provided by government agencies or government-related agencies, but there are rumors that the private sector may become involved in this area.

First, basic insurance principles apply to this field of insurance in a manner consistent with those applicable to other fields of insurance. The level of claim costs varies significantly by risk category, although not all of this variation is captured through rate relativities. Their impact may vary by type of loan guarantee. For example, a risk classification system can be constructed for the loan guarantees of real estate loans by use of such variables as loan-to-value relativities, geographic area of the real estate, the upkeep of building structures, and the ratio of the size of the mortgage payments to the income of the insured. Many of these relativities are related to the financial condition of the individual insured and the likelihood that the insured will continue payments on the loan that was provided. In governmental

programs, rates are often the same for all, and there are no risk classes. These government entities sometimes provide cross subsidies or subsidies for social purposes. These subsidies are highly related to the purpose for which the loans had been developed.

In some cases, if loans are made to promote home ownership, construction of infrastructure, or increased availability of education on a more universal basis, loan guarantee programs will have a relatively more limited risk classification system than would be warranted by general actuarial principles. Therefore, the design of the program will usually reflect the original objectives of the program. This is less true lately. In my own experience, risk-related premium elements have been introduced into at least one government program. This was viewed by some as not being practical, but because of potentially significant financial adverse selection and adverse experience, some programs have been forced to increase the complexity of their risk classification system. The typical underwriting/actuarial/pricing process has become a more integrated part of these programs over the last couple of years. In some cases, there still is a single rate for all loan applicants.

The second principle is that in many instances the risks involved are not independent of each other. That is, overall economic conditions will affect many loans at the same time, thus introducing a catastrophe risk potential. For example, in the mid-to-late 1980s, the entire oil-producing region in the southern U.S. underwent severe property value stress. As a result, the risk associated with an entire class or cohort of loans increased substantially. In particular, the increase in the claims cost for the geographic area of risks was significantly affected, resulting in a lack of independence of risks. It is much more difficult to apply the law of large numbers to this type of situation.

For educational loans, a period of high unemployment or bankruptcies can cause significant increases in overall losses. This requires that a significant margin be provided to cover the provision for such significant deviations from expected experience.

Private mortgage insurance is the only line of business in which catastrophe reserves are required in statutory accounting. As a result, it is now a unique entity in the private insurance business; in all other lines, catastrophe reserves are not allowed. This catastrophe reserve is not deductible for tax purposes. Wide swings in profitability still may occur. On a historical perspective, the entire private mortgage insurance market was wiped out in the Great Depression of the 1930s. I believe that every private mortgage insurance company went bankrupt, which is both the most important reason why government got involved and the reason for the introduction and use of the catastrophe reserve.

The third principle results from the fact that experience can vary so widely under different economic conditions. Projections of future experience require, in some cases, significant economic modeling efforts. Whether you use an econometric approach, significant alternative scenarios, or simulation approaches, a more refined approach forms a central element of analysis of loan guarantee programs. I believe that some of the approaches used in this area could be applied usefully to other areas of actuarial analysis as well. Although we are beginning to see some of these analyses included in asset/liability management models, for example, more application of the techniques may be appropriate.

Historically, most loan guarantee programs have not involved any refined actuarial techniques or approaches. As a matter of fact, when I talked to people in some government loan guarantee programs and asked what were their bases for pricing, I would get befuddled looks like, a basis for what? Some of those involved have no scientific underpinning for their premiums. In many cases, possibly because of the political environment in which they work, they have not developed the databases that actuaries have come to expect. They also may not appreciate the types of questions actuaries would expect to be asked all of the time. Management information for use in running large businesses is only now being developed. It is clear to me that actuaries in this area could add significant value.

The fourth principle is the application of multiple decrement approaches. Often the best actuarial model, at least in my experience, is a disability type model. This applies because in one circumstance, a loan could either default or prepay, or in another, a loan once defaulted could either turn into a claim or be cured (go back into premium-paying status). In the later case, a default could also be tracked through an intermediate series of status from initial delinquency to foreclosure to lender taking title to the property to ultimate disposition of the property, thus possibly involving a set of transitional probabilities.

These are similar to the study of active compared to disabled lives, when there is a chance of recovery, termination, or continuation in the existing status. Also, there are direct parallels in the evaluation of outstanding loan defaults that have not yet resulted in a claim.

Regarding approaches used, I have seen some traditional actuarial analyses used, such as typical property and casualty loss-reserve techniques. In many cases, these analyses are inadequate to the task at hand and/or have not been explained in understandable language to the people involved. In such cases, the analytical reports have been put on the shelf and never utilized. On the other hand, econometrics, disability, statistical, and discounted cash-flow techniques are useful. All of these should be in the actuary's bag of tools in this area.

The fifth and last principle that I'll mention is applicable in many areas of government-provided programs. Publicly provided loan guarantee experience can vary significantly by the management of the administration of these programs. Loosening and tightening of underwriting and claims policy is not necessarily related to which political party is in charge. It may be related to the personality or the person in charge of the government agency at the time. Thus more variables may be involved than just economic and demographic ones.

Accounting provisions of the government entity may also provide different incentives for decision-making. In some cases, although not as often as before, cash-based accounting has been applied. As a result, decisions may have been made to maximize the short-term revenues of the loan guarantee program, rather than long-term financial soundness. This may be based on the fact that losses tend to occur most frequently from three to seven years after the loan has been made. Thus, the accounting systems of the government agencies in some cases have driven political and economic decisions on these programs. Actuarial involvement in a more appropriate accounting environment would have led to sounder financial decisions. This is an additional reason actuarial evaluation analyses, principles, and techniques are needed in this area.

Mr. Henry W. Hansen: In Sam's Presidential luncheon address, a few points really hit home. One of them is a need to redefine the actuarial profession. In the loan guarantee business, for example, analysis of loan default has been dominated by persons from other professions, especially economists with strong statistical backgrounds, or investment and financial professionals. One does not walk into the mortgage business and obtain instant credibility by being an FSA. One has to compete by bringing at least as much value to default analysis as other professions.

Recently I read a very interesting letter from the Office of the Controller of the Currency (OCC), one of the federal organizations overseeing national banks. National banks, as you know, have been somewhat regulated away from direct participation in insurance, but in this letter, the OCC gave permission to such a bank to set up a captive mortgage reinsurance company. The reason given was that the reinsurer would not be reinsuring "actuarial" risk, but only credit risk. One could assume from this comment that actuaries are compartmentalized to special areas of practice only and are not considered experts in all fields.

Of course, economists and investment and financial professionals have been historically and most often involved in credit risk issues, but actuaries certainly have the education and experience to expand the boundaries of risk analysis in the loan default arena. Still, we have to earn our credibility.

I'd like to cover the measurement of default risk. To introduce you to the business, I will discuss the residential mortgage insurance market. I'll give you a look at the industry, some of its issues, and some of the history which Sam alluded to. We'll describe mortgage insurance risk, some of the data we study, and what actuaries can do.

ACTUARIAL TASKS

First of all, actuaries in credit risk practices are involved in tasks very similar to those of other lines of insurance, whether auto, life, annuities, disability, or health. For example, we project losses. The mortgage default loss patterns can be quite volatile. In good economic climates, or in geographic areas where home prices are rising steadily, default losses can be quite manageable. On the other hand, losses can be catastrophic in regions with severe recessions and/or falling home prices. Mortgage insurance losses are not easily predictable just by doing retrospective experience studies. Analysis is very much a prospective endeavor.

Most mortgage insurance losses occur within ten years of loan origination, with claims peaking between years four and seven. Borrowers generally don't default in the first couple years, but then events occur which can cause delinquencies. Both the magnitude and the timing of losses need to be studied.

Projecting mortgage insurance premiums involves forecasting decreases in principal balances on mortgages, and therefore interest-rate-driven prepayment modeling is used. Cancellation of mortgage insurance also occurs when lenders or investors in mortgages no longer require coverage, so other factors influencing cancellation must also be understood. For example, rapidly rising home prices in a locale can lead to a reduced need for mortgage insurance, or decreasing prices can lead to an extended need for insurance. Changes in premiums are driven largely by changes in interest rates, but other factors also influence the equation.

What kinds of products do mortgage insurers design and price? Some products are simply loan-by-loan insurance coverage, with the price determined by the type of loan insured and the coverage required. There are also other more complex financial instruments which may require mortgage insurance. Mortgage insurers may provide additional default coverage on pools of loans so that the investor in the pass-through or the mortgage-backed security obtains greater credit support and higher ratings.

A number of alternative forms of credit support for such pools of mortgages exist other than mortgage insurance. Senior/subordinated structures and letters of credit are two such arrangements. There is a danger of antiselection, a danger that the purchaser of credit support will only use mortgage insurance when it is most

advantageous to them. The designer and price of mortgage pool insurance must be familiar with competing forms of credit support.

Some very serious losses have emerged from mortgage pools originated in the early 1990s, since many of these pools had high concentrations of jumbo southern California loans. California, southern California in particular, went through a severe recession in the first half of the 1990s, and home price levels decreased significantly. Many foreclosures and losses occurred, and these were mostly absorbed by the mortgage insurers active in this line of business.

Some fundamental underwriting principles such as diversification of risk were overlooked perhaps in the effort to gain top-line growth, and insurers paid the price. It may also have occurred that the least risky loans went into senior/subordinated structures, and the mortgage insurers had a concentration of the riskiest mortgages. Antiselection may have exacerbated the situation.

From The Floor: Is this the case in Canada?

Mr. Hansen: I'm afraid I have no experience with the Canadian mortgage market, although a private mortgage insurance industry certainly exists in Canada.

There are also mortgage insurance industries in Australia, Great Britain, and some countries of Europe. Every country, of course, has its own form of mortgages and its own laws, regulations, and culture, and you have to understand these to analyze the needs and workings of their mortgage insurance markets. You can't just enter a foreign market and assume that you can do business just as in the U.S. Perhaps a good way to learn these markets is to get into joint ventures, or enter into a reinsurance arrangement to gain some education and experience without taking a large-risk position.

MORTGAGE INSURANCE

Mortgage insurance is the financial guarantee provided to a mortgage lender. Such institutions include banks, savings & loans (S&Ls), federal savings banks, mortgage bankers, credit unions, and insurance companies.

The mortgage insurance premium is paid by the lender, but in one form or another the cost is passed back to the borrower. The borrower either has a direct charge added to the monthly mortgage payment bill, or the interest rate is increased to indirectly cover the cost.

From the Floor: What is the typical premium you would pay?

Mr. Hansen: Premium levels depend on the type of loan. For example, a 30-year fixed rate loan of 95% of the single-family-property value, with insurance coverage of 30% of the loan value, might have a level annual premium of 74 basis points, i.e., 0.74% of the loan amount. That's \$740 a year on a \$100,000 mortgage. A 25-year adjustable rate mortgage (ARM) on 90% of the property value, with insurance coverage of 25% of the loan value, might have an annual premium of 55 basis points. Premiums probably average about 65 basis points for a typical mix of product types and coverages. Premiums are usually level and paid monthly, but historically, single premiums and front-end loaded annual premiums have been common.

Mortgage insurance is very much a commodity, and therefore rates for most coverages are about the same for mortgage insurers. If one insurer lowers rates, for example, most other insurers will have to follow, or lenders will direct a disproportionate share of their business to the lower rates.

From the Floor: Please describe the type of market and the number of firms involved.

Mr. Hansen: There are only nine significant private firms involved. There were more firms in the 1980s, but the large losses from the oil states led to a shaking out of the industry by the early 1990s. Two major barriers to entry are the high capital requirements and a knowledge of the industry. However, two new players have entered the market recently, one focused on a discounting and operational strategy, the other on a selected market niche. The Federal Housing Administration (FHA) and the Veterans Administration (VA), however, are perhaps the sources of greatest competition in many ways.

From the Floor: Is mortgage insurance always required? Are there risk classifications? I have had several mortgages in my life, and I've never seen an extra charge for mortgage insurance on it. Is it hidden in the spread, and does it vary by the duration of the mortgage?

Mr. Hansen: Mortgage insurance generally is required for conforming loans with a loan-to-value ratio greater than 80% when such loans are sold to the Federal National Mortgage Association (FNMA) or the Federal Home Loan Mortgage Corporation (FHLMC). Mortgage insurance generally is also required when loans with high loan to value (LTV) ratios are sold to investors securitizing the loans. Lenders holding loans in portfolio are not necessarily required to obtain mortgage insurance on high LTV loans, but for various reasons, they usually purchase insurance to lower their capital costs. As we said before, risk classifications are

primarily defined by mortgage type, length of the mortgage, and required coverage. Charges may be explicit, or implicit in a higher interest rate.

To summarize, mortgage insurance is protection to the lender in the event of mortgage default. It is not life insurance, which pays if the borrower dies, or disability insurance, which pays if the borrower becomes disabled. It is not homeowner's insurance, which pays if the home is damaged or destroyed. Indeed, statutory rules prevent private mortgage insurers from offering any line of insurance other than default protection. We cannot depend on profits from other lines of insurance to support eras of high credit losses; conversely, other lines are not threatened by potential high mortgage default losses. That is a primary reason mortgage insurers need to be so highly capitalized.

WHY PMI?

So why is there a market for private mortgage insurance, or PMI, as it's called? First, the Financial Institutions Reform, Recovery and Enforcement Act (FIRREA) of 1989 required savings and loan (S&Ls) and federal savings banks (FSB) to increase their risk-based capital. Now this risk-based capital is generally 8% of the principal balance on all uninsured loans. If the institution obtains mortgage insurance on the loans, however, the capital requirement generally drops to 4%. There can be a significant financial advantage in obtaining PMI.

Second, the government-sponsored entities (GSEs), FNMA and FHLMC, which purchase a very large proportion of conforming loans originated in the U.S. and provide the liquidity to enable an efficient national mortgage market, generally require mortgage insurance on mortgage loans with less than 20% down, or as we say, with the LTV ratio of over 80%. Conforming loans are loans less than \$207,000 (in 1997) meeting FNMA and FHLMC underwriting guidelines. Since most mortgage originators want to sell their conforming loans to individuals, mortgage insurance is very often an implicit requirement.

From the Floor: Do you know the percentage for loans less than \$207,000 actually sold or how many the banks keep?

Mr. Hansen: I believe that most fixed-rate loans are sold since lenders do not want to retain the interest rate risk inherent in holding onto fixed-rate loans in changing interest rate environments. Lenders holding loans in portfolio generally do it with adjustable rate mortgages, and this can be quite common with some large S&Ls. The advantage of selling the loans is to pass the interest rate risk on to the investors. I am not certain as to the actual percentages sold and portfolioed. Investors provide liquidity to lenders. Loans can be originated and sold without a large capital commitment.

The third reason for a PMI market is that banking agencies such as the Federal Deposit Insurance Corporation (FDIC), the Federal Reserve, the OCC, and the Office of Thrift Supervision (OTS) now generally recommend PMI on loans with LTVs of 85% and above. The recommendations carry much weight with banks and S&Ls.

Fourth, investors in mortgages and mortgage-backed securities usually want default protection, and mortgage insurance can be an effective way of obtaining it.

Finally, to summarize, PMI allows home buyers to get into a home with as little as 3–5% down, not the 20% which lenders usually require. PMI allows the mortgage market to operate with more liquidity and efficiency.

I don't want to get into deep discussions of the laws and regulations governing our business, but suffice it to say that state regulation of forms, rates, statutory reporting, and operations is only a small part of the constraints on the industry. Federal laws and regulations, HUD, FNMA, FHLMC, and investors play very significant roles in explicitly or implicitly governing our business. Our main competitors, the FHA and the VA, are not subject to state regulation. We are always cognizant of competing forms of credit enhancement totally outside the insurance business which can compete with our products and services.

MORTGAGE ORIGINATIONS

So what does the residential mortgage market look like? From 1986 to 1991, it was in the \$400–600 billion range, for all residential mortgage originated in the U.S. In 1992, mortgage interest rates dropped sharply, the market boomed, and just over \$1 trillion of residential mortgages was originated in 1993. The market in 1996 will probably come in around \$750 billion, and estimates for 1997 generally assume a 10–15% drop with a shrinking of the refinance market.

From the Floor: I would have expected the insured mortgages to be about 15–20% of total mortgage originations. Is that right?

Mr. Hansen: The insured market, including both the FHA and the VA along with PMI, has been growing steadily. It was at \$273 billion in 1995, 35% of the entire \$773 billion market. This reflects the growth in the first-time home buyer market, as well as, perhaps, the desire of buyers to diversify their assets and not put every dollar into their home. The stock market has shown greater growth than home prices recently. The federal government has also been encouraging home ownership, and this has led to more low down-payment loans.

FHA/VA VERSUS PMI

The share of the insured market has shifted between the government and the private market. During the late 1980s, when the mortgage market was under immense pressure from losses coming out of the oil patch, especially in Texas, the PMI industry retrenched. The FHA played an important role in keeping the market fluid and efficient. More recently, however, after the PMI industry was recapitalized and experience and fundamentals were improved, the private market has come back. In 1995 the private market captured 61% of the insured market.

Projecting the insured and the private market, is, of course, very important in business planning for a private mortgage insurance (MI) company.

Mr. Gutterman: The percentage market share between private and government has varied significantly, primarily because of changes in government policy, and the private sector has responded accordingly.

From the Floor: What are the FHA premium levels?

Mr. Hansen: Their prices are now 200 basis points (2%) in the first year, and 50 basis points (0.50%) for renewal.

Mr. Gutterman: The 50 basis points depends on the risk.

PMI INDUSTRY LOSS RATIOS

Mr. Hansen: The private market found itself under immense stress in the mid-and late-1980s. Some companies in existence then are no longer writing business, but were acquired by others or put into runoff. Loss ratios for the industry peaked at 199% in 1987 for all companies. That is, \$199 in losses were paid out for every \$100 of premiums collected. For companies still active, the loss ratio hit 128% in 1987.

For your information, the industry trade association, Mortgage Insurance Companies of America (MICA), now has eight active U.S. members, and there is a new start-up company focusing on the credit union business, for a total of nine. This number of players is a little different than in the life industry.

I should say that the oil patch crisis did have one positive effect. It reminded the PMI industry that it was an insurance business, not just a service to lenders, and losses could occur in a big way. For some companies, mine in particular, it led to a strong emphasis on risk management and control. For the first time actuaries began to take an active role in the business, at least in some companies.

From the Floor: What is the interest component? Is this business managed on just a combined ratio? Is an interest-adjusted loss ratio used?

Mr. Hansen: The loss ratio is the primary driver. The industry does not use an interest-adjusted ratio. The expense ratio has been about 25% historically, but has been decreasing recently. Investment income on the capital, especially on the contingency reserves, is significant, but the loss ratio primarily distinguishes strong eras from weak ones.

Mr. Gutterman: For level-premium business, the interest component is not very significant. When single premiums were more common, interest was much more significant.

LOSS RATIOS BY BOOK YEAR

Mr. Hansen: The industry loss ratio for 1987 was 199%. However, many book years, that is, production years, are included in the 1987 calendar year. For my company, the business written in 1982 has had a cumulative loss ratio of 262%. That is, total claims paid on the mortgages insured in 1982 have been 262% of the total premiums collected on those loans to date. By 1987, the ratio had already hit 230%.

The cumulative loss ratio for the 1985 book year, however, has developed over time to only 66%, driven by higher premiums taken in 1985, increased risk management, and an improvement in the oil patch economy. For the 1988 book year, business was written when controls were at their tightest and the industry had just faced its worst calendar-year loss ratio. The cumulative book-year loss ratio has developed to only 26% to date. In the 1991 book, the worsening California economy and a relaxation of underwriting standards has led to an increase in loss ratios from the 1988 year. To date, the ratio for 1991 stands at 29% after five years, and will continue to increase.

We'll get to claim development patterns in a little while, but suffice it to say now that losses tend to peak in the fourth through seventh policy years, and premiums, at least in the past, were very front-loaded. Loss ratios tend to peak a few years after loans are originally insured. A task of an actuary currently might be to look at loans being originated now, and to put a probability distribution on the possible ultimate losses or loss ratios on the book. A bit later we'll look at how this can be accomplished.

From the Floor: The government isn't interested in regulating the loss ratio?

Mr. Hansen: We do have to submit our rates to the states for approval. We have to demonstrate our rates are sufficient, but not overly so. Often, we try to demonstrate that we can receive a reasonable return on our equity over a long period of time. Returns can vary greatly by book year as the loss ratio development shows.

From the Floor: Are these inception-to-date loss ratios?

Mr. Hansen: Yes. They are the ratios of the cumulative losses to cumulative premiums.

From the Floor: Doesn't this kind of pattern of losses require that you set up unearned premium or deficiency reserves on the global premium?

Mr. Hansen: Mortgage insurers cannot set up reserves similar to life insurance net level premium or modified reserves. Insurers are required to hold contingency reserves, however, wherein 50% of the premium from each calendar year is held in reserve and only allowed to be released after ten years if experience is favorable. This reserve, generally, is treated as capital and surplus in the earnings statement and is not deductible as an expense. This requirement keeps premiums from being released into distributable earnings too quickly, since an economic downturn can lead to unpredictable, late and large losses. Unearned premium reserves are minimal. Loss reserves are only set up when mortgage delinquencies are reported. We'll discuss that later.

CURRENT GSE REQUIREMENTS

Let's get back to some industry vocabulary and definitions. As we said before, the GSEs, FNMA and FHLMC, determine the required insurance coverages for much of the market. We won't get into how these coverages are determined. For example, a \$100,000 home with a \$90,000 mortgage, that is, 10% down, or 90% LTV, requires 25% coverage. That is, a loan guarantee of 25% of \$90,000, or \$22,500, is required for a GSE to purchase a loan originated by a lender. That, together with the 10% down, gives protection of about \$32,500 to the GSE if they buy the loan and the borrower defaults. We say that coverage is extended down to \$67,500, or 68% of the \$100,000 home, rounded up. The GSE's required coverage varies by LTV, and perhaps by some other factors as well.

The GSEs recently increased required coverages on loans, and this has been responsible, in part, for recent growth in industry revenues over and above that driven by market sizes.

SOME SIMPLIFIED RELATIONSHIPS

For an average loan of \$100,000, about \$25,000 of coverage or risk is insured. PMI companies must hold capital at about a 20-to-1 ratio, that is, \$1 of capital for every \$20 of risk. So about \$1,250 of capital is necessary to insure a loan of \$100,000. If the annual premium were \$625, a reasonable assumption, you'd see that \$2 of capital must be posted to write \$1 of annual premium. Stated another way, only 50 cents of annual premium can be written for every \$1 of capital.

This is quite different from the \$3 or so of premium that can be written on \$1 of capital for auto and homeowners' insurance, for example. Investors require a reasonable return on a volatile monoline mortgage insurance company, and with the high capital requirement, a relatively large portion of premium must be devoted to return on capital.

Common Line of Business

The large capital requirements result from the volatility of the business, potential catastrophic losses, and the monoline requirement. No other lines of business are available to offset the possible large MI losses. Regulators don't want other lines of business that are subject to state guarantee funds to be brought down if the PMI business goes through a bad cycle. With the exception of only a few states, PMIs do not take part in state guarantee funds.

CLAIMS SETTLEMENT METHODS

It's important to see how mortgage insurers pay claims if one is to understand the risks that must be quantified and projected. A mortgage insurer, when presented with a loss by a lender, has at least two options. First, the insurer can pay the lender the covered percentage of the loss, say 25%. Second, the mortgage insurer can pay off the loan and expenses to the lender, take title to and sell the property.

Claim Settlement Example

For example, suppose there is a foreclosure on a home originally purchased for \$200,000 with a \$180,000 loan. Currently, the principal balance is \$170,000, and the lender has incurred \$22,000 in interest and other expenses since the borrower stopped making mortgage payments. The mortgage insurer would pay the lender 25% of the lender's \$192,000 cost, that is, \$48,000. The lender, of course, still must dispose of the property, and may still incur a net loss.

From the Floor: Is this an example of a bank that has kept the property?

Mr. Hansen: Yes, but this may also be true even if the loan was sold to FNMA, or FHLMC, or some other investor.

Any remaining loss is borne by the lender or investor, unless the lender or investor has additional credit support in the form of mortgage pool insurance, or letters of credit, or senior/subordinate tranche structures in a mortgage-backed security. In any case, the basic mortgage insurance may cover all, or perhaps only some, of the lender's loss.

From the Floor: In this case are they getting more than their expenses or am I missing something? Assuming they can sell the house now for at least \$170,000, they recover more than their expenses.

Mr. Hansen: Mortgage insurers cannot settle claims for more than the actual losses incurred by the lender. In certain situations, it makes sense for the insurer to use an alternative form of claims settlement.

Alternate Claim Settlement

Let's suppose that the mortgage insurer believes the net loss may be less than the basic coverage would pay. Then the mortgage insurer may pay the lender the entire \$192,000 cost and take title to the property. If the insurer can sell the home for, say, \$172,000, pay sales commission and other expenses of \$19,400, thus getting net proceeds of \$152,600 from the sale, the insurer only winds up with a net loss of \$39,400, less than the \$48,000 resulting from a scheduled payoff. Of course, the insurer must hold funds to buy the property and take a risk that the property value can be realized in a reasonable time, but losses can be mitigated in this fashion.

Other ways of settling claims are available. If home prices have been increasing enough and the home remains in good condition, the insurer may facilitate a sale of the property before it goes into foreclosure, greatly mitigating its losses. If it looks like the borrower can soon begin making mortgage payments with a high probability of making good on the mortgage, the insurer may advance the missing payments and penalties to the lender, keeping the borrower in the house. Any such prepayments, however, can be deducted from a subsequent claim, so the insurer and the lender have to agree that this is a prudent risk to take.

From the Floor: Shouldn't your claim payments cover all lender losses?

Mr. Hansen: No. Even with the maximum formula payment, the lender or investor still may incur additional losses. Of course, the lender would incur any losses on uninsured loans. Margins are built into interest rates to cover additional anticipated losses.

SAMPLE CLAIM PATTERNS

To understand how claims develop in mortgage insurance, let's look at claims coming from a specific book of business originated in a particular calendar year. Theoretically, mortgage insurance could remain on a loan for a full loan period of 15, 30, or 40 years, but most loans have a much shorter life, and mortgage insurance is usually dropped when the real equity in the home gets large enough. Typically, 90–95% of claims ever to be paid are paid within ten years of the year of loan origination.

In a typical book year, about 94% of the claims will be paid in the first ten years. For those ten years of claims, about 15% were paid in the third year from origination, 22% in the fourth, and 18%, 16%, and 10% in the fifth, sixth, and seventh years, respectively. That is, over half the claims paid come from a three year period, and about two-thirds come from a five-year period. The actual shape may differ somewhat from year to year and for different products or geographic regions.

EQUITY DRIVES RISK

Now, what really drives risk? There certainly are many factors, but one of the most important is real equity. If, for example, the actual value of your home were \$200,000, and the present value of your future principal and interest payments discounted at a current rate of interest were \$120,000, you would have positive equity in your home, and you probably would pose very little risk for a PMI claim. Indeed, you probably wouldn't be insured anymore.

If, on the other hand, the present value of payments were \$250,000, you might think twice as to whether it made a lot of financial sense to continue making mortgage payments. You might just send the keys of the house to the lender and walk. Certainly there is a much greater risk of default from such a borrower.

Now, what can lead to negative equity? First of all, the value of the home may have decreased. It would not at all be unusual for a home purchased in 1990 in California to have lost 25% or 30% of its market value as of 1996. That's buying a home for \$300,000 and being able to sell it for only a little more than \$200,000. Some percentage losses were even greater on higher-priced homes with super-jumbo mortgages. That's why industry losses today are being driven by California loans originated in 1989 and the early 1990s. That's when home prices peaked.

On the other hand, if home prices have just gone through a steep increase, claims may be negligible. Even if a person lost their income and couldn't make payments, the home could be sold for a large gain and the mortgage and expenses paid off.

This, of course, is what makes regional analysis so critical. Balance-sheet threatening losses can result from regional economic disasters, and estimating the probability of a downturn in a region is a key job in risk analysis.

When the economy is stable and strong all across the country, PMI companies can do very well. As you can guess, it's easy to forget that the economy can go into a tailspin, and it can become easy to repeat past mistakes in a very competitive market.

Now, what else can drive equity? With a high-interest-rate mortgage, say 12%, in today's 8% market, you might not have a lot of desire to make good on the loan. Especially if your home hasn't increased in value. You don't have to discount 12% mortgage payments at 8% to know that your mortgage isn't in line with your property value. Indeed, if you haven't been able to refinance, you probably have some serious credit problems, and you may present an even greater risk profile to the mortgage insurer.

Many examples exist where homeowners with a high-interest-rate mortgage greater than the current value of their home obtained a new lower rate mortgage on another home, and just sent the keys to the first home to the lender, leaving the lender and mortgage insurer with large losses.

Mr. Gutterman: In many cases in the oil patch area, that actually happened.

Mr. Hansen: Yes, even though the borrower had more than enough personal assets to make good on the original mortgage.

In an increasing-interest-rate environment, the opposite may occur. If you have a 6.5% interest rate loan in an 8.5% market, for example, and your home value hasn't decreased significantly, you're going to do whatever it takes to keep that loan in force. Again, a 6.5% mortgage discounted at 8.5% decreases the present value of your mortgage, and increased real equity results. It is definitely in your best interest to make your mortgage payments.

To measure changes in home prices, a good tool is a repeat sales index. This measure incorporates the changes in home prices between two successive arm's-length sales of specific homes, and develops a measure of home price changes by quarter. One index is available commercially. Another is produced by Fannie Mae and Freddie Mac. Depending on the index, information is available on a state, county, metropolitan statistical area, or even zip code level. This is available if enough sales were recorded to give credibility.

Changes in median home prices are widely quoted, but short-term changes in this index may represent shifts in sales between high-priced homes and low-priced homes, rather than a fundamental shift in overall price levels, which drives default losses.

From the Floor: Can you get access to a repeat sales index?

Mr. Hansen: Yes. One commonly quoted index is available from Case Shiller Weiss, Inc. Such information on home price changes by market is very useful. Steep run-ups in home prices which occurred in the Northeast and California in the 1980s are often precursors to subsequent steep drops. Purchases at the top of the market are particularly susceptible to large default losses, especially if price drops occur in conjunction with a local recession. Credible data allow for enhanced modeling and forecasting capabilities, so such indices are very useful.

PREPAYMENT RISK, ONE BOOK

How does this affect prepayment and loss risk in a particular book year? The answer is, significantly. If interest rates drop, most qualified borrowers refinance. The remaining borrowers often cannot refinance because of credit or other problems, so your best risks leave, and generally poorer risks remain. Since rates have declined, the remaining risks have less real equity, and therefore are even riskier than they were before. On that particular book year, premiums drop precipitously, but claims can continue.

PMI premium flows decrease when loans run off, but also when borrowers cancel PMI. Loan run-off is very closely related to changes in mortgage interest rates, but PMI cancellations also increase when home prices run up and borrowers generate sufficient equity to cancel earlier than expected.

Again, remaining borrowers can actually be riskier than before the refinance wave, so the conditional claim rates on the remaining borrowers can increase significantly.

PREPAYMENT RISK, TOTAL IN FORCE

Surprisingly, or maybe not so surprisingly, total premium flows for the PMI company are not affected too greatly by movements in interest rates. Many of the borrowers who refilled out of one book year may re-enter with an insured refinanced mortgage. Although some of the refinances may no longer need mortgage insurance on their new loan, the loss is easily made up by new homeowners who can get their first home in the low-interest-rate environment. Generally, when interest rates are low, borrowers put less down, and they leverage themselves more, thus adding to the demand for higher LTV PMI with its higher premiums.

Of course, there are always some people who do not take advantage of the ability to refinance when the opportunity presents itself, and a small group just refuse to refinance.

Mr. Gutterman: This group, which refuses to refinance, is a declining percentage of people.

Mr. Hansen: Yes, I would definitely say so. One other positive for mortgage insurers is that quality can be much higher on business originated in low-interest-rate environments. Underwriters can be more selective, borrowers don't want to lose their low-interest-rate loans, and those who refinance have lower mortgage payments and therefore less payment pressure.

An actual negative effect from a refinance wave can come shortly after the low rates jump back up. Lenders and mortgage insurers had to beef up their staffs and resources to handle the large refinance-loan volume. When rates go up, there are few borrowers left. To feed the machine, there is a great desire to do loans which might not exactly meet the normal underwriting guidelines. To put it another way, the quality of the business can deteriorate significantly.

To summarize, actuaries who want to get involved in mortgage insurance premium and loss projections should expect to become immersed in economics, statistics, and modeling.

PMI RESERVES

To change topics just slightly, let's discuss the reserves that mortgage insurers are required to hold. The largest are contingency reserves for catastrophic losses. These reserves somewhat serve the role of net level reserves in life insurance. Mortgage insurance premiums either are level, which is typical now, or front end loaded, which was more common a couple of years ago. As we've seen, losses are negligible the first couple of years, then increase to a peak between years four and seven, and then drop off. In the early years, the excess of premiums over losses is booked directly to profits on the bottom line. The Internal Revenue Service (IRS) will not allow deduction of net level premium "life insurance-type" reserves, but contingency reserves hold back the dividending out of these early "profits" before the claim cycle is entered.

The IRS will allow the deduction of loss reserves. Mortgage insurers set up reserves to cover ultimate losses when lenders report that a borrower has become delinquent in making mortgage payments, usually after one or two mortgage payments have been missed. This is the more interesting reserve for an actuary.

The unearned premium reserve is just what it says. For single premiums, the unearned premium reserve is large, since it is amortized over perhaps ten years or more. For annual premiums, there is at least a half year's premium unearned on average. In 1994, monthly premiums became the norm for the industry, and a half-month's premium doesn't amount to much.

CONTINGENCY RESERVES

As we said before, contingency reserves are put up for catastrophes. They are purely accounting reserves with no actuarial input needed. Simply described, half of each year's premium is put into the reserve for ten years, after which it may be released and paid out in dividend, if it is still around. Each calendar year, losses in excess of 35% of the earned premium for that year may be paid out of the contingency reserve on a first-in, first-out (FIFO) basis. In the 1980s, with loss ratios over 100% in many years, most, if not all, of the industry's contingency reserves were burned up, but the contingency reserves did the job they were designed for. These reserves are now being built up again. One hopes that a negative underwriting cycle doesn't hit again before the reserves get fully funded with ten consecutive years built up.

From the Floor: Is the contingency reserve included in the loss ratio that you previously mentioned?

Mr. Hansen: The losses in the numerator of the loss ratio include only claims paid plus the increase in loss reserves. The loss ratio is not affected by increases or decreases to the contingency reserve. The contingency reserve is generally treated as if it were part of company equity.

If loss ratios are about 40% and expense ratios are about 25%, and 50% of premium must be contributed to the contingency reserve, it becomes clear why mortgage insurers can only pay dividends after a long period with no large loss cycles.

From the Floor: What type of insurance companies usually write mortgage insurance?

Mr. Hansen: Property and casualty companies.

From the Floor: None of those contingency reserves are tax deductible?

Mr. Hansen: None of them. Loss reserves are, but only at the time a loan becomes delinquent. Unearned premium reserves are also deductible, but these are very small.

From the Floor: Is there an incurred but not reported (IBNR) concept?

Mr. Hansen: IBNR reserves are set up for loans which are delinquent but not yet reported to the mortgage insurer. IBNR may represent perhaps 10–15% of total loss reserves.

LOSS RESERVES

Loss reserves are a traditional area for actuarial practice, and actuaries are required to opine on loss-reserve levels in an actuarial opinion. Loss reserves can be set on a case basis, with reserves held on each delinquent loan, and revised as the delinquency ages. More professionally, a development triangle method can be used. If one wished to be very elegant, an economic model could be used to project losses resulting from the delinquent loans.

One simply described, but effective, method involves accumulating all delinquencies received during a calendar year, or as we call it, a report year. The number of notices of delinquencies (NOD) is multiplied by the percentage of those NODs estimated to go to claim, and then multiplied by the expected average claim size. This is an estimate of the total claims to be paid from that report year of reported delinquencies, that is, an estimate of incurred losses. The reserve at any time is simply equal to that estimate less actual claims paid to date.

As a report year ages, more exact estimates of the percentage going to claim and the average claim size are determined. The reserve becomes more accurate as the book ages. One tries to be conservative early on so reserves don't have to be increased later. Of course, the IRS doesn't allow one to get too conservative. This can be a problem since experience can be quite volatile.

LOSS-RESERVE ESTIMATES

A traditional method for developing reserves is to track historical development of older report years, a retrospective approach. That is, one tracks how long it takes older report years of delinquent loans either to go to claim or to cure. One tracks also the development of average claim sizes over time. This can be made more exact by tracking NODs by geographic region, for example, and then combining results for the total country. This method, although somewhat mechanical, involves some judgment and can be very effective in setting reserves and determining what sufficiency, if any, exists in the assumptions.

A more interesting approach recognizes that the number of newly delinquent mortgages is driven by credit stress on the borrower—running up credit card bills, for example—and by changes in the local employment markets. Regressions can be

performed on these and a few other variables to develop estimates of numbers of loans in a portfolio expected to become delinquent over the next year.

Once loans are reported as delinquent, the actual percentage of NODs going to claim is driven by real equity in the home, again driven by home price changes and relationships between current and mortgage loan interest rates. Again, regressions can be performed to develop estimates of the percentages of new delinquencies expected to go to claim, and to rank delinquent loans in order of likelihood of becoming a claim.

Claim sizes vary greatly by region. Claims coming from California today are significantly larger than those coming from the rest of the country, for example.

As an example, one out of three loans reported as delinquent in California may wind up as a claim, but in other areas of the country, the ratio may be 1 in 16. When all factors are combined, a loss reserve posted on a new California delinquency could be eight or nine times greater than one posted on a delinquency from another region of the U.S.

Since these reserves affect income, it can be useful to apply some sophisticated techniques in regions like California, or whatever area is currently the greatest driver of claims, to attempt to identify peaks and turning points. Again, an actuary would make great use of economics and statistics.

SOME LOSS PROJECTION VARIABLES

If actuaries were to become involved in projecting losses resulting from future defaults on mortgages originated today, what are some of the variables they might consider?

It's certain that borrower credit is a very important variable. Payment history and use or abuse of credit is taken into account by underwriters and is an extremely important variable in a loss-projection analysis and model. The income and assets of the borrower can be important and so is the appraised value of the home and the metropolitan statistical area in which the home is located. Risks vary significantly by region.

Loan characteristics are important. Adjustable rate mortgages, especially if they may involve negative amortization, can be much riskier than a 15-year fixed rate mortgage, for example. High-LTV loans can be more risky because there is less equity involved. Investor loans can also be more risky than a loan taken out by a person intending to live in the home which is insured.

Finally, market conditions drive losses. Relatively small changes in losses can occur by varying the factors described above, but the large economic swings determine whether the business originated this year will have a 30% or a 230% loss ratio after eight years. These are the variables which can make or break a company if we can read them right, or if we misread them. A little investment here can have huge rewards.

PROJECTING LOSSES, SCORING LOANS

What does one do to project mortgage default losses? The actual methods, as you might guess, are somewhat closely guarded secrets, because some methods and models work better than others and are competitive tools. Generally speaking, one approach is somewhat simple to describe.

First, one gathers data on borrowers, their credit, the property, the loan, the market, and a variety of time series of economic and geodemographic information. Actual loan loss experience over many years is needed. The breadth, depth, and accuracy of that data over a long time period is a determining factor as to how powerful and robust the modeling results may be. The information may come from the company's own records, or if one is entering a new market with no historical experience, experience may be purchased from a variety of enterprises which accumulate and sell information.

Next, one does a regression on those data. Logistic regression seems to be a good tool to use. I'm not sure it's in the actuarial syllabus. From the regression, factors can be developed to apply to the information collected on a new loan and to current market and economic conditions. From this, a mortgage score can be determined which may vary by MSA, or whatever geographic region one has data for.

Many other modern mathematical or statistical formulas could be tried, but logistical regression seems to work very well.

MORTGAGE RISK BY QUARTER

My company has been doing mortgage scoring since 1986, which not by coincidence was when we hired our first actuary who was a property and casualty actuary. In 1986 companies were also running very scared due to record losses. We brought in underwriters who were familiar with scoring systems used in the automobile insurance business and used the facilities of a consulting organization with high-powered statisticians and mainframe computers. Luckily we had been gathering extensive loan level data since 1981, and believe me, we had plenty of loss experience. That was about the only good thing to come out of the oil patch crisis.

Our system has evolved significantly since then, and we are now also using large amounts of regional economic data to develop our scores. We have three scores: a loan score, which measures the average loan quality of new business written; a market score, which measures the strength of the economy as it relates to losses on mortgage insurance business; and a combined score, which measures the combined effects of both. Each is based on a separate regression.

According to the scores, average loan quality deteriorated through 1994 and since has shown some improvement, but current scores are worse than early 1994. This was largely the result of the need to do whatever mortgages were out there when the refinance market came to a screeching halt, but it also reflects the conscious effort of FNMA and FHLMC and the PMIs to move in a major way into the affordable housing market. It may also reflect the increase of the PMI share growth versus the FHA and VA. The movement in scores also reflects the increased percentage of ARM business when fixed mortgage rates went up. Higher scores are not necessarily bad since mortgage insurance premiums are generally higher on ARMS relative to fixed.

The decreasing market scores are counteracting the higher loan scores, which is driven primarily by the improving California economy. Not that the California economy is great, but it's sure much better than it was a few years ago. The combined effect shows that the overall mortgage insurance market has improved since early 1994.

MARKET RISK BY REGION

As we said, recent industry losses have been very much driven by California experience. Going back to the first quarter of 1992, setting the U.S. outside of California at 100, we see that southern California reached almost 400, and northern California was to the 200 level. Both regions have seen significant improvement, as far as our models can determine. This also has been correlated to many other sources of information and analysis. This information is useful both for loss-projection purposes and for market planning.

SO HOW POWERFUL ARE THESE MORTGAGE SCORES?

By grouping my company's loans into ten equal deciles, an equal number of loans in each, and arranging them from lowest mortgage score to the highest, and then tabulating claim rates for each, the results are encouraging. Norming the scores so that the fifth decile has a claim relativity of 1, the top decile has 12.8 times as many claims as the fifth, and the bottom decile only 21% as many as the fifth. The top decile generated 60 times as many claims as the first. Fully two-thirds of all claims came out of the top two deciles.

This general relationship is true among all cuts of business—products, LTV, borrower credit, and geographic region. The slope may differ by cut, but it still appears to be a strong predictor.

PRICING PMI

So how do we price PMI? Well, it's not very different than most insurance. We set up income statements, cash flows, balance sheets, project premiums, losses, and expenses. We use marginal approaches when appropriate, and do a variety of scenario testing. Our scenarios can vary extremely due to premium run-off and loss volatility. If a product involves a stop-loss, Monte Carlo simulation is useful. Losses can vary significantly by state and region, but we tend to price our basic products with national rates because big lenders are national lenders and prefer uniform prices.

Our projected losses involve historic experience and patterns to be sure, but more and more we are relying on mortgage scores and economic conditions and forecasts. Some rates are stable over long periods of time, but deal-by-deal, prices can be determined by current conditions.

SOME PMI PRODUCTS

Each PMI company has to have a set of basic rates applicable to any type of mortgage and coverage written by various lenders, and if you have shopped around recently you've seen a huge variety of mortgage products.

As I alluded to earlier, there are also a variety of products which can be sold to the secondary market. Many of these involve stop-losses depending on the level of credit support required by a particular mortgage pool or mortgage-backed security.

In the affordable housing arena, many creative products have been designed. A particularly effective product has involved layered co-insurance with the mortgage lender, and sometimes tri-party risk-sharing agreements with a lender, a housing authority, and the mortgage insurer. There have been large national efforts to get potential homeowners out of apartments and into homes, and the PMIs have played an integral role in creating a wide variety of very creative approaches.

Finally, there have been many risk-sharing structures proposed between the PMIs and lenders, and even recently between the PMIs and the FHA. The arrangements can be very simple, or they can be extremely complex. With the fast development of mortgage finance products and an extremely competitive lending market, new products appear monthly, and mortgage insurers must develop corresponding new products in extremely short time frames. Life is never dull.

Mr. Gutterman: I believe that the potential for actuarial analysis in this area is significant. What Hank has provided you may appear to be an in-depth review, but it is really an introductory view of the private mortgage market. In addition, there's potential in other credit areas, including credit card risk, educational loan risk, or any other types of risks which can be provided against in terms of providing lender assistance insurance. Traditional actuarial analyses are not enough, as Hank has said. You have to develop econometrics or statistical techniques to supplement typical actuarial analysis. I think that this will, hopefully, also provide some movement to other lines of business where some of these same techniques can be used which haven't been used in the past. I think that although the variables will vary by type of loan guarantee, the same approach can be used. Whatever the type of loan it is, an actuary has to understand or get familiar with the variables, the risk categories, and the risk classifications which should be used. There are some differences between small and large (for example, multifamily and commercial) loans which you have to reflect (for example, different types of variables), but the same basic type of approach would still be appropriate, in addition to individual financial risk assessment.

Mr. Hansen: Resources for learning and research are not commonly found in traditional actuarial sources and literature.

Mr. Gutterman: That's correct. Resources for the private mortgage market are often found in the residential housing finance journals. Maybe we can add something to the actuarial literature, but you have to go beyond the *Transactions* of the SOA for references at the present time. On the other hand, I think you can utilize your same general research techniques. You just have to broaden your scope as to how to get that information. I've been involved in these areas for a decade. My knowledge has grown every year in terms of new techniques and new approaches. I think you can find some good sources of techniques publicly available that can give you some hints. Some other areas are written about strictly in economic and financial journals right now, although those aren't the final answer. I think the actuarial approach can add a great deal of value to that.

Mr. Hansen: For example, some FHLMC analysts and University of California Berkeley researchers have joined forces to publish some very interesting papers in academic and other journals.

Mr. Gutterman: Before you get involved, you should start conducting your own research. There is a small group which has experience in that area, but there certainly is room for more people.

Mr. Hansen: Without exposing other researchers in these fields to what actuaries can add, actuaries will not be automatically called upon for expert testimony and assistance in these areas. We have to demonstrate that we can add value.

Mr. Gutterman: One source of actuarial involvement is associated with the statutory requirement to opine on the adequacy of loss reserves. Other requirements also exist. For example, I started by making a recommendation to the U. S. Congress about nine years ago that the FHA be required to have an annual actuarial analysis of the dynamic financial condition type. This was turned into legislation, for which I have served as the actuarial consultant. I hope that such actuarial involvement will expand in the future.

From the Floor: How many of the nine companies have actuaries?

Mr. Hansen: Our company was the first to bring an actuary in house. Our first actuary was from the property and casualty profession, because mortgage insurance is reported in the property and casualty blank. Many risks are similar to life and disability risks. We now have one life fellow, one casualty fellow, and one casualty associate. As far as I know, only one other company as an actuary in house with a professional designation, and that is a life associate serving as a risk analyst. I have met at least one life fellow in a mortgage lending operation associated with a life insurance company.

Mr. Gutterman: In addition, there are a handful of consultants who are also involved in this type of analysis.