

WORKING PAPER SERIES

The Efficiency of Residential Mortgage  
Guarantee Insurance Markets

Donald S. Allen  
Thomas S. Chan

Working Paper 1997-013A  
<http://research.stlouisfed.org/wp/1997/97-013.pdf>

PUBLISHED: Journal of Regional Science, May 2000, pp. 323-51

FEDERAL RESERVE BANK OF ST. LOUIS  
Research Division  
411 Locust Street  
St. Louis, MO 63102

---

The views expressed are those of the individual authors and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors.

Federal Reserve Bank of St. Louis Working Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Federal Reserve Bank of St. Louis Working Papers (other than an acknowledgment that the writer has had access to unpublished material) should be cleared with the author or authors.

Photo courtesy of The Gateway Arch, St. Louis, MO. [www.gatewayarch.com](http://www.gatewayarch.com)

# **The Efficiency of Residential Mortgage Guarantee Insurance Markets**

**June 1997**

## **Abstract**

Mortgage Guarantee Insurance (MGI) provides protection to lenders against default by borrowers who have less than 20 percent equity interest in the mortgaged property. The existence of this form of insurance helps to stimulate home ownership by allowing consumers with less than twenty percent down payment access to credit markets. Initially an invention of lenders, MGI became dominated by government agencies after the Great Depression but recently private insurers have increased their market share to more than 75 percent. The domination of the industry by the private sector appears not to affirm competition, however. Despite varying loss ratios across states, MGI premiums appear to remain relatively uniform, suggesting price inflexibility. This paper uses cross-sectional data on loss ratio, mortgage delinquency rates, and housing prices to test empirically the level of competition in the MGI industry. The paper finds that the level of competition in the industry is not sufficient to drive the premiums to the competitive (efficient) level. The implication is that national cross subsidies occur where high risk insureds are subsidized by low risk insureds.

**Keywords:** Mortgage Guarantee Insurance, Efficiency Markets

**JEL Classification:** D4, D8, G2

Donald S. Allen  
Economist  
Federal Reserve Bank of St. Louis  
411 Locust Street  
St. Louis, MO 63102  
allen@stls.frb.org

Thomas S. Chan  
Economist  
Missouri Department of Insurance  
P.O. Box 690  
Jefferson City, MO 65102-0690  
tchan01@mail.state.mo.us

We wish to thank Jackie Kuschel and Theresa Nilges for assistance in data preparation and Brad Conner for comments.

# **The Efficiency of Residential Mortgage Guarantee Insurance Markets**

**Donald S. Allen and Thomas S. Chan**

## **Introduction**

The introduction of mortgage guarantee insurance (MGI) was one of the government policies instituted in the 1930s to promote home ownership in the US (Sellon (1990)). MGI reduces the lenders' risk and exposure to default of residential mortgage holders with less than 20 percent equity interest in the property. This reduces the moral hazard which may exist when the mortgagee does not stand to lose much in the way of equity in the event of default. The premiums are paid by the insured (the mortgagee), while the loss-payee is the mortgage holder. Both homeowners with insufficient down payment for standard financing, and mortgage companies who faced reduced exposure to default benefit from MGI. The expansion of the private sector in MGI seems to suggest increasing competition in the industry. Uniformity in MGI premiums across states with widely varying default rates seems to indicate that competition may be limited. This paper tests empirically whether the industry is efficient by looking at cross-sectional data on mortgage delinquency rates, MGI premiums, housing prices, and insurance loss ratio.

The paper is organized as follows. Section 1 gives a brief history of the industry and outlines the issue, section 2 provides a description of the MGI industry, section 3 discusses the empirical investigation and section 4 provides the result. Section 5 is a discussion of the implications of the findings and Section 6 concludes.

## 1 The Issue

The first incarnation of the mortgage guarantee industry in the United States occurred in New York state in 1885 when firms were allowed to include coverage of payment along with title insurance. The industry expanded and peaked in 1930 then collapsed with the wholesale defaults and bankruptcies which occurred during the Depression. The second incarnation, in 1937, was in the form of the Federal Housing Administration's (FHA) loan guarantee. The industry remained primarily government sponsored until 1957 when the Mortgage Guaranty Insurance Corporation (MGIC) was chartered under Wisconsin's state laws. Since this third incarnation, private mortgage insurance has expanded and now holds the lion's share of the market. The industry has evolved significantly along the way and can be credited with bolstering the Savings and Loan industry and stimulating home ownership. Graaskamp (1967) and Browne (1979) provide good summaries of the evolution of the industry. Sellon (1990) credits MGI as one of the tools used by the U.S. government to stimulate home ownership.

With the increasing market share of private mortgage insurance companies, one might conclude that the industry is efficient, or at least moving in the direction of perfect competition. Yet MGI premiums appear to be relatively uniform at the national level. The mortgage guarantee insurance (MGI) business is characterized by large loss fluctuations in the aggregate level in both cross sectional and historical dimensions. As shown in figure 1, state level loss ratios between 1984 and 1996 vary from less than 10 percent in Guam to almost 90 percent in California and New Hampshire. This wide discrepancies in underwriting experience appears to exist over a long period of time. According to data from the Missouri Department of Insurance, for all MGI companies writing in this line of business in Missouri, their loss ratios from 1970 to 1995 are

69.2% nation-wide and 31.7% in Missouri.

In spite of the large variations in loss experience, most insurance companies apply a uniform fee schedule to all customers in all states except Pennsylvania and South Carolina. This unusual rate uniformity has been challenged by insurance regulators such as former Wyoming commissioner Langdon. Insurers argue that a varied rate will cause more consumers to be rejected by mortgage lenders and therefore limit mortgage availability. They also defend their rate schedules by the variations in demand factors across states.<sup>1</sup>

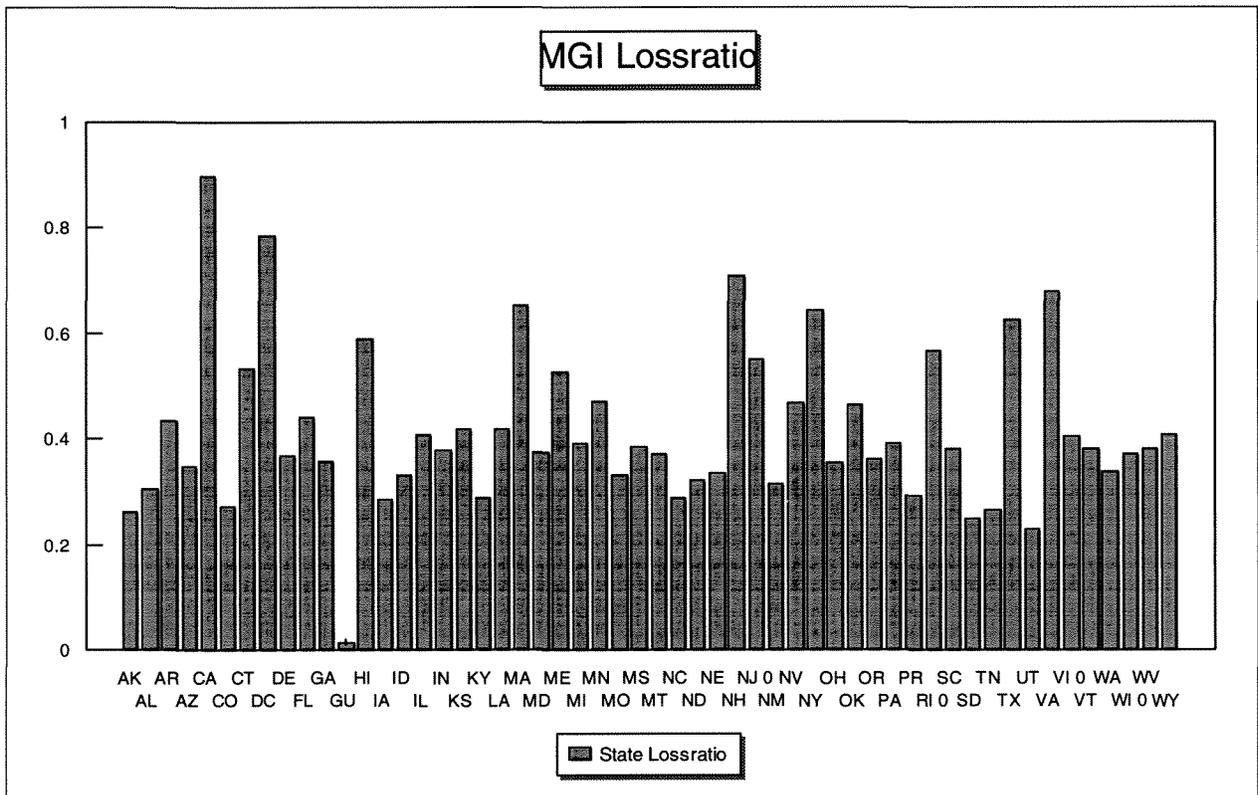
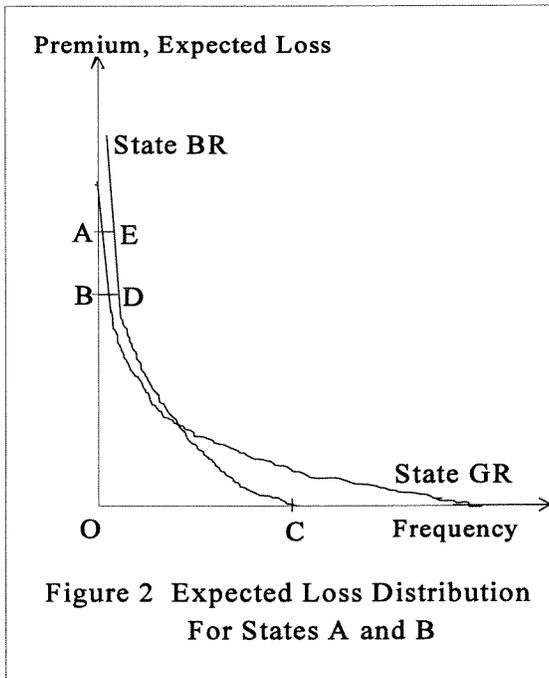


Figure 1: MGI Loss ratio by state

<sup>1</sup>In the case of *Mortgage Guaranty Insurance Corporation v. Langdon*, MGIC sued Wyoming insurance commissioner Langdon for withdrawing his prior approval of a rate schedule submitted by MGIC because of the much lower loss ratio of MGI insurance in Wyoming in comparison to the



These explanations generate more puzzles. It is understandable that a lower uniform rate will hamper insurance availability to certain high risk consumers. For example, consider the expected loss distribution of policies of state BR as shown in curve CDE in figure 2. If premium is set at OB, only consumers with an expected loss no more than OB can obtain coverage. Suppose premium is set at level OA, than mortgage borrowers with an expected loss between OA and OB, area ABDE, can also obtain

coverage. The question is: if the prevailing rate is at level OA, why other insurers do not try to charge rate OB to compete for the less risky customers in area BDCO. In addition, given that the average customers in state GR are more profitable than in state BR, why insurers do not set a slightly lower rate in state GR to compete for the business in state GR.

Of course, one can argue that variations in the underwriting experience are due exclusively to unpredictable variations in MGI losses. For example, Spahr and Escolas (1990) argue that MGI losses are particularly difficult to predict because of the correlation among different policies in the cross-sectional level. So far there is no formal study on the predictability of mortgage insurance losses. We explore this issue in this paper. Since individual level data is

---

countrywide average. The insurers argue that Langdon fail to consider non-insurance factors such as, Detroit demand mortgage guaranty insurance for insurance against mortgage defaults whereas Wyoming, because of its greater need for external capital, demands mortgage guaranty insurance for the marketability of mortgages in the secondary markets. The court ruled in favor of the insurer.

not available to us, we only explore the predictable components of loss variations in the state level. Suppose a significant portion of the state level loss variations is predictable, a failure of the premiums to track these predictable loss components should suggest a lack of competition in this market.

## **2 A Brief Overview of the Mortgage Guarantee Insurance Markets**

Table 1 shows the market share distribution of the 10 largest MGI insurers in 1995. Note that this is a highly concentrated market with the top five insurers constituted more than 90 percent of the market share. As collusion is more likely in a concentrated market, and it has also been suggested that colluding companies are more likely to maintain stable market shares . We plot the market shares of the top eleven groups of mortgage insurers since 1984 in figures 3, 4, and 5. There is no evidence that market shares are stable over time.

The market power of the MGI insurers is also contested by the presence of close substitutes and the potential of entry. Mortgage loans can also be insured by Federal Housing Administration, Veterans Administration, State mortgage insurance funds in a few states such as California, and lender self insurance. According to Blood (pp. 658), lender self insurance accounted for over 50 percent of the market in 1988 and early 1989.

The entry cost varies from state to state. The common requirement is in the neighborhood of 1 million of equity capital and another 1 million of paid-in surplus. Most residential mortgage insurers also use a salaried street sales force. These appear to be modest barriers to entry, especially for other large property and casualty insurance companies. There is also no obvious reason to expect that exit is costly. In sum, assuming complete market information, this appears to be a contestable market.

Information in this market, however, is particularly fragmented. Insurance pricing is complicated and confusing for consumers. The mortgage insurance rates depend on factors including the amount of coverage and the loan to value ratio. Borrower type is only used for underwriting decision. Including borrower type as a rating variable certainly complicates the matter. The indirect contact between mortgage insurers and mortgage borrowers further complicates the transaction. MGI companies usually open a master account with a lender and deal with the lender directly. Mortgage borrowers frequently do not know the names of the insurers, let alone how to compare their prices. They simply rely on lenders' advice or let the mortgage lenders choose the insurer for them.

For MGI insurers, their information about mortgage borrowers is imperfect and less complete than mortgage lenders. Mortgage lenders, especially in the early days of the MGI business, have more data about their customers because they have been in the business for a longer time than the insurers. They have more information about the mortgage borrowers because they have direct contact with their customers. The reliance of insurers on lenders for borrower information is evidenced by the common practice of delegated underwriting by insurers to lenders (Blood, pp. 646). Some MGI companies appear to concentrate their monitoring effort on the lenders only.

In sum, if information is complete, this appears to be a contestable market. However, information is far from complete in either the buyer or the seller side. Whether this is a contestable market becomes an empirical question. In the following, we investigate this issue by studying whether variations in the state level MGI business profitability (or loss ratio) are predictable.

### 3 Empirical Estimation

To investigate whether state level premium variations successfully track predictable losses, we perform least square regressions of 1996 loss ratios on several variables that we expect to be determinants of or contain information about loss ratio. The loss ratio is a ubiquitous measure in the insurance literature. Not only is it frequently used as a measure of profitability, theoretically, it has also been argued that the inverse of the loss ratio is the price of insurance. Suppose there is perfect competition, we expect the expected profit to be zero in all states. Hence, if we assume that expectations based on existing information is on average accurate (i.e. agents have rational expectations), loss ratio should not be associated with any variable that was known when the premium rates were set.

The independent variables are the standard deviation of annual housing price between 1979 and 1992, the average delinquency rate of conventional mortgage loans from 1979 to 1991, the standard deviation of the aforementioned delinquency rate from 1979 to 1991 (making it 1979 to 1992 does not have a significant effect on the results), the past loss ratio (loss ratio between 1984 and 1991), the commission and brokerage expense as a percentage of earned premium, and the tax and licensing expense as a percentage of earned premium. Defaults of mortgage loans usually happen in the first two to three years. Consequently, losses in 1995 and 1996 are not likely to be caused by housing price fluctuations which occurred prior to 1992. We also use loss ratios and delinquency rates prior to 1992 to ensure that there is enough time for insurers to react to this information.

The total mortgage insurance losses can be decomposed into loss frequency and loss severity. Past mortgage delinquency rates should provide some information about future loss

frequency. States with more volatile business or housing business cycles are likely to have more delinquency rate fluctuations. We therefore include both the average and the standard deviation of the delinquency rate as separate independent variables.

Loss severity, and also loss frequency, should be affected by the fluctuations in housing prices. The average of the standard deviations of housing price in major metropolitan areas for each state is used to capture the degree of fluctuations in housing price. Regressions use the data of twenty five states as described in Appendix I. Figures 6 and 7 plot the loss ratios, housing price standard deviations and mortgage delinquency rates for these twenty five states. Note the strong association between housing price standard deviation and loss ratio.

As a higher operating cost requires a higher price to breakeven, the commission and brokerage expense rate and the license and tax expense rate are included as independent variables. In addition, past loss ratio is included as an independent variable to explore how companies adjust their underwriting guidelines according to their past underwriting experience. An appropriate adjustment of premium should cause loss ratio to be independent of any past information. A significant coefficient may suggest that adjustments of premiums according to past losses do not adequately track expected losses.

Due to the law of large number, states with larger business volumes should have smaller loss ratio variations. As a consequence, we use weighted least square regressions. The weight used is the square root of the earned premium. One way to interpret the loss ratio is that it is the average realized loss per unit of insurance coverage (which can be approximated by premium divided by an expense multiplier as suggested in Pauly, Kleindorfer and Kunreuther (1986)) purchased.

#### 4 Results

The results are reported in table 2. Both the standard deviation of housing prices and the standard deviation of the delinquency rate enter significantly, indicating that the fluctuations in the housing price have a significant effect on the loss ratio of residential mortgage guarantee insurance. The impact of housing price fluctuation on loss ratio is particularly pronounced. Increasing the standard deviation of housing price by one standard deviation increases the 1996 loss ratio by 0.242, which is 19 percent less than one standard deviation of the loss ratio.

The standard deviation of the delinquency rate is significant whereas the average default rate is not. These two variables appear to be highly correlated because excluding either one makes the other one much more significant. Excluding the standard deviation makes the average delinquency rate significant at the 5 percent level. This is actually not surprising because the standard deviation of the delinquency rate is likely to embody both information about the volatility of the housing cycles as well as the level of average delinquency rate. The results suggest that increasing the standard deviation of the delinquency rate by one standard deviation will increase the 1996 loss ratio by 0.077, which is about 26 percent of its standard deviation.

The past loss ratio coefficient is negative and statistically significant, indicating that insurers adjust their underwriting criteria according to past underwriting experience. An ideal adjustment, however, should cause the loss ratio to be independent of all information available for price setting. A negative coefficient suggests two possibilities. First, premium does not adjust completely according to expected loss. Second, insurers do not or do not only rely on statistical data. For example, they also form long term relationship with lenders, rely on lenders to screen the customers, and design underwriting guidelines partially to punish lenders with poor

underwriting performance.

The other variables are insignificant and of the expected sign except for the commission and brokerage expense which is of the wrong sign. The wrong sign could be because commission and brokerage expense and tax and licensing expense data are available only since 1995. We also find that several companies reported zero commission and brokerage expense in several states even though they have a large amount of earned premium in those states. It is possible that sales incentives, bonuses or even expenses paid to their salaried sales force may not be reported by companies. Legal issues may cause insurers to avoid reporting their expenses in this area. It may be illegal for lenders to accept kickbacks and even if they are not illegal, lenders may want to avoid releasing this kind of information simply because of the possibility for kickbacks to become illegal one day as in other businesses such as the residential real estate brokerage in a certain period of time. Hence, the commission and brokerage expense data is not necessarily an accurate measure of sales expense.

The coefficients for housing price standard deviation and default frequency standard deviation appear to be quite robust. When past loss ratio, tax and licensing expense, and commission and brokerage expense are excluded from the regression equation, the coefficients of these two variables remain statistically significant and are somewhat larger. In addition, similar results are found when 1995, 1994, or 1993 loss ratios are used as the dependent variable.

## **5 Discussion**

The results of this study indicate that state level loss-ratio variations in mortgage guarantee insurance have a strong correlation with housing price fluctuations and past delinquency rate fluctuations, especially the former. The sheer magnitudes of these relationships,

in addition to their statistical significance, suggest that there is insufficient price competition in this market. Premiums fail to track losses in a large scale.

One possible reason is that expenses may be inversely related to the mortgage insurance losses. Mortgage lenders frequently have their own licensed mortgage insurance agents and therefore can legally accept commission from the mortgage insurers. One can see the commission as the price insurers pay to the lenders for their policies. Rigorous competition should drive this price level to the net present values of the policies.

If that is the case, however, we expect the commission expense of insurers to account for at least the bulk of the loss ratio differentials. Unfortunately, the commission and brokerage expense ratio variable is insignificant. Of course, it is possible that this is caused by the inaccuracies of the commission and brokerage expense data as discussed before.

Suppose mortgage insurers did pass their abnormal profit to the lenders through some kind of commission or sales incentive, mortgage lending in states with lower loss ratios should be more profitable. If the mortgage market is competitive then we expect lenders to pass their additional income from MGI business to their customers through a lower initial fee or lower mortgage interest rate. We perform a regression of the state level initial fee to loan ratio on mortgage interest rate. We perform a regression of the state level initial fee to loan ratio on mortgage loss ratio. The loss ratio turns out to be statistically insignificant. Since lenders usually quote the same mortgage interest rates independent of the loan-to-value ratio whereas the initial fees are usually professed to be negotiable, it seems that the only fair way of passing lenders' additional income from MGI business back to customers should be through the initial fees. Customers making more than 20 percent of down payment do not need mortgage insurance and therefore should not share in the "savings." We nonetheless also regress the effective

mortgage interest rate on the MGI loss ratio. The loss ratio once again turns out to be statistically insignificant.

Another possibility is that insurers do not have complete control of the underwriting criteria and therefore cannot rely completely on their objective expectation of future losses to set the premium rates. They instead rely on lenders to screen customers and use some kind of incentive system to control profit such as sharing short run loss and profit fluctuations with lenders. The incentive to set a statistically fair premium rate may be lacking in this industry because as insurers have to rely on lenders to screen customers, setting a lower rate and therefore paying lenders a lower “price” for customers may cause the insurer to receive only the worst risks among each risk category from the lenders. In any event, it is still not clear where this payment for customers ends up.

## **6 Conclusion**

In sum, the results of this study indicate that competition in the MGI market fails to drive price to its competitive level in all states. In addition, there is also no statistical evidence that additional profits are being passed back to consumers. Some insurers suggest that a higher insurance rate help to increase the availability of mortgage loans to consumers. This is clearly a very controversial opinion, if not wrong.

A uniform rate can mean that insurers are making positive economic profits in certain states. Or, suppose insurers breakeven, a uniform rate schedule implies that good risks are subsidizing bad risks. Though this arbitrary cross subsidizing improves mortgage availability or affordability for the bad risks, it certainly hampers mortgage loan affordability for the good risks. As a higher price decreases quantity demanded by the good risks, it may actually have a negative

net aggregate effect on home purchasing. In addition, it arbitrarily transfers wealth from the good risks to other parties.

Indeed, considering the negative effects of default on a mortgage borrower's credit history, the benefit of the availability of mortgage loan is also not clear. Though one can argue that a bad risk would not make a mortgage loan knowing that the expected benefit is negative, asymmetric information in this market may imply that the borrower has a less accurate self-risk assessment than the lender. The borrower may have more personal information, but the lender should have more information about the prospect of the market as well as statistics about the chance of default of individual borrower types.

An examination of the market structure, however, suggests that this should be a reasonably competitive market if there is enough information flow. The flow of information between customers and insurers is filtered through lenders. It is possible that insurers' ability to set price exclusively according to expected loss is hampered by the indirect nature of the information flow process. As the cost of information gathering is declining over time, the efficiency gain of using lender's information instead of soliciting information and selling to mortgage borrowers directly may have dwindled. Hence, this may be time to mandate lenders to lend to all borrowers with a certain level of MGI insurance and pave way for direct marketing in this line of insurance business. Lenders are similar to independent agents in the property-liability insurance business. Insurers using independent agents are known to have a substantially higher commission expense to premium ratio than insurers using direct marketing or captive agents.

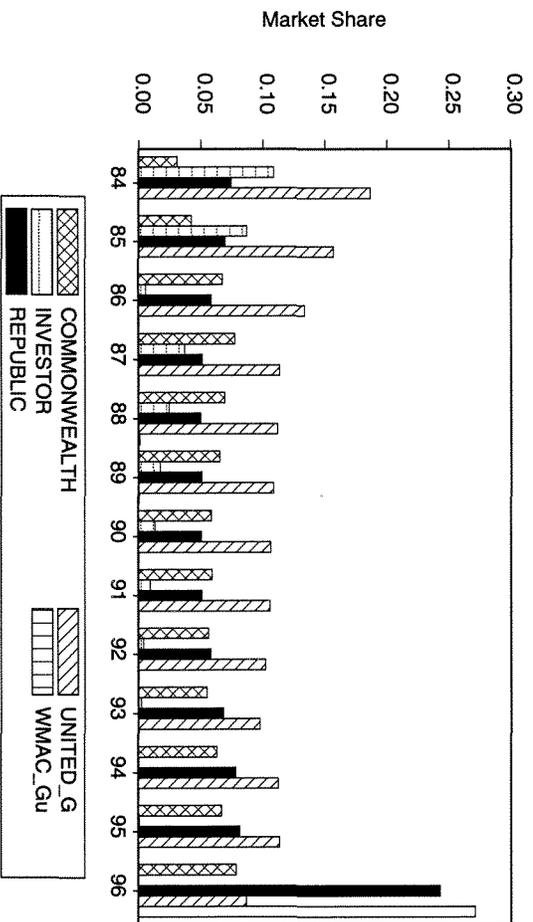


Figure 3

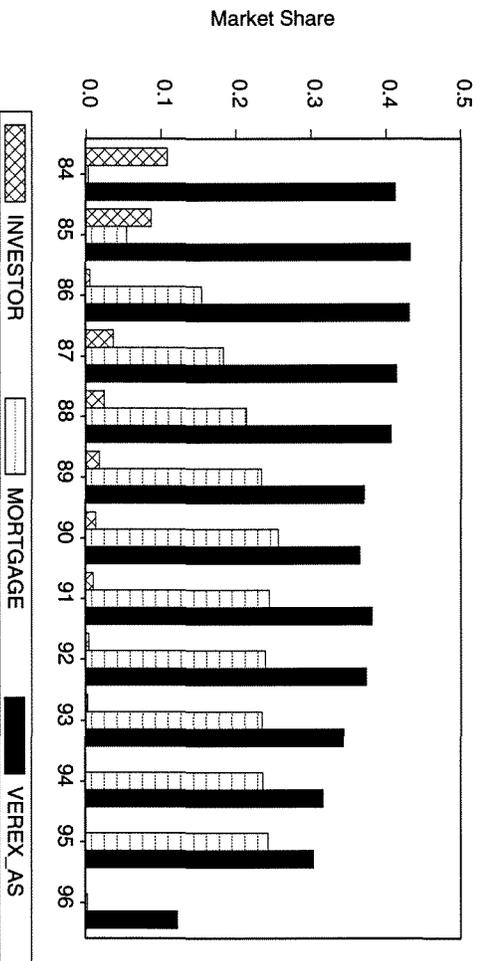


Figure 4

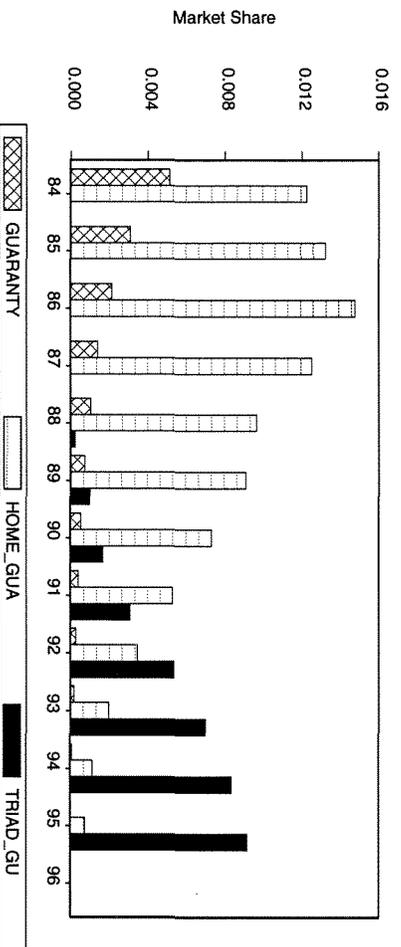
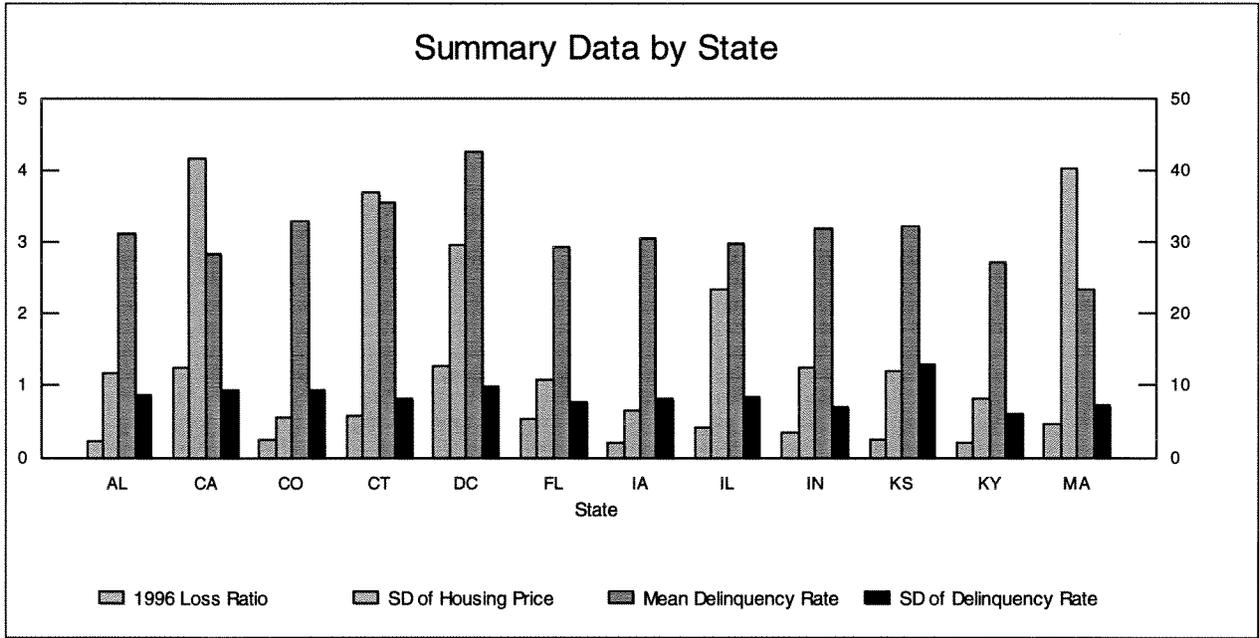
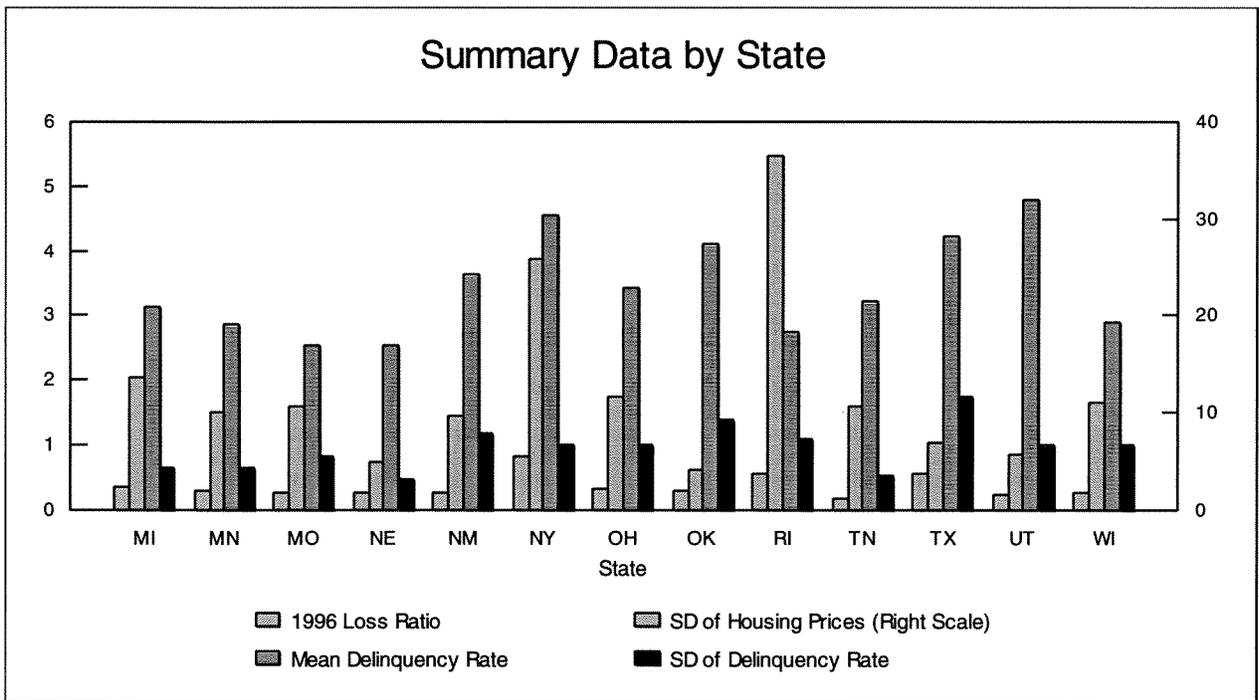


Figure 5



**Figure 6**



**Figure 7**

Table 1. 1995 Market Concentration

Company/Group Name	Direct Premium Earned	Market Share	Cumulative Market Share
General Electric	640,592,431	30.81	30.81
Mortgage Guaranty Corp S/G	492,295,245	23.68	54.49
AllState Insurance Group	336,720,087	16.20	70.69
American International Group	235,324,894	11.32	82.01
Old Republic Group	170,271,570	8.19	90.20
CMAC Group	139,469,073	6.71	96.91
Amerin Group	34,337,883	1.65	98.56
Collateral Mortgage Group	18,889,934	0.91	99.47
Travelers Insurance Group	5,166,415	0.25	99.72
Policyholders Benefit Corp.	1,866,126	0.09	99.81
Total	2,078,940,768	100	100

Source: National Association of Insurance Commissioners, "1995 Market Share Reports for Property/Casualty Groups and Companies."

Table 2 Weighted LS Regression Results (1996 Loss Ratio is the Dependent Variable)<sup>a</sup>

Independent Variable	Coefficient (Standard Error)	Mean (Standard Dev.)
Intercept	1.26 (0.494)	
Housing Price Standard Deviation	0.0202 (0.00276)	16.01 (11.95)
Default Rate Standard Deviation	0.272 (0.144)	0.00911 (0.00282)
Average Default Rate	0.00768 (0.0879)	0.0329 (0.00647)
Pass Loss Ratio	-2.24 (0.536)	0.429 (0.063)
License Tax Expense Rate	-18.1 (11.9)	0.0238 (0.000425)
Commission Brokerage Exp. Rate	-3.49 (26.5)	0.00198 (0.00129)
R-Square	0.528	

a. The mean and standard deviation of the dependent variable (loss ratio) are 0.424 and 0.298.

## Appendix I Data

The state level mortgage guaranty insurance data comes from the National Association of Insurance Commissioners (NAIC). In 1992, line six was added to the state page of the annual statement filed with the NAIC to report MGI business. Prior to 1992, total business of a company reported in line 32 of the state page of the annual statement is used to calculate the MGI experience data for the following companies:

Commonwealth Mortgage Assurance Company, CMG Mortgage Insurance Company, Guaranty National Insurance Company of California, General Electric Home Equity Insurance Corporation of North Carolina, General Electric Mortgage Insurance Corporation, General Electric Mortgage Insurance Corporation of North Carolina, General Electric Residential Mortgage Insurance Corp. Of North Carolina, Home Guaranty Insurance Corporation, Investors Equity Insurance Company Inc., Mortgage Guaranty Insurance Corp., PMI Mortgage Insurance Company, Policy Holders Benefit Corporation, Republic Mortgage Insurance Company, Triad Guaranty Insurance Corp., United Guaranty Credit Insurance Company, United Guaranty Residential Insurance Company, United Guaranty Residential Insurance Corp. of North Carolina, Verex Assurance Inc., WMAC Credit Insurance Corp.

These are all the MGI companies file with NAIC between 1992 and 1996. They include the largest mortgage insurers in the last two decades.

The loss ratio is calculated from the total premium earned and loss incurred. The MGI premium and loss data from the NAIC database include the total numbers for both commercial and residential lines. The commercial line, however, is a relatively small component. Mortgage

insurers are required to report their countrywide and Missouri underwriting experience in both commercial and residential lines to the Missouri Department of Insurance. According to data from the Missouri Department of Insurance, for all the mortgage insurers licensed in Missouri, their total commercial premium earned countrywide for the past twenty six years is less than one percent of the total mortgage insurance premiums earned countrywide. Though commercial mortgage guaranty business has fluctuated over time, for all insurers licensed in Missouri, the share of commercial MGI premiums never exceeded 3 percent of the total MGI premiums. We further curtail the noises from the commercial MGI premiums by excluding the premium and loss data of three of the biggest commercial mortgage insurers from the premium and loss data used in this study.

The housing price data is from the National Association of Realtors.<sup>2</sup> They are the medium price of existing housing by metropolitan statistical area for the years 1979 to 1992. Since the data for some metropolitan areas are not continuous, they are excluded. Only twenty five states with the longest continuous data series are retained. The housing price standard deviation for each state used is the average housing price standard deviation of the following metropolitan areas and states. Note that if we use only the figures for states with a continuous housing price series from 1979 to 1992, only 15 states will be left. Nonetheless, the regression results are similar when this smaller sample is used.

States and metropolitan areas with housing price data from 1979 to 1992:

Alabama (Birmingham), California (Los Angeles, San Diego, San Francisco Bay Area,

---

<sup>2</sup>The Chamber of Commerce also surveys and publishes housing price data for metropolitan areas in their ACCRA Report. Unfortunately, the ACCRA housing price series are also frequently not continuous.

Riverside/San Bernardino), Florida (Lauderdale/Hollywood/Pompano Beach, Tampa/St. Petersburg/Clearwater), Illinois (Chicago), Indiana (Indianapolis, Memphis), Michigan (Detroit), Minnesota (Minneapolis/St. Paul), Missouri (Kansas City), New York (Albany/Schenectady/Troy, Rochester), Ohio (Columbus), Rhode Island (Providence), Texas (Houston, San Antonio), Utah (Salt Lake City), DC (Washington DC), Wisconsin (Milwaukee).

States and metropolitan areas with housing price data from 1980 to 1992:

California (Sacramento), Connecticut (Hardford), Iowa (Des Moines), Kentucky (Louisville), Michigan (Grand Rapids), New Mexico (Albuquerque), New York (New York, Syracuse), Ohio (Akron), Oklahoma (Oklahoma, Tulsa), Tennessee (Nashville/Davidson), Texas (El Paso).

States and metropolitan areas with housing price data from 1981 to 1992:

California (Orange County), Florida (Orlando, West Palm Beach/Boca Raton/Delray Beach), New York (New York), Oklahoma (Oklahoma City), Tennessee (Knoxville).

States and metropolitan areas with housing price data from 1982 to 1992:

Colorado (Denver), Massachusetts (Boston), Nebraska (Omaha), Missouri (St. Louis), Texas (Dallas).

As for the mortgage delinquency rates, the Mortgage Bankers Association surveys and publishes mortgage delinquency rates for conventional mortgage loans, VA mortgage loans, and FHA loans quarterly since 1979. The standard deviations and the averages of the delinquency rates are the standard deviations and averages of the quarterly series. In addition, the mortgage interest rate and initial fee data are obtained from the Housing and Urban Development.

## Reference

Blood, Roger (1992), "Managing Insured Mortgage Risk." *The Secondary Mortgage Market: Strategies for Surviving & Thriving in Today's Challenging Markets*. Jess Lederman Edited.

Browne, Diana G., "The Private Mortgage Insurance Industry, The Thrift Industry and The Secondary Mortgage Market: Their Interrelationship", *Akron Law Review*, Spring 1979, Vol. 12, pp. 631-670.

Graaskamp, James, "Development and Structure of Mortgage Loan Guaranty Insurance in the United States", *Journal of Risk and Insurance*, March 1967, pp.47-67.

Pauly, Mark, Paul Kleindorfer, and Howard Kunreuther (1986), "Regulation and Quality Competition in the U. S. Insurance Industry." *The Economics of Insurance Regulation* edited by J. Finsinger and Mark Pauly (London: MacMillan Press).

Sellon, Jr., Gordon H., "The Role of Government in Promoting Homeownership: The U.S. Experience", *Economic Review*, Federal Reserve Bank of Kansas City, July/August 1990, pp. 37-43.

Spahr, Ronald W. and Edmond L. Escolas (1990), "Mortgage Guaranty Insurance: A Unique Style of Insurance." *Journal of Risk and Insurance* pp. 308-319.